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DEPARTMENT OF DEFENCE

**RAAF BASE
TOWNSVILLE**

HUMAN HEALTH RISK
ASSESSMENT (HHRA)

wsp

OCTOBER 2018

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RAAF Base Townsville Human Health Risk Assessment (HHRA)

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LIST OF ABBREVIATIONS

ADI	Acceptable Daily Intake
AFFF	Aqueous Film Forming Foam
ANZECC	Australian and New Zealand Environment Conservation Council
ATSDR	Agency for Toxic Substances and Disease Registry
BMD	Benchmark Dose
BW	Body Weight
COPC	Chemicals of Potential Concern
CSM	Conceptual Site Model
CSR	Contaminated Sites Register
DoEE	Department of Energy and Environment
DoH	Department of Health
DSI	Detailed Site Investigation
EFSA	European Food Safety Authority
EPA	Environment Protection Authority (Australia) or Environmental Protection Agency
EPC	Exposure Point Concentration
ESP	Ecological Service Professionals Pty Ltd
FSANZ	Food Standards Australia New Zealand
FtS	Fluorotelemer Sulphonamide
HED	Human Equivalent Dose
HEPA	Heads of EPAs Australia New Zealand
HHRA	Human Health Risk Assessment
IA	Investigation Area
IARC	International Agency for Research on Cancer
LOAEL	Lowest Observed Adverse Effect Level
LOD	Limit of Detection
LOR	Limit of Reporting
mg/kg	Milligram per kilogram
MSES	Matters of State Environmental Significance
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NEMP	National Environmental Management Plan
NHMRC	National Health and Medical Research Council

NOAEL	No Observed Adverse Effect Level
OLA	Ordnance Loading Apron
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate (alternative name Perfluorooctane sulfonic acid)
PFHxS	Perfluorohexane sulfonic acid
PFHxA	Perfluorohexanoic acid
POD	Point of Departure
RAAF	Royal Australian Air Force
RfC	Reference Concentration
RfD	Reference Dose
RME	Reasonable Maximum Exposure
SAQP	Sampling, Analysis and Quality Plan
SPP	State Planning Policy
TBA	To be Advised
TDI	Tolerable Daily Intake
TRV	Toxicity Reference Value
UF	Uncertainty Factor
µg/kg	Microgram per Kilogram
UKCOT	United Kingdom Committee on Toxicity
US EPA	United States Environmental Protection Agency
WHO	World Health Organisation

GLOSSARY OF TERMS

Acceptable daily intake (ADI)	Is analogous to tolerable daily intake (TDI). It is the estimated daily intake of a substances that can be ingested without an appreciable increase in human-health risk.
Additive effect	An additive effect is where two or more substances act together to produce a total effect that is the same as the sum of the individual effects
Absorption	The process by which one things absorbs or is absorbed by another. For a human being or animal, absorption is the process of a substance getting into the body through the eyes, skin, stomach, intestines or lungs.
Adverse health effect	A change in body function or cell structure that might lead to disease or health problems.
Carcinogen	A substance that causes cancer.
Chronic exposure	Continuous or repeated exposure contact (for more than 1 year) between a chemical substance and a target receptor.
Dermal contact	Direct contact (by touching) with the skin
Dose	Is the total amount of a chemical administered to, taken up by, or absorbed by an organism, system or population.
Exposure	Is the concentration or amount of a particular chemical that reaches a target organism, or system, or population in a specific frequency for a defined duration.
Exposure assessment	Is the evaluation of the exposure of an organism, system, or population to a chemical (and its derivatives).
Exposure pathway	Is the means by which a contaminant makes contact with the exposed population.
Exposure route	Is the way in which a chemical substance enters a target after contact (for example, ingestion, inhalation or dermal absorption).
Exposure scenario	Is a set of conditions or assumptions about sources, exposure pathways, concentration of contaminants involved, and exposed population (i.e. numbers, characteristics, habits) used in the evaluation and quantification of exposure(s) in a given situation.
Genotoxic chemicals	Are those for which there is adequate evidence of the potential to interact with, and/or modify the function of genetic material and which has the ability to induce tumours via a mechanism involving direct damage to DNA.
Hazard	Is the inherent property of a contaminant or situation having the potential to cause adverse effects when a population may be exposed to that contaminant.
Hazard identification	Is the identification of the type and nature of adverse effects that a contaminant has an inherent capacity to cause to an exposed population.
Hazard Index (HI)	Is the sum(s) of at least two hazard quotients.
Hazard Quotient (HQ)	Is the ratio of the mean daily intake to the reference dose or tolerable daily intake for threshold exposure.

Health risk assessment (HRA)	Is the process of estimating the potential impact of a chemical, biological or physical agent on a specified human population system under a specific set of conditions.
Health Investigation Levels (HILs)	The concentration of a contaminant above which further appropriate investigation and evaluation will be required to ensure the protection of human health.
Intake	Is the total amount of contaminant (or dose) taken into the body by the exposure route.
Lowest-observed adverse effect level (LOAEL)	The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.
No-observed adverse effect level (NOAEL)	The tested dose of a substance that does not cause adverse effects in people or animals.
Non-genotoxic carcinogen	Is a chemical substance that induces tumours via a mechanism that does not involve direct damage to genetic material (DNA).
Point of exposure	The place where someone can come into contact with a substance present in the environment.
Population	A group or number of people living within a specified area or sharing similar characteristics (such as occupation or age).
Response	Is the change developed in the state of dynamics of an organism, system, or population in reaction to exposure to a chemical substance.
Risk	Means the probability in a certain timeframe that an adverse outcome will occur in a person, a group of people, plants, animals and/or the ecology of a specified area that is exposed to a particular dose or concentration of a chemical substance, i.e. it depends on both the level of toxicity of the chemical substance and the level of exposure to it.
Screening	Is the process of comparison of site data to screening criteria to obtain a rapid assessment of contaminants of potential concern.
Threshold	Is the dose or exposure concentration of a chemical substance below which a stated effect is not observed or expected to occur.
Tolerable daily intake (TDI)	Is analogous to acceptable daily intake (ADI). The term 'tolerable' is used for substances that are not deliberately added, such as contaminants in food and water.
Toxicity	Is the inherent property of a chemical substance to cause an adverse biological effect.
Toxicity reference value (TRV)	Is a measure of tolerable intake or acceptable risk. The TRV may be associated with either a threshold (i.e. ADI, TDI or reference dose) or non-threshold (i.e. slope factor or unit risk) dose-response relationship.
Uncertainty factor	A number used to divide NOAEL or LOAEL values derived from measurements in animals or small groups of humans, in order to estimate a NOAEL or LOAEL value for the whole human population; also called a margin-of-safety or safety factor. Uncertainty factors are used to account for variations in people's sensitivity, for differences between animals and humans and for differences between a LOAEL and a NOAEL. Scientists use uncertainty factors when they have some, but not all of the information from animal or human studies to decide whether an exposure will cause harm to people.

EXECUTIVE SUMMARY

BACKGROUND

WSP Australia Pty Ltd (WSP) was commissioned by the Department of Defence (Defence) under the Defence per- and poly-fluoroalkyl substances (PFAS) Panel to conduct a Human Health Risk Assessment (HHRA). The HHRA was undertaken to quantitatively assess the risk to human health resulting from potential environmental exposure to PFAS, contained in legacy Aqueous Film Forming Foams (AFFF) used at the Royal Australian Air Force (RAAF) Base Townsville (herein referred to as 'the Base'). The Base is located on Ingham Road, Garbutt, Queensland 4180.

AFFF were stored and used by Defence at the Base for fire-fighting purposes, including routine testing and emergency fire-fighting response practice drills, from approximately the 1970s to 2004. AFFF containing PFOS and PFOA as active ingredients was phased out in approximately 2004 and replaced by another product (Ansulite).

WSP completed a Detailed Site Investigation (DSI) (WSP, 2018) of the Base and surrounding off-Base areas, including the Townsville Town Common Conservation Park (the Town Common) and the suburbs of Garbutt, Rose Bay, Belgian Gardens and Pallarenda (the 'Investigation Area') between April 2017 and February 2018. This report was publicly released in May 2018 by the Department of Defence and presented at a Community-Walk-In-Session.

The HHRA also incorporates environmental analytical results collected across the Investigation Area following the rainfall events that occurred across the catchments in post-March 2018. This dataset will be presented in the DSI Addendum Report which is in preparation as at the issue of this HHRA and expected for release early 2019.

Finally, the HHRA also includes aquatic biota analytical results from investigations conducted across the Investigation Area and Cleveland Bay between July 2017 and March 2018. The whole of this data, including the supporting technical reports prepared by those engaged by WSP, to collect the samples ethically, are appended to this report.

This HHRA has undergone a rigorous technical review process including:

- An independent Technical Advisor (TA) who is an accredited as a Queensland Department of Environment and Science (DES) accredited auditor; and
- The Technical Working Group established by the Queensland Government Interdepartmental Committee for Fluorinated Fire Fighting Foam which draws together expertise from Queensland State Government including Queensland Health and DES.

OBJECTIVES

As the HHRA evaluates exposure via the direct contact with environmental media as well as exposure that may occur via the consumption of locally caught and/or home-grown foods that comprise PFAS, the objectives of the HHRA are to:

- Assess, quantitatively and qualitatively, potential human health risks to human receptors within the Investigation Area that may be inadvertently exposed (via direct contact), to PFAS impacted environmental media (i.e. soil, groundwater, surface water and sediment) from the Base; and
- Assess exposure via the consumption of locally caught and/or home-grown foods (i.e. fish, fruits and vegetables) within the Investigation Area, that either comprise PFAS, or are irrigated with bore water that comprises detectable concentrations of PFAS.

FIELD INVESTIGATION FINDINGS

Environmental samples (i.e. soil, groundwater, surface water and sediment), as well as aquatic biota samples (i.e. fish, crustaceans, plants) collected in the field, underwent an initial screening process against published relevant criteria for each media investigated. The purpose of the screening process was to determine if a sampled media returned results that were above the adopted screening criteria. If the concentrations were found to be above the screening criteria, for a particular media, then additional assessment via the HHRA was required to assess the human health risk.

As two shallow soil samples collected during the DSI fieldwork program at the Former Fire Training Area (NQ0054) were reported above the relevant health screening value for PFOS + PFHxS at a depth of 0.5 mBGL, soil at the Base was evaluated further as part of the HHRA. Soil sampling conducted for the DSI Addendum in the Ingham Road Sports Field were below the adopted screening criteria for public open space. This sampling closes out an uncertainty raised in the DSI and demonstrates that the human health risk to users of the sporting field from PFAS to be acceptable.

Soil samples collected from within the kindergarten/domestic area reported soil samples collected at depths greater than 0.5 mBGL to be above the 'residential with garden/accessible soil' screening criterion for PFOS + PFHxS. However, all surface soil samples collected within the kindergarten area were below the residential criterion, demonstrating that the potential soil exposure pathway to children at the kindergarten is acceptable.

A review of the off-Base shallow soil data (i.e. ≤ 0.5 mBGL) identified concentrations of PFOS + PFHxS to be above the residential garden/accessible soil in one surface sample collected from one property in the Garbutt Community where irrigation with groundwater is known to occur at the property. No exceedances of the PFOS + PFHxS residential criterion was reported in the remaining residential sampling dataset, which includes properties where groundwater irrigation or surface water inundation occurs in Garbutt, Rowes Bay and Pallarenda. Where a reported concentration was identified to be above the residential screening criterion, further assessment was conducted in the HHRA.

PFAS has been detected in groundwater from the majority of wells on the Base. However, the absence of PFAS in isolated monitoring wells suggests that there isn't one continuous PFAS 'plume' beneath the Base, but a series of PFAS 'plumes' related to specific source areas and possibly surface water bodies. Plumes were interpreted to extend to the east and north-east from the south-eastern section of the Base, west and north-west from 5 AVN and north from the northern end of the runway. The highest PFAS concentrations were generally reported from monitoring wells installed at the known source areas or immediately downgradient of the source areas.

The detection of PFAS in off-Base monitoring wells to the north-west, north, north-east, south-east and east of the Base suggested that groundwater 'plumes' have transported PFAS off-Base in these directions. The DSI concluded that the groundwater impacts are not continuous 'plumes' in the traditional hydrogeological sense but rather, are more likely to occur at distances from the Base as a result of surface water PFAS transport, with subsequent infiltration of PFAS impacted water into the underlying aquifer. This transport mechanism was considered to still be occurring in the surface water bodies of the Town Common and the Three Mile Creek and Mundy Creek catchments.

A water use survey was distributed to 2,500 residents and businesses within the Investigation Area during the DSI activities to identify the presence and use of groundwater bores. As at 27 April 2018, the project team received 166 Water Use Surveys via mail, email, phone and in person. Twenty-eight respondents to the survey indicated that they had bores on their property, 22 of which were operable and 18 of which were actively in use for water supply. Residential groundwater users have been identified in the surrounding suburbs of Garbutt, Belgian Gardens, Rowes Bay and Pallarenda. Residential groundwater use is limited to the irrigation of lawns, gardens, vegetables and fruit trees; and these exposure pathways warrant consideration in the HHRA. No extracted groundwater was identified to be used for drinking purposes, livestock watering, stored in tanks or used to fill swimming pools.

PFAS was detected in surface water and sediment on- and off-Base at concentrations in exceedance of the nominated human health guidelines. The results indicate that PFAS is being transported by surface waters from the Base into the Town Common, Louisa Creek, Three Mile Creek and Mundy Creek catchments. At the time of the DSI investigation, there was no surface water flow from the Base. However, a period of higher flow was observed in the dataset collected for the DSI Addendum with elevated PFAS concentrations observed discharging from the Base. It appears that PFAS

impacted sediments found at a distance from the Base have been transported to those locations bound to the sediments in these high flow events. Recreational exposure to surface water is expected to be limited given the occurrence of crocodiles in the area and seasonal stingers in the estuaries.

Results of samples collected up-gradient of the Base indicate a background source of PFAS exists in the upper catchments of Louisa and Peewee Creeks and in the middle reaches of the Bohle River. However, compared with the concentrations recorded in surface waters discharging from the Base, the background up-gradient input of PFAS concentrations to the Investigation Area is considered to be minor.

The off-Base aquatic biota dataset, which is appended to the HHRA, identified the following:

- Reported concentrations of PFOS + PFHxS within finfish (flesh) samples were reported above the Food Standards Australia New Zealand (FSANZ) screening criteria in mullet collected from the Bohle River (estuarine) and with flesh samples of anchovy, bream, catfish, mullet, queen-fish and whiting from the Town Common (estuarine). PFAS concentrations (PFOS + PFHxS and PFOA) in all other finfish (flesh) samples were reported below the screening criteria.
- Reported concentrations of PFOS + PFHxS and PFOA within finfish (flesh) marine samples collected from Rows Bay and Bohle River were below the FSANZ screening criterion in all species sampled.
- Reported concentrations of PFOS + PFHxS within finfish (liver) samples were reported above the FSANZ screening criteria in samples (Mullet and Catfish) collected from the Town Common, PFOA concentrations were reported below the screening criteria. It is acknowledged that liver results generally showed higher PFAS concentrations than flesh samples. The fish (liver) results at all other sampling locations reported PFOS + PFHxS and PFOA below the adopted screening criteria.
- Fish livers are not expected to be consumed in isolation by recreational fishers in the Investigation Area but rather in the rare instances where the whole of the fish is consumed or utilised (such as the production of stock). Fish flesh is considered to be the portion of the fish more likely to be consumed and thus the dominant exposure pathway.
- Crustacean (flesh) samples reported concentrations of PFOS + PFHxS below the FSANZ screening criteria in all samples collected. A crustacean (whole) sample collected from the Bohle River reported PFOS + PFHxS at the screening criteria. All other crustacean samples (whole and flesh) reported PFAS concentrations (PFOS + PFHxS and PFOA) below the adopted screening criteria.
- Reported PFAS concentrations (PFOS + PFHxS and PFOA) in mollusc (oyster) samples were below the laboratory limit of reporting (LOR). Given the limited number of available samples and the paucity of molluscs in the area due to limited occurrence, the results for shell and flesh were evaluated together. Hence, no further consideration of molluscs in the HHRA was undertaken.
- Samphire and sargassum samples, which can be consumed by humans, reported PFAS concentrations (PFOS + PFHxS and PFOA) below the laboratory limit of reporting (LOR). Hence, no further consideration of edible aquatic plants in the HHRA was undertaken.
- All reported PFOA concentrations in finfish and crustaceans were below the FSANZ screening criteria. Hence, PFOA concentrations in finfish and crustaceans was not considered further in the HHRA. Crustaceans (whole and flesh) were not evaluated further as PFAS was not identified above the FSANZ screening criteria of 65 µg/kg.

CONCEPTUAL SITE MODEL

The CSM has been presented in three parts, representing the three primary receiving surface water catchments in the Investigation Area (Louisa Creek/Town Common/Bohle River; Three Mile Creek; Mundy Creek). Summary of the linkages between identified sources, exposure pathways and sensitive receptors for the three catchments is in a graphical representation provided in Figures ES.1, ES.2 and ES.3 overleaf.

Three Mile Creek Catchment

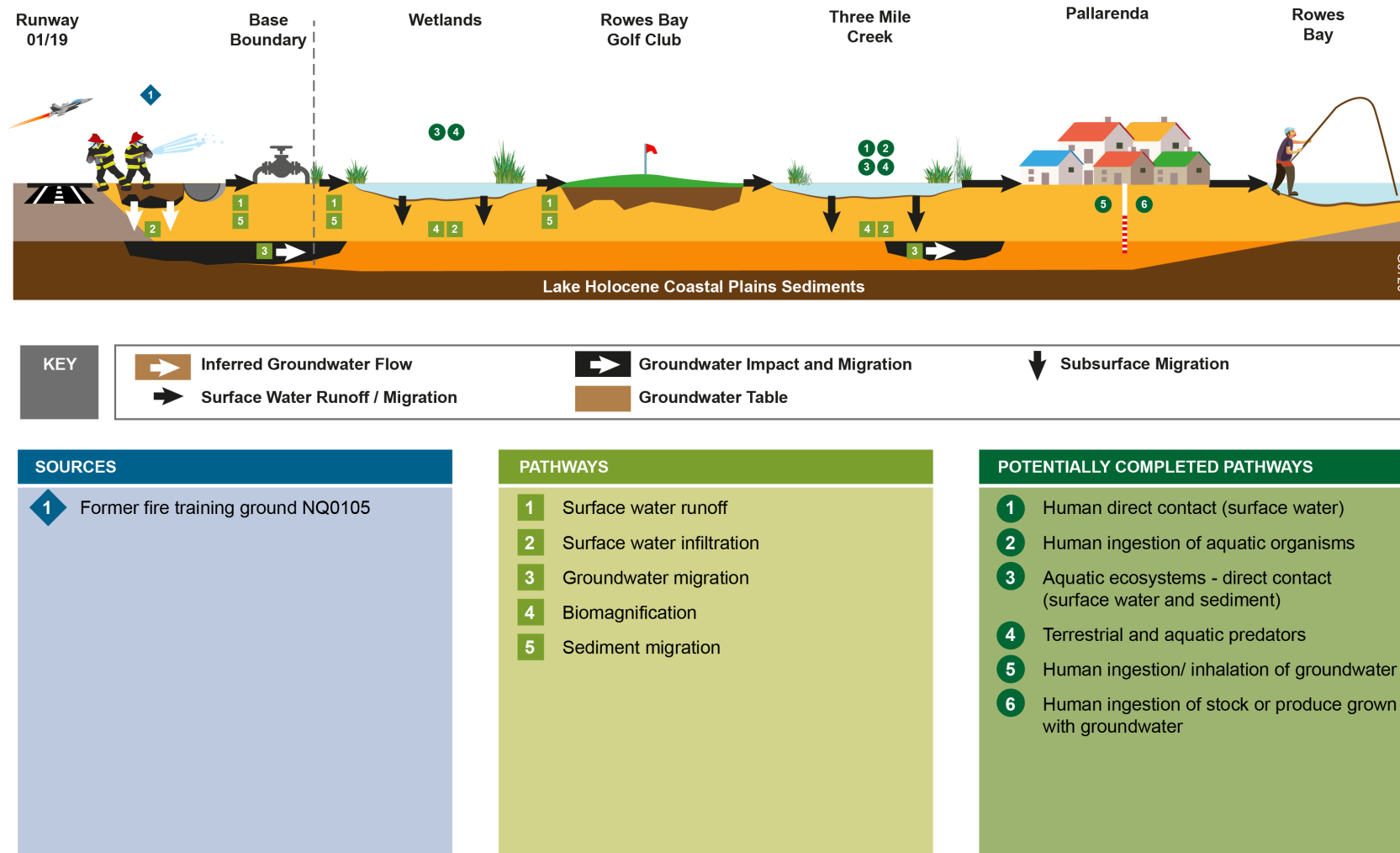
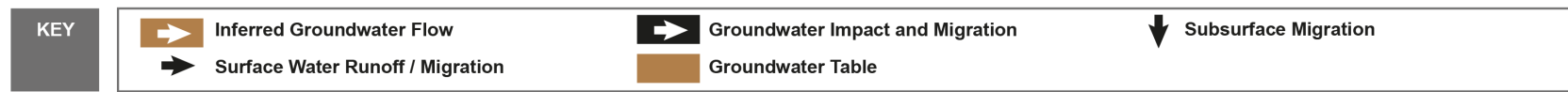
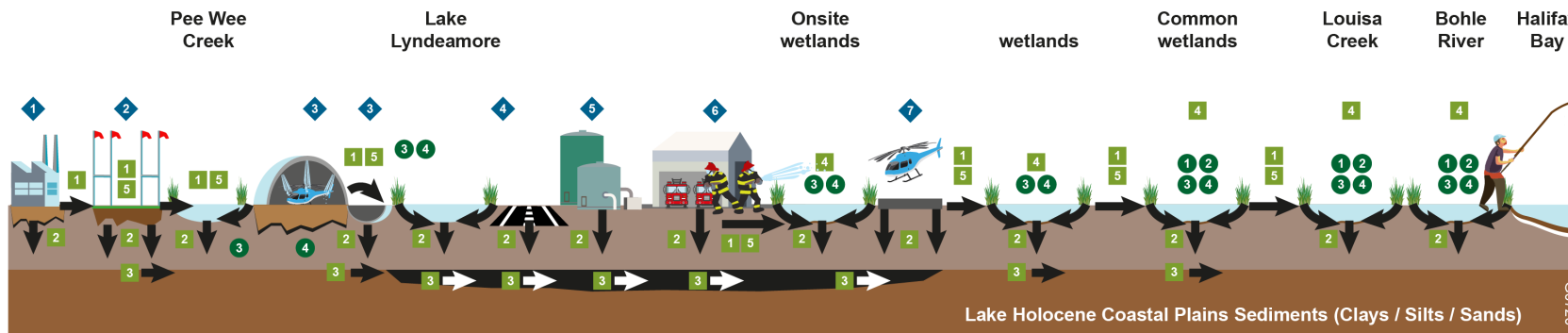


Figure ES.1 Conceptual Site Model for the Three Mile Creek catchment

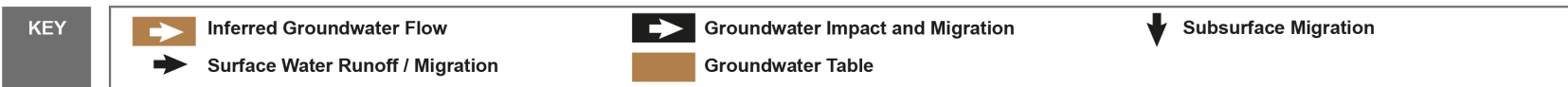
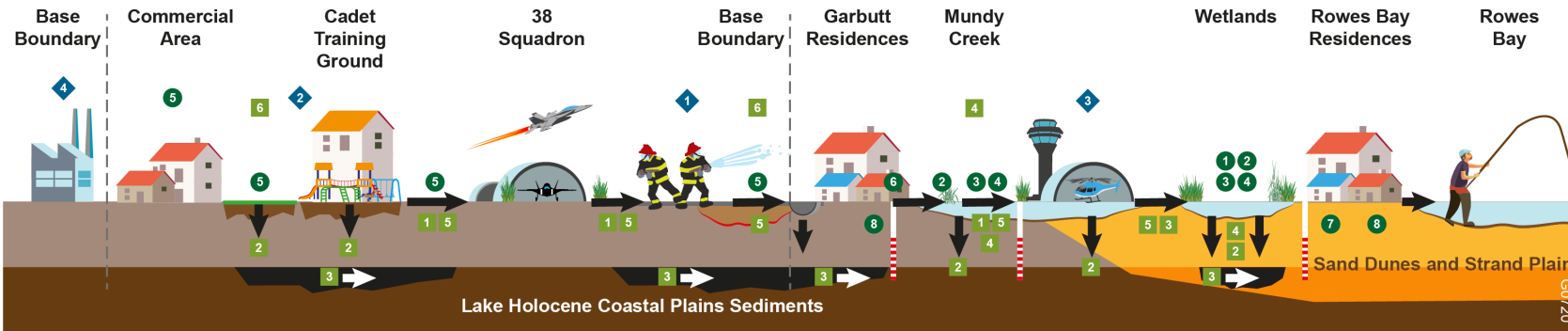
Louisa Creek / Common Catchment



SOURCES	PATHWAYS	POTENTIALLY COMPLETED PATHWAYS
1 Potential unidentified off-Base source 2 Ingham Road sports field 3 5AVN hangers and washplant 4 Runway 13/31 5 Fuel farm 2 NQ0099 6 Fire station NQ 0055 7 Pad Brahman	1 Surface water runoff 2 Surface water infiltration 3 Groundwater migration 4 Biomagnification 5 Sediment migration	1 Human direct contact (Surface water) 2 Human ingestion of aquatic organisms 3 Aquatic ecosystems direct contact (Surface water and sediment) 4 Terrestrial and aquatic predators

Figure ES.2 Conceptual Site Model for the Louisa Creek/Town Common/Bohle River catchment

Mundy Creek Catchment



SOURCES	PATHWAYS	POTENTIALLY COMPLETED PATHWAYS
1 Former fire training ground NQ0054 2 Former cadet training ground 3 Potential former fire training ground 4 Potential unidentified off-Base source	1 Surface water runoff 2 Surface water infiltration 3 Groundwater migration 4 Biomagnification 5 Sediment migration 6 Wind erosion - aerial transport of dust particles	1 Human direct contact (surface water) 2 Human ingestion of aquatic organisms 3 Aquatic ecosystems - direct contact (wind/sediment) 4 Terrestrial and aquatic predators 5 Human inhalation and direct contact (soil/dust) 6 Human ingestion/inhalation of groundwater aerosols 7 Human ingestion/ inhalation of groundwater 8 Human ingestion of stock or produce grown with groundwater

Figure ES.3 Conceptual Site Model for the Mundy Creek catchment

ADOPTED TOXICITY CRITERIA

The tolerable daily intake (TDI) values as developed by FSANZ in 2017 have been adopted in the HHRA, as per the standard practice for assessing human health risks to PFAS in Australia. The TDIs apply to PFOS and PFOA (although PFHxS is added to PFOS in the assessment as a conservative approach).

- PFOS: FSANZ derived a TDI of 20 ng/kg bw/day based on the no-observed-adverse-effect-level (NOAEL) in a study where the adverse health outcome of decreased parental and offspring body weight gains in a multigeneration reproductive toxicity study in rats was observed.
- PFOA: FSANZ derived a TDI of 160 ng/kg bw/day based on the NOAEL in a study where the adverse health outcome of foetal toxicity in a developmental and reproductive study in mice was observed.
- On the basis PFHxS also displayed similar toxicokinetic differences between laboratory animals and humans, like PFOS and PFOA, the establishment of a TDI for PFHxS was not recommended given the limited data. As indicated above, FSANZ adopted the same approach as enHealth in recommending the use of the TDI for the sum of PFOS +PFHxS as a conservative interim measure.

In development of both these TDIs, the TDI from the primary study was divided by 30 to account for interspecies differences and intra-species differences in humans (hence, embedding conservatism into the TDI derivation).

EXPOSURE ASSESSMENT

The following complete exposure pathways and receptor groups were selected for further evaluation on-Base:

- Direct contact exposure to PFAS-impacted soil, inclusive of incidental ingestion, dermal contact and inhalation of dusts, by Defence personnel on-Base
- Direct contact exposure to PFAS-impacted soil, sediments, surface water and/or groundwater, inclusive of incidental ingestion, dermal contact and inhalation of dusts, by subgrade maintenance/utilities workers on-Base.

The following potentially complete exposure pathways for off-Base human receptors within the Investigation Area were quantitatively assessed in the HHRA:

- Ingestion of PFAS in home-grown produce, including fruits and vegetables, by residents (child and adult) where groundwater is used for irrigation
- Direct contact of PFAS in water irrigated to gardens and grass where groundwater is extracted from private bores
- Ingestion of PFAS in aquatic biota, including various locally caught fish species, by residents (child and adult) caught within off-Base (estuarine) waterways
- Direct contact with PFAS in garden soils, inclusive of incidental ingestion, dermal contact and inhalation of windblown dust, by residents living adjacent to the Base
- Direct contact with PFAS in soil, sediment, surface water and/or groundwater, inclusive of incidental ingestion, dermal contact and inhalation of dusts, by maintenance/utility workers accessing subgrade utilities.

Pathways that were not assessed quantitatively in the HHRA, but rather were assessed qualitatively, are listed below. These pathways were confirmed to be either incomplete (i.e. the pathway is not present) and/or the concentration of PFAS reported was below the nominated trigger human health criterion at the point of exposure, meaning the health risk was acceptable.

- Inhalation of PFAS impacted dusts generated from soil by children attending and adults working at the on-Base kindergarten. Incidental ingestion and dermal contact with PFAS in soil is incomplete given no trigger of the residential criterion in surface soils in the kindergarten.
- Ingestion of water from either private bores and surface water off-Base, due to the supply of municipal town water and no reported occurrence of this pathway in the Water Use Survey (refer to the DSI report).

- The non-potable/domestic use (including sprinkler play) of private bore water or surface water off-Base, due to the supply of municipal town water.
- Recreational direct contact with PFAS in sediments and surface water by off-Base residents given the potential occurrence of crocodiles and stingers in off-Base waterways.
- Incidental ingestion and dermal contact with water whilst swimming in private or public pools filled from bore water, due to the supply of municipal town water and no reported occurrence of this pathway in the Water Use Survey (refer to the DSI report).
- The consumption of home-raised poultry and poultry eggs, due to the supply of municipal town water and no reported occurrence of this pathway in the Water Use Survey (refer to the DSI report).
- The consumption of home slaughtered meat and/or home-made dairy products (i.e. milk, cheese), due to the land use setting which is suburban residential.
- The consumption of home-made honey from a bee hive hobbyist (i.e. kept for domestic uses), due to the land use setting which is suburban residential.

Several exposure pathways including the consumption of home-raised/slaughtered meat, poultry and poultry-eggs; dairy products and/or honey (from home-kept bee hives) were not evaluated as part of the HHRA, as they were found to be incomplete, based on current information available for the Investigation Area. Likewise, the extractive use(s) of private bore water for drinking and/or other non-potable and domestic uses, including the filling of swimming pools were also identified to be incomplete, based on the information obtained from the WUS (as at 27 April 2018); and the supply of municipal (town) water for primary drinking and domestic use(s). However, should any of the above exposure pathways for home-grown produce and/or extractive uses of groundwater be realised (currently or in the future), then further assessment including a risk evaluation is warranted.

CONCLUSIONS

Given the current land uses in the Investigation Area and the current behaviour of human receptors within the Investigation Area, the following worst-case human health exposure scenarios and associated health risk outcomes are summarised below in Table ES.1.

Table ES.1 Summary of exposure scenarios and Human Health Risks

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
ON-BASE						
Defence personnel	Soil	Sorption of PFAS onto soil during various activities (training, emergency response incidents, equipment testing and historical fire training/discharging etc.)	Direct contact pathways (oral ingestion, dermal contact and dust)	Exceeded adopted screening criteria	Yes	Low and acceptable
	Groundwater	Extraction	Direct contact pathways (oral ingestion and dermal contact)	Incomplete – groundwater is not being extracted by Defence personnel to carry out Base activities	No	No exposure risk identified as pathway incomplete
	Surface water	Runoff to on-Base drains, open pits and waterways	Direct contact pathways (oral ingestion and dermal contact)	Exceeded adopted screening criteria	Yes	Low and acceptable
	Sediment	Sorption of PFAS onto sediments within surface water drains and open pits	Direct contact pathways (oral ingestion and dermal contact)	Below screening assessment criteria	No	No exposure risk identified as below adopted screening criteria
Kindergarten – children and adult workers	Soil	Outdoors – surface and shallow soils (<0.5 mBGL)	Direct contact pathways (oral ingestion, dermal contact and dust)	Below screening assessment criteria	No	No exposure risk identified as below adopted screening criteria

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
		Outdoors – soil at depth (>0.5 mBGL)	Direct contact pathways (oral ingestion, dermal contact and dust)	Above screening criteria	Yes – dust inhalation pathway	Low and acceptable for dust inhalation pathway <i>NB: Potential for elevated health risk if deeper soils are brought to the surface and exposed – management required for deeper soils. Refer to Note (1) underneath table.</i>
	Groundwater	Extraction	Direct contact pathways (oral ingestion and dermal contact)	Incomplete – groundwater is not being extracted by attendees at the kindergarten	No	No exposure risk identified as pathway incomplete
	Surface water	Runoff to on-Base drains, open pits and waterways	Direct contact pathways (oral ingestion and dermal contact)	Incomplete (no accessible on-Base drains, open pits or waterways in the kindergarten)	No	No exposure risk identified as pathway incomplete
	Sediment	Sorption of PFAS onto sediments within surface water drains and open pits	Direct contact pathways (oral ingestion and dermal contact)	Incomplete (no accessible on-Base drains, open pits or waterways in the kindergarten)	No	No exposure risk identified as pathway incomplete

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
Maintenance/utility workers	Soil	Sorption of soil onto PFAS	Direct contact pathways (oral ingestion, dermal contact and dust)	No available soil screening criteria for intrusive maintenance works. Therefore, scenario quantified in HHRA	Yes	Low and acceptable
	Groundwater	Extraction and seepage into open excavation	Direct contact pathways (oral ingestion and dermal contact)	Above screening criteria	Yes	Marginal <i>In the event that impacted groundwater is not intersected during subgrade activities at the Base, the human health risk is considered to be low and acceptable.</i>
	Surface Water	Runoff to on-Base drains, open pits and waterways	Direct contact pathways (oral ingestion and dermal contact)	Above screening criteria	Yes	Low and acceptable
	Sediment	Sorption of PFAS onto sediments within surface water drains and open pits	Direct contact pathways (oral ingestion and dermal contact)	No available sediment screening criteria for intrusive maintenance works. Therefore, scenario quantified in HHRA	Yes	Low and acceptable <i>NB: The total health risk from exposure to combined media (i.e. soil, groundwater, surface water and sediment) was elevated during the wet season only.</i>

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
OFF-BASE						
Residents (child and adult)	Soil	Sorption of PFAS onto soil from irrigating with private bore water	Direct contact pathways (oral ingestion, dermal contact and dust)	Above screening criteria in x1 sample collected from Garbutt	Yes	Low and acceptable
	Groundwater	Extraction	Direct contact pathways (oral ingestion and dermal contact)	Incomplete for drinking water, filling of swimming pools and other non-potable uses	No	No exposure risk currently identified as pathway incomplete
	Groundwater	Extraction	Direct contact pathways (oral ingestion and dermal contact)	Above screening for domestic garden watering	Yes	Low and acceptable
	Surface Water	Surface water drainage off-Base into nearby surrounding surface water bodies	Direct contact (oral ingestion and dermal contact) during swimming	Incomplete	No	No exposure risk currently identified as pathway incomplete
	Sediment	Sorption of PFAS onto sediments within surface water bodies	Direct contact pathways (oral ingestion and dermal contact)	Incomplete	No	No exposure risk currently identified as pathway incomplete
	Home-grown fruit and vegetables	Uptake of PFAS by fruit and vegetables irrigated with PFAS impacted bore water	Consumption of home-grown produce	Complete	Yes	Low and acceptable
	Home-raised poultry and poultry eggs	Uptake of PFAS by poultry watered with impacted bore water	Consumption of home-raised poultry meat and/or poultry eggs	Incomplete	No	No exposure risk currently identified as pathway incomplete

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
Consumers of locally caught aquatic biota (child and adult). Includes local residents and/or recreational fishers holidaying in the area	Aquatic biota (finfish, prawns, crabs, molluscs, samphire etc)	Uptake of PFAS by aquatic biota	Consumption of locally caught finfish, prawns, crabs and edible aquatic plants	Above screening criteria for finfish caught within estuarine waterways only. Exposure scenario evaluated in two parts (i) the flesh (edible) component of the fish and (ii) the fish liver (see below) as a component where the whole of the fish is consumed or utilised	Yes – finfish (flesh component)	Child – low and acceptable for average daily intakes (i.e. 28 g per day) Child – marginal for upper limit intakes (i.e. 72 g per day) Adult – low and acceptable for average and upper limit intakes (i.e. 56 g and 143 g per day respectively)
Consumers of locally caught aquatic biota (child and adult). Includes local residents and/or recreational fishers holidaying in the area	Aquatic biota (finfish, prawns, crabs, molluscs, samphire etc)	Uptake of PFAS by aquatic biota	Consumption of locally caught finfish, prawns, crabs and edible aquatic plants	Above screening criteria for finfish (liver) from estuarine waterways only. Fish livers are only likely to be consumed when the whole of the fish is consumed or utilised, which has a low likelihood.	Yes – finfish (liver component). Only evaluated for adults as young children assumed not to eat liver in accordance with FSANZ (2017c)	Adult – marginal for average intakes (i.e. 32 g per day) Adult – elevated health risk identified for upper limit intakes (i.e. 84 g per day)
Recreational users of Ingham Road Sports Field (child and adult)	Soil	Sorption of PFAS onto soil	Direct contact pathways (oral ingestion, dermal contact and dust)	Below screening criteria	No	No exposure risk identified as below adopted screening criteria. <i>Refer to Note (2) underneath table.</i>

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
Recreational users of nearby surface waters (child and adult)	Surface water	Surface water drainage off-Base into nearby surrounding surface water bodies	Direct contact pathways during swimming (oral ingestion and dermal)	Incomplete – not safe for swimming due to the presence of crocodiles and other wildlife	No	No exposure risk identified as pathway incomplete
	Sediment	Sorption of PFAS onto sediment within water ways	Direct contact pathways (oral ingestion and dermal contact)	Incomplete – waterways not deemed safe for swimming due to the presence of crocodiles and other wildlife	No	No exposure risk identified as pathway incomplete
Recreational users of nearby public swimming pools (child and adult)	Groundwater	Extraction	Direct contact pathways during swimming (oral ingestion and dermal)	Incomplete	No	No exposure risk identified as pathway incomplete
Maintenance/utility workers	Soil	Sorption of PFAS onto soil	Direct contact pathways (oral ingestion, dermal contact and dust)	No available soil screening criteria for intrusive maintenance works. Therefore, scenario quantified in HHRA	Yes	Low and acceptable
	Groundwater	Extraction and seepage into open excavation	Direct contact pathways (oral ingestion and dermal contact)	Above screening criteria	Yes	Low and acceptable
	Surface water	Surface water drainage off-Base to nearby stormwater drains or irrigation systems	Direct contact pathways (oral ingestion and dermal contact)	Above screening criteria	Yes	Low and acceptable

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
	Sediment	Sorption of PFAS onto sediment in drains/irrigation systems	Direct contact pathways (oral ingestion and dermal contact)	No available sediment screening criteria for intrusive maintenance works. Therefore, scenario quantified in HHRA	Yes	Low and acceptable

Note (1) – Whilst soil impact at depth is present within the kindergarten (i.e. ≥ 0.5 mBGL), exposure to deeper soils beneath the kindergarten is considered unlikely as any digging activities by children are only considered to occur within the designated play areas (i.e. sandpit and/or raised playground area surfaced with tanbark). All surface soil samples collected from the kindergarten (including play areas or exposed surface areas) were below the adopted screening criteria. One approach to manage potential exposures from soil at depth (i.e. > 0.5 mBGL) could be the implementation of a management plan. It is understood that during construction and maintenance activities on the Base, Defence will implement control measures documented in PFAS-specific guidance publications to facilitate effective management of PFAS on the Defence estate.

Note (2) – In regards to surface soils at the Ingham Road Sports Field, concentrations of PFAS were identified to be below the public open space screening criteria and hence; this pathway was screened out from the risk quantification step. Additional surface soil samples were also collected on 26 June 2018 and did not identify concentrations to be above the open space screening criteria. Whilst only a small soil dataset exists for soils at a depth where there is the most potential for direct contact to occur (i.e. shallow soils), it is considered that the sports field would be used infrequently by Defence personnel and off-Base recreational users. Hence, it is unlikely to be driving the exposure risk in comparison to other on and off-Base scenarios quantified as part of this HHRA.

Based on the information provided in Table ES.1 overall health risks were predicted to be low and acceptable for the identified receptors and exposure pathways, based on the available data utilised in the HHRA, except for the following:

- The unacceptable human health risk for consumption of fish liver is driven by the assumption that an adult consumes whole fish daily (i.e. 365 day/year) for 29 years with the daily consumption being 227 g of fish per person (with over a third of the fish weight being the liver) from fish sourced within estuarine waterway located within the Investigation Area. The typical intake, which still assumes daily consumption of whole fish, assumes 88 g of fish and the predicted human health risk was predicted to be acceptable. Thus, *ad hoc* consumption of whole fish sourced from the Investigation Area is unlikely to result in a risk to human health.
- The marginal human health risk predicted for children consuming fish flesh is driven by the assumption that a young child will consume upper limit intakes daily (i.e. 72 g per day) for 6 years. This exposure scenario also assumes that a fish is sourced within an estuarine waterway located within the Investigation Area and is continually impacted with an upper limit exposure concentration (i.e. 4 µg/kg). The typical intake, which also assumes the daily consumption of fish at 28 g per day for 6 years was predicted to be low and acceptable.
- The unacceptable human health risk for maintenance workers at the Base is only just above the trigger level of a hazard index of 1 (during the wet season). The worst-case health risk is being driven by the assumptions that the same worker attends the Base 40 days/year for 30 years, is exposed to groundwater for the whole of a 10-hour shift and that over this period, that 125 mL of impacted groundwater is ingested every day whilst on-Base. Even at this extreme exposure, the hazard index was only just triggered suggesting that an adverse health outcome to maintenance/utility workers attending the Base is unlikely.
- Whilst the health risks to maintenance/utility workers on-Base, associated with exposure to sediments was identified to be low and acceptable, no sampling of sediments from equipment used within source areas and/or wastewater drainage systems was completed to assess if exposure was acceptable. Hence, one approach to manage potential exposures from handling equipment; and/or any maintenance works of wastewater drainage systems by workers, could be the implementation of a management plan.

KEY ASSUMPTIONS AND LIMITATIONS OF THE HHRA

This HHRA is based on the following key assumptions, limitations and approach to quantifying health risks:

- The HHRA included population groups either residing or working within the nominated Investigation Area only and so includes surrounding suburbs of the Base (i.e. Mount St John, Bohle, Pallarenda and Rowes Bay; and parts of Belgian Gardens, Garbutt, West End, Mount Louisa and Cosgrove).
- The WUS did not identify any off-Base bores to be in use for stock watering purposes (including dairy cows) and no livestock were identified during completion of the DSI. Properties within the Investigation Area are ‘standard’ suburban blocks that would not permit self-sustainability. Hence, dairy, livestock meat, poultry and poultry eggs; and honey products were excluded from the HHRA at this current time, as exposure via the consumption of these foods is considered incomplete. If any of the above use(s) of groundwater were found to be complete and/or home-grown foods confirmed (i.e. dairy, livestock meat, poultry or poultry eggs), currently or in the future, then management and/or further assessment (including a risk assessment) may be required to evaluate the potential exposure risk.
- The WUS identified the irrigational use of private bore water for gardens including vegetable gardens at two off-Base properties located in Pallarenda (sampled bores BW021 and BW022). Hence, an evaluation of home-grown produce was completed for fruits and vegetables. Of note, the two properties sampled in Pallarenda reported detectable concentrations of PFOS + PFHxS (ranging between 0.01 µg/L to 0.05 µg/L) and PFOA (ranging from <0.00005 µg/L to 0.002 µg/L). However, the reported concentrations were below the drinking water screening criteria.
- No direct measurements of terrestrial biota samples including fruits and vegetables was undertaken as part of the DSI sampling program. Hence, the evaluation of exposure risk from home-grown fruit and vegetables has relied on the available off-Base soil and groundwater data, to calculate theoretical concentrations within fruits and vegetables

(including green leafy and tuber types). The concentrations estimated within each fruit and vegetable group were then used to determine the intake exposure concentration within child and adult receptors.

- Several fruit and vegetables (including a green leafy vegetable) were sampled from a property in Garbutt. Samples collected included lemons, limes, cherries, tomatoes, cucumber and silver beet. PFOS was only detected in one sample (silver beet) at a concentration below the FSANZ trigger limit for leafy green vegetables.
- Based on the results of the WUS and observations during the DSI, residential groundwater use was limited to the irrigation of lawns, gardens and vegetables. Residential properties, including the community of Happy Valley, are connected to the Townsville reticulated water supply. No extracted groundwater was identified to be used for drinking purposes, other domestic non-potable uses (i.e. washing, cooking, cleaning, watering animals, recreational purposes), stored in tanks or used to fill swimming pools. However, it is noted that currently there is no mechanism that prevents the use of extracted water for these purposes. If any of the above use(s) of groundwater were found to be complete (currently or in the future) then further assessment and/or management maybe required.
- The contamination status of non-irrigated shallow soils off-Base to the east from the former fire training area in the south-east of the Base has been reported below the guidance value for garden accessible soil by sampling along the Base boundary. Hence, this exposure pathway was considered to be incomplete.
- The potential direct contact exposure risk to shallow soils that are irrigated with bore water impacted with PFAS, was assessed utilising the data collected during additional surface soil sampling undertaken in June 2018, from lawn and gardens areas in residential properties located in surrounding suburbs including Garbutt. The owners of the two residential properties where PFOS + PFHxS were reported above the guidance value for residential garden/accessible soil were retirees, thus exposure pathway for children was incomplete. As PFOS + PFHxS was not reported in excess of the guidance value at any other property, the exposure pathway for children with garden accessible soil is confirmed to be incomplete across the Investigation Area.
- Both the mean and 90th percentile concentrations of PFOS + PFHxS and PFOA reported during the dry season investigation were utilised in this assessment. The mean concentration was considered to represent a typical exposure (or mean) concentration that the general population would be exposed to. The 90th percentile concentrations were adopted to evaluate an upper limit exposure intake and were considered to represent a plausible maximum exposure scenario that could occur during dry or wet season conditions.
- Aquatic biota sampling was limited to seasonal availability of different fish species and accessibility for sampling. As no aquatic biota samples were collected during the wet season. The quantification of the maximum exposure that may occur during the dry season, was also inferred to occur during the wet season (i.e. the quantification of risks is based on dry season aquatic biota data only).
- Although four separate fish sample events were undertaken to increase sample sizes for certain fish species, the resulting datasets for most fish species was generally considered too small to quantify potential health risks at each sampled location. Hence, the approach for assessing the exposure pathway for fish consumption has utilised all available fish flesh data, across all sampled locations. This approach has the potential to underestimate the health risk quantified for this pathway, at locations where fish samples reported elevated PFAS concentrations. Conversely it may overestimate health risks at locations where detected PFAS concentrations were low or negligible. For example, at the Bohle River and Town Common (both estuarine systems) measured PFAS results were at their highest. The inclusion of the higher results obtained at the Bohle River and Town Common with the lower results obtained at remaining impact sites (i.e. Mundy Creek, Rows Bay and Three Mile Creek) to estimate average and upper limit intake exposure concentrations, may have resulted in underestimating the predicted health risk outcome for fish species present within the Bohle River (estuarine) and Town Common (estuarine).
- The assessment of potential health risks was based on data obtained during the DSI (WSP, 2018) and ESP's aquatic biota sampling programs between July 2017 and March 2018 only. The evaluation of historical intake exposures was not considered possible (or plausible) as the concentrations within the various media were not known.
- For child receptors, the relevant exposure scenarios were calculated for young children by adopting the exposure parameters for a child aged 2–3 years. They are noted to be the most sensitive receptors due to their behaviours; and

bodyweight to intake ratio which is higher than that of an adult (i.e. lower bodyweight = higher intake per unit of bodyweight). The risk assessment has been limited to addressing the impacts of the selected PFAS chemicals (i.e. PFOS + PFHxS and PFOA), to a specific assumed receptor population, under a defined exposure scenario (i.e. off-Base residents and defence personnel), based on information available at the time of preparing the HHRA. The risk assessment approach presented does not consider a fully probabilistic estimate of risk, but presents conditional estimates based on several assumptions regarding exposure and toxicity consistent with the nationally endorsed regulatory approach. Further assessments would be required to assess risk, where site uses vary from the assumed Base conditions and/or exposure settings adopted off-Base for the purposes of this risk assessment.

Generic advice from the Queensland Department of Health, the federal Department of Health and FSANZ have been provided in Appendix G for reference. The guidance documents describe approaches for limiting the severity of some exposure pathways assessed in the HHRA (e.g. consumption of seafood) whilst explaining why some exposure pathways that are currently incomplete should not be completed (e.g. chronic ingestion of groundwater). Whilst the publications were current as at the issue of this report, care should be taken to ensure the advice is current through referring to the authoring government agency.

1 INTRODUCTION

WSP Australia Pty Ltd (WSP) was commissioned by the Department of Defence (Defence) under the Defence per- and poly-fluoroalkyl substances (PFAS) Panel to conduct a Human Health Risk Assessment (HHRA) to quantitatively assess the risk to human health resulting from exposure to the historical use of Aqueous Film Forming Foams (AFFF) containing PFAS at the Royal Australian Air Force (RAAF) Base Townsville. Herein referred to as ‘the Base’, located on Ingham Road, Garbutt, Queensland.

The WSP assessment included the following:

- Review of site history information (and previous assessment reports) to identify potential areas of AFFF use and storage
- Collection of soil, sediment, surface water, groundwater and biota samples from areas potentially contaminated by PFAS
- Comparison of above sample results to published guidelines (for each media type) for an initial evaluation of potential human health and ecological risk. This information was reported in the Detailed Site Investigation (DSI) Report (WSP, 2018) exception for the aquatic biota sample results (contained herein)
- Where concentrations were reported above the published guideline values, further assessment was required. This document (i.e. the HHRA report) documents the evaluation of human health risk associated with PFAS contamination identified within the Investigation Area for RAAF Base Townsville (refer to Figure 1, Appendix A)
- This assessment has not addressed potential human health risks associated with other chemicals.

1.1 BACKGROUND

AFFF were stored and used by Defence at the Base for fire-fighting purposes, including routine testing and emergency fire-fighting response practice drills from approximately the 1970s to 2004. AFFF containing PFAS was phased out in approximately 2004 and replaced by another product (Ansulite).

WSP has undertaken a DSI (WSP, 2018) across the Investigation Area (which incorporates both on-Base and off-Base areas), targeting soil, sediment, surface water, groundwater and aquatic biota. A Queensland Department of Environment and Science (DES) accredited auditor, was engaged by Defence as the Technical Advisor (TA); and third party reviewer of technical deliverables for the project.

1.2 OBJECTIVES

The primary objectives of the HHRA are to:

- Quantitatively assess the potential human health risks to the identified receptors within the IA associated with exposure to PFAS impacted environmental media including: soil, groundwater, surface water, sediment, terrestrial and aquatic biota (food products as identified); and
- Assist in guiding the remediation and/or risk management measures to address PFAS contamination within the IA.

2 HHRA FRAMEWORK

In accordance with the United States Environmental Protection Agency (US EPA), PFAS are classified as emerging contaminants. Thus, information regarding the fate, transport and toxicity of PFAS is the subject of ongoing development with new information becoming available on a regular basis. Hence, the HHRA has been prepared in cognisance of this; and in consultation with various stakeholders including the Commonwealth, the Queensland Government, Townsville City Council (TCC), Defence, nearby residents, Base workers, the TA and Traditional custodians.

The HHRA has been undertaken in accordance with the following national guidelines:

- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013' (NEPC 2013).
The relevant provisions within the NEPM are:
 - Schedule B4 – Guideline on Site-Specific Health Risk Assessment Methodology
 - Schedule B7 – Guideline on Derivation of Health-Based Investigation Levels.
- Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards. Department of Health and Aging, 2012 Update (enHealth, 2012a).
- enHealth Australian Exposure Factor Guide (enHealth, 2012b).
- Heads of EPAs Australia and New Zealand (HEPA), PFAS National Environmental Management Plan (NEMP), January 2018.

Other guidance documents that specifically relate to PFAS have also been considered in the HHRA as follows:

- Food Standards Australia New Zealand (FSANZ), *Perfluorinated chemicals in food* (FSANZ 2017a).
- FSANZ, *Hazard assessment report – Perfluorooctane Sulfonate (PFOS), Perfluorooctanoic Acid (PFOA), Perfluorohexane Sulfonate (PFHxS)* (FSANZ 2017b).
- FSANZ, Supporting Document 2 – *Assessment of potential dietary exposure to PFOS, PFOA and PFHxS occurring in foods sampled from contaminated sites* (FSANZ 2017c).
- FSANZ, Attachment 1 to Supporting Document 2 – *Occurrence of and dietary exposure to PFOS, PFOA and PFHxS reported in literature* (FSANZ 2017d).
- Australian Government Department of Health, Health Based Guidance Values for Per – and – Poly Fluoroalkyl Substances (PFAS) (Department of Health (DoH) 2017).
- enHealth (2016), Interim national guidance on human health reference values for per- and poly-fluoroalkyl substances for use in site investigations in Australia.

Where required, additional guidance has also been sourced from international references and referenced within this HHRA report.

The overall approach adopted for the HHRA was based on enHealth (2012a) and is summarised in Figure 2.1.

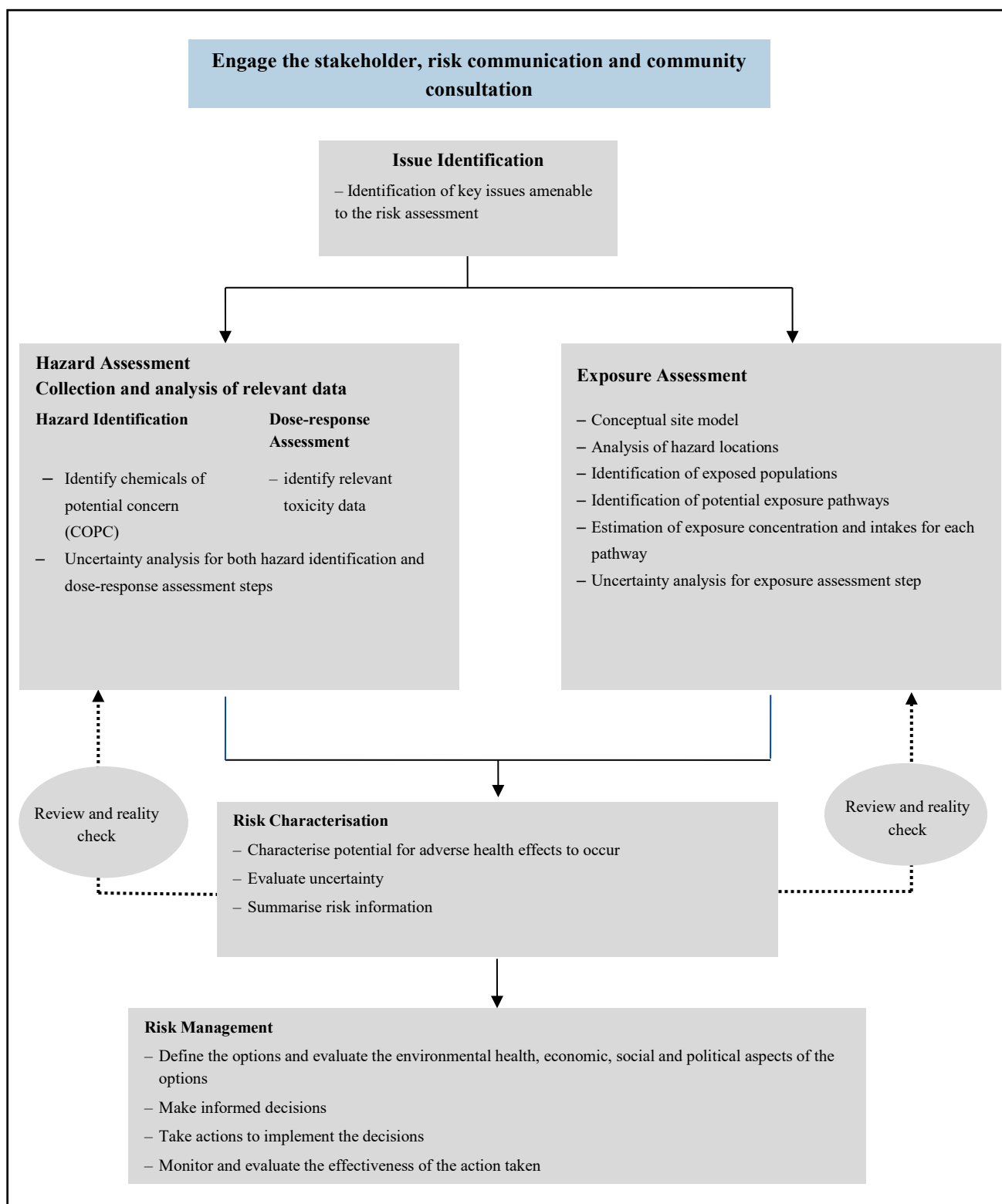


Figure 2.1 Risk assessment framework

2.1 AVAILABLE INFORMATION

The HHRA has relied on information collected as part of the DSI program (WSP, 2018) as well as data obtained for aquatic biota sampling by Ecological Service Professionals Pty Ltd (ESP). This includes the marine data obtained during the sampling event conducted on 22 March 2018.

The information and data that has formed the basis of the HHRA includes the following reports which document the collection and analysis of environmental media inclusive of biota, as used in this risk assessment:

- ESP (2018a), RAAF Base Townsville – PFAS Investigation Aquatic Biota Sampling and Analysis, July 2018. Prepared by Ecological Service Professionals Pty Ltd.
- ESP (2018b), RAAF Base Townsville – PFAS Investigation Estuarine Biota Sampling and Analysis, July 2018. Prepared by Ecological Service Professionals Pty Ltd.
- ESP (2018c), RAAF Base Townsville – PFAS Investigation Marine Biota Sampling and Analysis, August 2018. Prepared by Ecological Service Professionals Pty Ltd.
- WSP (2017), MEMO – RAAF Base Townsville Kindergarten School Building 154 (NQ0111): Summary of PFAS Analytical Results, 14 July 2017.
- WSP (2018), RAAF Base Townsville Detailed Site Investigation. WSP Australia Pty Ltd.
 - PFAS Volume 1: Main Report, 02 May 2018.
 - PFAS Volume 2: Appendices A & B, 02 May 2018.
 - PFAS Volume 3: Appendices C to I, 02 May 2018.

Of note, wet season data for groundwater, surface and sediments has also been incorporated into the HHRA report, with tabulated results tables presented in Appendix B. It is understood that an addendum DSI report is currently in preparation and will be provided to Defence and the TA for review. For the wet season, potential risks were quantified separately for groundwater, surface water and sediments only. As aquatic biota samples were not collected during the wet season, a separate risk estimate was not calculated for the wet season.

This revision of the report has also incorporated additional soil sampling conducted in Rowes Bay, Pallarenda and Garbutt (private residences). The soil samples were collected from the surface as follows:

- SS200 – collected from the back garden at a property located in Garbutt
- SS201 – collected from the surface of a vegetable garden within a property located in Pallarenda
- SS202 – collected from the back garden at a property located in Rowes Bay
- SS203 – collected from a small garden bed located in a property at Rowes Bay; and
- SS204 – collected from the back garden of a property located in Garbutt.

Of note, soil samples indicated to be collected from a ‘back garden’ were either collected from just underneath a lawn or from bare patches present within a lawn.

Additional on-Base data for the Ingham Road Sports Field and the area east of Mundy Creek Drain was also included. Details of the samples are provided below:

- BH061 and BH062: surface soil samples collected from the area east of Mundy Creek Drain
- BH063–BH066: surface soil samples collected at Ingham Road Sports Field.

2.2 KEY ASSUMPTIONS AND LIMITATIONS OF THE HHRA

This HHRA is based on the following key assumptions and limitations:

- DSI sampling and analysis that targeted both on-Base and off-Base media during the dry season included soil, groundwater, sediment, surface water, extracted groundwater from private property bores and aquatic biota (i.e. finfish and crustaceans). The collection of wet season data (both on and off-Base) was undertaken for groundwater, surface water and sediment. The results for the wet season have been incorporated into the HHRA (refer Appendix B).
- The HHRA included population groups either residing or working within the nominated Investigation Area only and so includes surrounding suburbs of the Base (i.e. Mount St John, Bohle, Pallarenda and Rowes Bay; and parts of Belgian Gardens, Garbutt, West End, Mount Louisa and Cosgrove).
- An evaluation of potential exposure risks to workers during firefighting training works/activities with AFFF was not conducted as part of the HHRA. Any such evaluation would be highly dependent on the type of AFFF product used and the training activities and practices undertaken.
- In evaluating potential health risks to Defence personnel, the use of personal protective equipment (PPE) and appropriate health and safety measures during their work activities was (conservatively) not considered in the evaluation of exposure risks.
- The WUS did not identify any off-Base bores to be in use for stock watering purposes (including dairy cows) and no livestock were identified during completion of the DSI. Properties within the Investigation Area are 'standard' suburban blocks that would not permit self-sustainability. Hence, dairy, livestock meat, poultry and poultry eggs; and honey products were excluded from the HHRA at this current time, as exposure via the consumption of these foods is considered incomplete. If any of the above use(s) of groundwater were found to be complete and/or home-grown foods confirmed (i.e. dairy, livestock meat, poultry or poultry eggs), currently or in the future, then management and/or further assessment (including a risk assessment) maybe required to evaluate the potential exposure risk.
- The WUS identified the irrigational use of private bore water for gardens including vegetable gardens at two off-Base properties located in Pallarenda (sampled bores BW021 and BW022). Hence, an evaluation of home-grown produce was completed for fruits and vegetables. Of note, the two properties sampled in Pallarenda reported detectable concentrations of PFOS + PFHxS (ranging between 0.01 µg/L to 0.05 µg/L) and PFOA (ranging from <0.00005 µg/L to 0.002 µg/L). However, the reported concentrations were below the drinking water screening criteria.
- No direct measurements of terrestrial biota samples including fruits and vegetables was undertaken as part of the DSI sampling program. Hence, the evaluation of exposure risk from home-grown fruit and vegetables has relied on the available off-Base soil and groundwater data, to calculate theoretical concentrations within fruits and vegetables (including green leafy and tuber types). The concentrations estimated within each fruit and vegetable group were then used to determine the intake exposure concentration within child and adult receptors.
- Several fruit and vegetables (including a green leafy vegetable) were sampled from a property in Garbutt. Samples collected included lemons, limes, cherries, tomatoes, cucumber and silver beet. PFOS was only detected in one sample (silver beet) at a concentration below the FSANZ trigger limit for leafy green vegetables.
- Only chronic long-term exposures that occur over a lifetime with assumed continuous exposure to PFAS in soil, water, sediment and food were assessed. Published toxicity studies have not identified potential risk issues associated with acute short-term exposure (up to 14 days); and hence were not evaluated in this HHRA.
- Based on the results of the WUS and observations during the DSI, residential groundwater use was limited to the irrigation of lawns, gardens and vegetables. Residential properties, including the community of Happy Valley, are connected to the Townsville reticulated water supply. No extracted groundwater was identified to be used for drinking purposes, other domestic non-potable uses (i.e. washing, cooking, cleaning, watering animals, recreational purposes), stored in tanks or used to fill swimming pools. However, it is noted that currently there is no mechanism

that prevents the use of extracted water for these purposes. If any of the above use(s) of groundwater were found to be complete (currently or in the future) then further assessment and/or management maybe required.

- Surface soil data from sample locations collected within the kindergarten were below adopted screening criteria. However, deeper soil samples (i.e. >0.5 mBGL) were reported above the screening criteria. Direct contact (oral ingestion and dermal) with deeper soils was considered incomplete for children and adults attending and working at the kindergarten. However, to account for any nearby open excavation (which may expose deeper soils and bring them to the surface), resulting in the generation and transport of contaminated dusts (that could also be carried indoors), the dust inhalation pathway was quantified for both children and adults. As deeper soils have been identified above the screening criteria, one approach to mitigate direct contact exposure could be the implementation of a management plan for excavation works on the Base.
- The contamination status of non-irrigated shallow soils off-Base to the east from the former fire training area in the south-east of the Base has been reported below the guidance value for garden accessible soil by sampling along the Base boundary. Hence, this exposure pathway was considered to be incomplete.
- The potential direct contact exposure risk to shallow soils that are irrigated with bore water impacted with PFAS, was assessed utilising the data collected during additional surface soil sampling undertaken in June 2018, from lawn and gardens areas in residential properties located in surrounding suburbs including Garbutt. The owners of the two residential properties where PFOS + PFHxS were reported above the guidance value for residential garden/accessible soil were retirees, thus exposure pathway for children was incomplete. As PFOS + PFHxS was not reported in excess of the guidance value at any other property, the exposure pathway for children with garden accessible soil is confirmed to be incomplete across the Investigation Area.
- Both the mean and 90th percentile concentrations of PFOS + PFHxS and PFOA reported during the dry season investigation were utilised in this assessment. The mean concentration was considered to represent a typical exposure (or mean) concentration that the general population would be exposed to. The 90th percentile concentrations were adopted to evaluate an upper limit exposure intake and were considered to represent a plausible maximum exposure scenario that could occur during dry or wet season conditions.
- Aquatic biota sampling was limited to seasonal availability of different fish species and accessibility for sampling. As no aquatic biota samples were collected during the wet season. The quantification of the maximum exposure that may occur during the dry season, was also inferred to occur during the wet season (i.e. the quantification of risks is based on dry season aquatic biota data only).
- Although four separate fish sample events were undertaken to increase sample sizes for certain fish species, the resulting datasets for most fish species was generally considered too small to quantify potential health risks at each sampled location. Hence, the approach for assessing the exposure pathway for fish consumption has utilised all available fish flesh data, across all sampled locations. This approach has the potential to underestimate the health risk quantified for this pathway, at locations where fish samples reported elevated PFAS concentrations. Conversely it may overestimate health risks at locations where detected PFAS concentrations were low or negligible. For example, at the Bohle River and Town Common (both estuarine systems) measured PFAS results were at their highest. The inclusion of the higher results obtained at the Bohle River and Town Common with the lower results obtained at remaining impact sites (i.e. Mundy Creek, Rows Bay and Three Mile Creek) to estimate average and upper limit intake exposure concentrations, may have resulted in underestimating the predicted health risk outcome for fish species present within the Bohle River (estuarine) and Town Common (estuarine).
- The assessment of potential health risks was based on data obtained during the DSI (WSP, 2018) and ESP's aquatic biota sampling programs between July 2017 and March 2018 only. The evaluation of historical intake exposures was not considered possible (or plausible) as the concentrations within the various media were not known.
- For child receptors, the relevant exposure scenarios were calculated for young children by adopting the exposure parameters for a child aged 2–3 years. They are noted to be the most sensitive receptors due to their behaviours; and bodyweight to intake ratio which is higher than that of an adult (i.e. lower bodyweight = higher intake per unit of bodyweight).
- The bioavailability of each PFAS compound was conservatively assumed to be 100%.

3 BACKGROUND AND HISTORY OF AFFF USE AT THE BASE

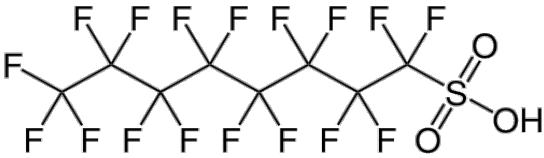
3.1 WHAT IS PFAS

As noted in Section 1 above, PFAS is the collective name given to a large group of chemicals with similar structure and properties. There are hundreds of chemicals that can be classed as PFAS. However, current commercial analytical methods can only detect a limited number of these.

PFAS are man-made compounds that do not occur naturally in the environment, are characterized by their fluorinated carbon chains where the hydrogen atoms have been replaced with fluorine atoms. The resulting carbon-fluorine bond ensures that PFAS are both highly resistant to being degraded or metabolized; and are bio-accumulative (ATSDR, 2015). Perfluorooctane sulfonate (PFOS) contains eight carbon atoms and a sulfonate group ($C_8 F_{17} SO_3$); and perfluorooctanoic acid (PFOA) also contains eight carbon atoms and is a persistent perfluorinated carboxylic acid ($C_8 HF_{15} O_2$). Both compounds are members of the PFAS group most commonly associated with historical AFFF (ATSDR 2015).

Of the PFAS compounds that were included within the analysis suite (i.e. 28 in total), sufficient toxicological information is (currently) only available for PFOS, per-fluorohexane sulfonate (PFHxS) and PFOA to allow for the derivation of human health and ecological protection guidelines. Hence, the quantitative evaluation of human health and ecological risks related to PFAS (other than PFOS, PFHxS and PFOA) is not currently possible. Further discussion regarding the evaluation of other PFAS compounds is provided in Section 8.4. The chemical structure of PFOS, PFHxS and PFOA is provided in Table 3.1 below.

Table 3.1 Chemical structure of PFOS, PFOA and PFHxS

NAME	CHEMICAL FORMULA	CHEMICAL DIAGRAM
PFOS	$C_8 HF_{17} O_3 S$	
PFHxS	$C_6 HF_{13} O_3 S$	As above but only 13 fluorine atoms.
PFOA	$C_8 HF_{15} O_2$	

3.2 PHYSICAL AND CHEMICAL PROPERTIES OF PFAS

PFOS, PFOA and PFHxS are manufactured chemicals that exhibit the following properties:

- **Chemically and biologically stable** – persistent in the environment and resistant to biodegradation, atmospheric photooxidation, direct photolysis and hydrolysis. However, note that dispersion will ‘naturally dilute’ PFAS concentrations proportional to the distance from the source of PFAS contamination.
- **Moderately to highly soluble in water** – (PFHxS and PFOA are highly soluble and PFOS is moderately soluble). Therefore, PFOS, PFHxS and PFOA are readily dissolved/leached from soils by infiltrating water (i.e. rainwater, surface water or groundwater) and move into receiving water (i.e. groundwater and surface water) in areas where they have been released into the environment.
- **Highly mobile** – PFAS show little chemical/physical retardation (i.e. adsorption and/or degradation) during transport (e.g. in surface water or groundwater). Therefore, once PFAS enters the environment it can be transported a significant distance from the source/release point.
- **Not biodegradable** – Biodegradation of PFAS compounds is not known to occur; however, microbial degradation or metabolic processes of larger organisms can form PFOS and PFOA through the breakdown of longer-chain ‘precursor’ compounds (i.e. 10:2 fluorotelomer sulfonate (FtS)) or related substances.
- **Non-volatile** – PFAS compounds generally have low volatility. Therefore, PFAS does not partition to soil vapour or the atmosphere.
- **Permeation** – PFAS can permeate some solid surfaces (e.g. concrete and other building materials). These materials can accumulate high concentrations of PFAS and act as a potential secondary source of contamination.
- **Bioaccumulation** – PFAS has been reported to bioaccumulate within the environment. Bioaccumulation occurs when an organism absorbs a substance at a rate faster than that at which the substance is lost by catabolism and excretion. Therefore, the reported concentration of PFAS within an animal can be greater than the concentration of PFAS within the environment (e.g. fish reporting a higher concentration of PFAS than the water in which it lives).

The combination of the above physical and chemical characteristics results in PFAS being readily transported from primary and secondary (soil and sediment) sources via groundwater/surface water and wide spread contamination of the surrounding environment (including biota).

PFAS contamination can persist (within the environment) for many years (or decades) following the initial release.

3.3 GENERAL USE OF FIRE FIGHTING FOAM

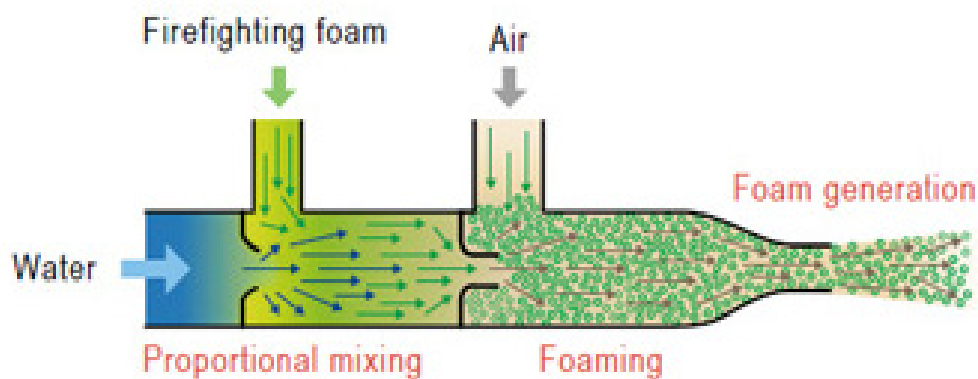
PFAS have been used in various industrial processes and consumer products since the 1950s. It is understood that PFAS were first used as a constituent of Aqueous Film Forming Foam (AFFF) in the late 1960’s and by the mid 1970’s was used widely internationally and within Australia by civilian and military authorities.

It is understood that the primary AFFF product in use at Defence sites until approximately 2004–2005 was 3M Lightwater™, which is known to contain many PFAS compounds, but is dominated by PFOS, PFHxS and to a lesser extent PFOA.

Ansulite® replaced 3M Lightwater™ at RAAF Base Townsville after 2004.

Firefighting foam (containing PFAS) was also widely used by other industries where flammable chemicals were present (e.g. petroleum and chemical sites) and civil fire authorities (e.g. vehicle accidents, industrial firefighting).

Firefighting foam works by ‘smothering’ the fuel source (e.g. burning object/liquid fuel) with a foam layer, extinguishing the flames and preventing further combustion. Firefighting foam can be applied over a large area very quickly, therefore mitigating property damage and loss of life better than other firefighting methods.



Foam is generated by combining air with an aqueous solution comprising a mix of water and extinguishing agent in fixed proportions.

Note: This image was sourced from the internet and is not a representation of activities at RAAF Base Townsville.

Figure 3.1 Example how the foam delivery equipment produces foam via mixing the liquid 'foam' agent with water and air

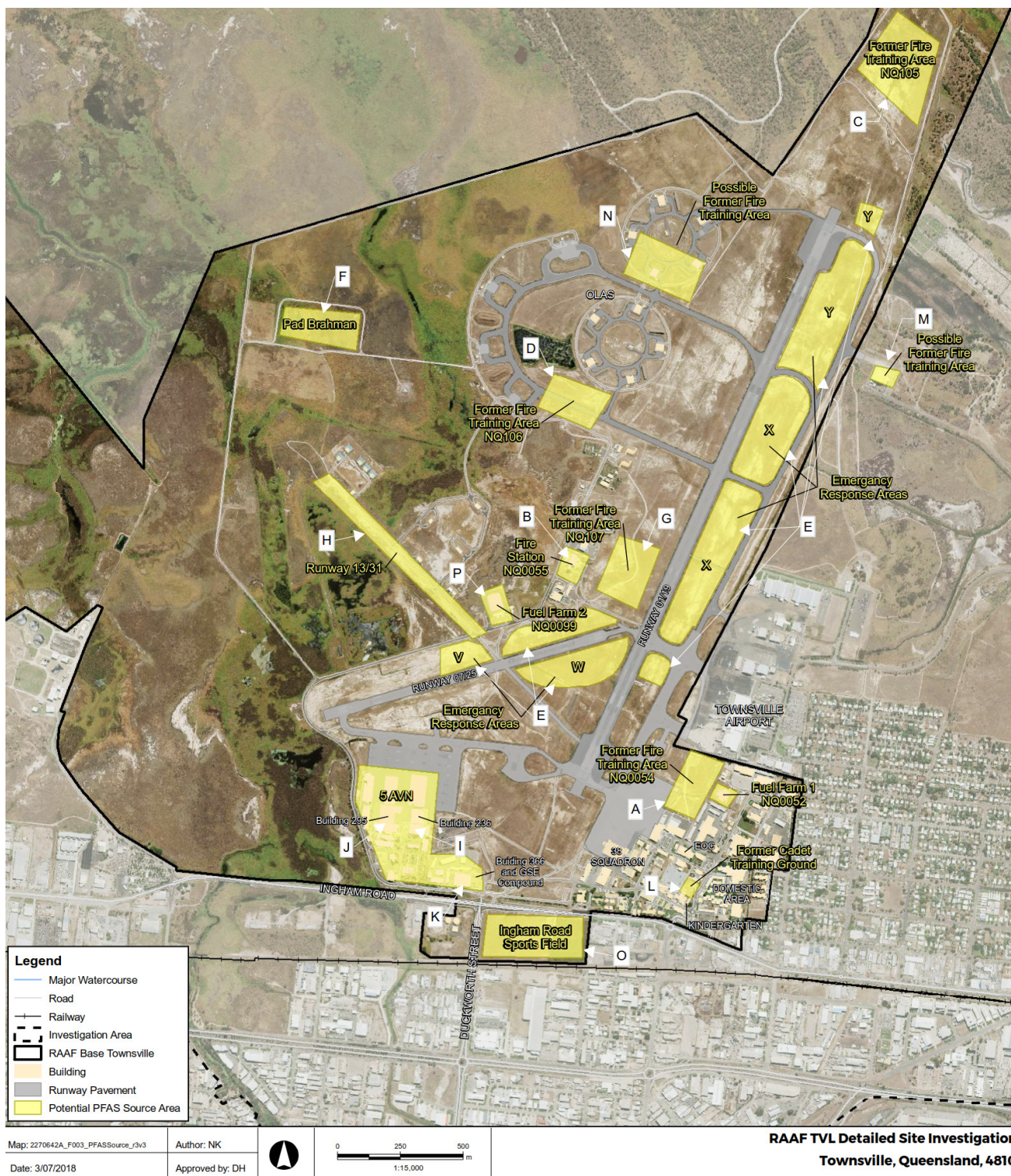
Firefighting foam is supplied and stored (prior to use) in a liquid form. During application, the firefighting foam 'liquid' is mixed with water and air (under pressure) and forced through a nozzle to create a foam (refer to Figure 3.1 above).

3.4 USE OF FIRE FIGHTING FOAM AT RAAF BASE TOWNSVILLE

The use of AFFF (containing PFAS) at RAAF Base Townsville was related to the following activities:

- **Mobile firefighting capability** – RAAF Base Townsville maintains an on-Base emergency firefighting capability related to aircraft operations. This includes:
 - **Firefighting training** – To maintain the firefighting capability, firefighting training was conducted on a regular basis (e.g. weekly)
 - **Testing and maintenance of foam dispersion equipment** – routine testing of fire-fighting equipment and testing of fire suppression systems on vehicles; and
 - **Emergency response** – Any situation where the firefighting capability was deployed, e.g. Aircraft accidents, fuel spills, etc.
- **Above ground fuel farms** – there was the potential for equipment testing and purging of fire truck tanks to have occurred within the fuel farm areas.
- **Aircraft Hangers** – Fixed fire suppression systems charged with AFFF were installed within several hangars located on RAAF Base Townsville.
- **Open Day Demonstrations** – AFFF was sprayed to the ground at two on-Base area's during annual "Open Day Demonstrations".

Potential source areas/activities are outlined in Figure 3.2 and discussed in more detail in Table 3.2.



Note: Figure extracted from Figure 3 of the WSP (2018) DSI report.

Figure 3.2 Areas where firefighting foam was known or suspected to have been used

Table 3.2 Summary of potential firefighting foam use and identified impacts

AREA	LOCATION	POTENTIAL FOR FIREFIGHTING FOAM USE	PFAS CONCENTRATIONS IDENTIFIED (✓ / ✖) ⁽¹⁾		
			SOIL/SEDIMENT	GROUNDWATER	SURFACE WATER
Aircraft Washing Facility and Former Fire Training Ground (NQ0054) (Shown as Area A on Figure 3.2 above)	Approximately 200 m to the east of the southern extent of the main runway (Runway 01/19).	Confirmed use. Refer to Section 3.4.1 below.	✓	✓	No surface water sample obtained as no surface water body present
Fire Station (NQ0055) (Shown as Area B on Figure 3.2 above)	Located approximately 300 m west of the main runway (Runway 01/19) and 200 m north of Runway 07/25 (centrally located on Base).	Confirmed use. Refer to Section 3.4.2 below.	✓	✓	✓
Former Fire Training Ground (NQ0105) (Shown as Area C on Figure 3.2 above)	Approximately 530 m north of the northern extent of the main runway (Runway 01/19).	Confirmed use. Refer to Section 3.4.3.1 below.	✓	✓	✓
Former Fire Training Ground (NQ0106) (Shown as Area D on Figure 3.2 above)	Approximately 540 m west of the main runway (Runway 01/19) and south of the ordnance loading aprons (OLA).	Confirmed use. Refer to Section 3.4.3.2 below.	✓	✓	✓
Emergency Response areas – Runway 07/25 and Runway 01/19 (Shown as Area E on Figure 3.2 above)	Various locations across the Base (exact locations and number of emergency response events is not known).	Confirmed use. Refer to Section 3.4.4 below.	✓	✓	No surface water sample obtained as no surface water body present
Pad Brahman (Shown as Area F on Figure 3.2 above)	Located within the north-western corner of the base (to the northwest of the base runways).	Likely use. Refer to Section 3.4.5 below.	✓	✓	✓
Fire Training Area Site Q (NQ0107) (Shown as Area G on Figure 3.2 above)	Located adjacent to the west of the main runway (Runway 01/19) and to the east of the Fire Station.	Confirmed use. Refer to Section 3.4.3.3 below.	✓	✓	No surface water sample obtained as no surface water body present ⁽²⁾
Disused Runway 13/31 (Shown as Area H on Figure 3.2 above)	Located to the northwest of Runway 07/25.	Confirmed use. Refer to Section 3.4.6 below.	✓	✓	✓ – south of disused runway

AREA	LOCATION	POTENTIAL FOR FIREFIGHTING FOAM USE	PFAS CONCENTRATIONS IDENTIFIED (✓ / ✖) ⁽¹⁾		
			SOIL/SEDIMENT	GROUNDWATER	SURFACE WATER
5 AVN C Squadron Hangar (Building 236) (Shown as Area I on Figure 3.2 above)	Approximately 650 m west-south-west from the southern extent of the main runway (Runway 01/19).	Confirmed use. Refer to Section 3.4.7 below.	✓	✓	✓
5 AVN A/B (Building 295) (Shown as Area J on Figure 3.2 above)	Approximately 750 m west-south-west from the southern extent of the main runway (Runway 01/19).	Confirmed use. Refer to Section 3.4.8 below.	✓	✓	✓
5 AVN Wash Point (Building 366) and GSE Compound (Shown as Area K on Figure 3.2 above)	Approximately 600 south-west from the southern extent of the main runway (Runway 01/19).	Confirmed use. (Refer to Section 3.4.9 below).	✓	✓	✓
Former Cadet Training Area (Domestic Area) (Shown as Area L on Figure 3.2 above)	Approximately 550 m south-east from the southern extent of the main runway (Runway 01/19).	Confirmed use. Refer to Section 3.4.10 below.	✓	✓	✓
Former Fire Training Area (Shown as Area M on Figure 3.2 above)	Approximately 400 m east from the northern portion of the main runway (Runway 01/19) (now Off-Base).	Possible use. Refer to Section 3.4.11 below.	NA	NA	NA
Former Fire Training Area (Shown as Area N on Figure 3.2 above)	North of the OLAs, approximately 450 m east from the northern extent of the main runway (Runway 01/19).	Possible use. Refer to Section 3.4.12 below.	NA	NA	NA
Ingham Road Sports Field – “Open Day Demonstrations” Shown as Area O on Figure 3.2 above)	Adjacent to the southern side of Ingham Road, east of Duckworth Street.	Confirmed use. Refer to Section 3.4.13 below.	✓	✓	✓ – south-west of sports field
Fuel Farm 2 (NQ0099) (Shown as Area P on Figure 3.2 above)	Fuel Farm 2 was located to the north of Runway 07/25.	Likely use. Refer to Section 3.4.14 below.	✓	✓	No surface water sample obtained as no surface water body present

Notes:

- (1) ✓ = detected ✖ = below laboratory reporting limits. Based on identified PFAS concentrations in the DSI (WSP 2018).
- (2) NA – indicates not applicable as no sampling of relevant media undertaken within specific area. Refer Section 7.7 for details regarding the suitability of the datasets for the HHRA.

3.4.1 AIRCRAFT WASHING FACILITY AND FIRE TRAINING GROUND (AREA A)

The Aircraft Washing Facility and Fire Training Ground area was located approximately 200 m to the east of the southern extent of the main runway (Runway 01/19) and comprised the following features:

- An unsealed flat grassed area; and
- A drainage channel traversing through the southern portion of the area (refer to Figure 3.3).



Figure 3.3 Aircraft washing facility and fire training ground (aerial view)

Based on information provided by former Fire Service personnel, the former fire training ground area was used up until late 2005.

Routine fire training and equipment testing activities were conducted approximately once a week (using a 6% 3M Lightwater™ AFFF concentrate) where approximately 200 L of mixed AFFF concentrate and water would be discharged onto the ground.

Testing and fire training activities were conducted across the entire area. However, most of the testing activities were conducted in the southern portion of the area to the south of the drainage channel.

No live fire training exercises are known to have been conducted within the area.

3.4.2 FIRE STATION (NQ0055) (AREA B)

The Fire Station was located approximately 300 m west of the main runway (Runway 01/19) and 200 m north of Runway 07/25 (centrally located on Base) (refer to Figure 3.4) and comprised the following features:

- Station building within the northern portion of the area and flat grass area to the south; and
- A small bunded fire training area.



Figure 3.4 Fire station (aerial view)

A small bunded fire training area is located on the western side of the area with a 2,000 L separator attached in which 'hot fire' training using hand held fire extinguishers is conducted. Waste water flows into a sump and is disposed off-Base.

Adjacent to the north of the live fire training area, the area was used for fire training with AFFF. A drum storage shed (Building 115) is adjacent to the fire station building, in which AFFF, fuel and oil were stored in 200 L drums on unsealed earth.

Anecdotal information indicated that the grassed area to the east of the fire station was used extensively to purge fire trucks that had contained AFFF. In addition, an old fuel tanker was located to the northeast of the fire station, which appeared to be have been ignited for live fire training exercises.

3.4.3 FORMER FIRE TRAINING GROUNDS (AREAS C, D AND G)

Several former Fire Training Ground Areas were used across the base and are described in the following sections.

3.4.3.1 NQ0105 (AREA C)

A Former Fire Training Ground (NQ0105) was located approximately 530 m north of the northern extent of the main runway (Runway 01/19). At the time of the DSI, the area was generally flat and consisted of grassed and unvegetated areas.



Figure 3.5 Former fire training ground (NQ0105) (aerial view)

Anecdotal information indicated that the Former Training Ground consisted of four discrete areas and that the grounds were used for intense live fire training activities in the 1970s and 1980s, however the exact location and timing of the fire training activities within the grounds are uncertain.

3.4.3.2 NQ0106 (AREA D)

A Former Fire Training Ground (NQ0106) was located approximately 540 m west of the main runway (Runway 01/19) and south of the OLAs. At the time of the DSI, the southern OLA taxiway traverses through the middle of the former training area.



Figure 3.6 Former fire training ground (NQ0106) (aerial view)

Anecdotal information indicated that the Former Training Ground consisted of two discrete areas used for fire training prior to the construction of the OLAs in 2000. Fire training activities in this area generally involved the burning of any available fuels and scrap materials in un-lined earthen pits. Interviews conducted during the DSI confirmed the above information. This area has undergone extensive earthworks as part of the construction of the OLAs.

3.4.3.3 SITE Q (NQ0107) (AREA G)

A former fire training area was located adjacent to the west of the main runway (Runway 01/19) and to the east of the Fire Station (as previously noted). The area consisted of grass vegetation.

Anecdotal information indicated that the firefighting activities conducted in this area consisted of burning of car bodies, tyres, paints and fuels.



Figure 3.7 Former fire training area (NQ0107) (aerial view)

3.4.4 EMERGENCY RESPONSES (AREA E)

Emergency Responses were required due to incidents/crashes on the Base. Four discrete areas were identified as being potentially contaminated due to the emergency responses. These potentially impacted areas were grouped as being:

- Adjacent to the north and south of Runway 07/25; and
- Adjacent to the east of the main runway (Runway 01/19).



Figure 3.8 Emergency response area potentially impacted (aerial view)

Anecdotal information indicated that two known incidents requiring emergency responses had occurred at the base:

- 1985/1986 – A4 Skyhawk crash during heaving storms
Information provided indicated that AFFF deployed as a result of the crash had been “washed away” by rainfall during the following night.
- 1993 – Royal Flying Doctor’s Service Beechcraft.
No further information with respect to the nature of the incident and/or type/volume of AFFF deployed was provided. The exact locations of the two abovementioned incidents is not known.

3.4.5 PAD BRAHAM (AREA F)

Pad Braham is a grassed area located within the north-western corner of the base (to the northwest of the base runways), used for helicopter training.



Figure 3.9 Pad Braham (aerial view)

Anecdotal information indicated that a vehicle rollover had occurred (date unknown) that resulted in the spillage of approximately 980 L of AFFF (3M Lightwater™) concentrate.

In addition, information provided indicated that the area had historically been used for fire-fighting training. However, no further details were provided.

3.4.6 DISUSED RUNWAY 13/31 (AREA H)

The disused runway (Runway 13/31) was located to the northwest of Runway 07/25. The area comprised of a bitumen road (former runway) and grass verge on either side.

With respect to AFFF use, anecdotal information indicated that the disused runway was historically used for live fire training activities (generally the western end of the runway) including the burning of aircraft and vehicle shells. During the 1970s (over a three-year period) used tyres were assembled into a “mock-plane” and set alight for training purposes.

Sparging of AFFF from fire trucks was regularly undertaken on a weekly basis along the entire length of the runway. Up to 50 L of AFFF was discharged at each event.

In addition, the area is also used for the stockpiling of impacted soils generated by on-Base development activities.



Figure 3.10 Disused runway 13/31 (aerial view)

3.4.7 BUILDING 236 – 5 AVN C SQUADRON HANGAR (AREA I)

Building 236 is a hangar located in the south-west portion of the Base, approximately 650 m west-south-west from the southern extent of the main runway (Runway 01/19). This area comprises the following:

- Hangar building
- Surface water interceptor (Asset 381).



Figure 3.11 Building 236 (aerial view)

Building 236 is a hangar, which contained an AFFF-charged fire deluge system until mid-2017, after which it was changed to a water-charged deluge system. The internal floor and apron (east) of the hangar is concrete.

Surface water drainage from the hangar flows east to a drain with a concrete base and grassed banks. The surface water interceptor is located at the edge of the concrete slab. Overflow from the interceptor flows south, discharging in Peewee Creek at the Base's south-western corner.

3.4.8 BUILDING 295 (AREA J)

Building 295 is a hangar located in the south-west portion of the Base, approximately 750 m west-south-west from the southern extent of the main runway (Runway 01/19). This area comprises the following:

- Hangar building
- Separation tank (Asset 271) linked to a surface water drain from the hangar
- Interceptor pit (Asset 016) linked to a surface water drain from the hangar.



Figure 3.12 Building 295 (aerial view)

Building 295 is a hangar with an AFFF-charged fire deluge system. The hangar has a concrete base and is surrounded by a concrete apron.

GHD (2011) reported historical discharges of AFFF from this area as a result of accidental triggers of the fire suppression systems and spills from the overflows of the separation tank.

Golders (2012K) reported that an incident involving leakage or overflow of diluted AFFF from the separation tank occurred in July, 2012.

It is understood that surface water drainage from the hangar flows westwards, entering a drain on the wester Base boundary, via a separation tank. The drain flows northwards to an interceptor pit, from which water discharges westwards to wetlands associated with Louisa Creek.

3.4.9 5 AVN WASH POINT (BUILDING 366) AND GSE COMPOUND (AREA K)

Building 366 and the GSE compound is located at the southern boundary of the Base approximately 600 south-west from the southern extent of the main runway (Runway 01/19). This area comprises the following:

- **Building 366:** Comprising awash bay, including a collection sump and small water treatment plant (foam fractionator).
- **Ground Support Equipment (GSE) compound:** Comprising a laydown area that was used for the storage of AFFF drums.



Figure 3.13 Building 366 and GSE compound (aerial view)

GHD (2011) reported that the wash bay was a designated area for testing AFFF systems on vehicles. It is understood that the sump is designed to collect impacted water from the wash bay for removal by pumping and treatment in the foam fractionator. However, it was observed that overflows of untreated water from the sump had occurred, discharging to the grassed area to the north of the wash bay.

The GSE area used to store drums of AFFF, has not always been sealed and has never been bunded. However, GHD (2011) reported that there were no indication of spills/leaks of AFFF in this area.

Surface water drains from the GSE compound north to the grassed area. Surface water then flows from the grassed area into a swale that runs north before joining a drain that runs west, and then runs south Off-Base, discharging into Peewee Creek.

3.4.10 FORMER CADET TRAINING AREA (AREA L)

This former fire training area is located in the grassed area and former barracks within the Domestic Area, approximately 550 m south-east from the southern extent of the main runway (Runway 01/19).



Figure 3.14 Former cadet training area (aerial view)

Based on information provided by former fire service personnel at the base, fire training was undertaken in this area.

In addition, it is understood that AFFF was generated in this area during annual “Open Day Demonstrations”. Approximately one truck load (~200 L) of foam was produced at each event during the 1970s and 1980s. It is unknown when these demonstrations ceased.

Drainage from this area runs via a piped network into the open drain that runs along the Base’s eastern boundary.

3.4.11 FORMER FIRE TRAINING AREA (AREA M)

This former fire training area is located in the area of an existing hangar approximately 400 m east from the northern extent of the main runway (Runway 01/19). The hangar is currently used by a pilot training school and helicopter rental company and is now Off-Base.



Figure 3.15 Former fire training area (aerial view)

Based on information provided by former fire service personnel at the base, fire training was undertaken in this area, pre-dating the building of the current hangar (approximately 1990) and access taxiway.

Surface water drainage from this area enters the open drain on the eastern side of the Base, which forms part of the Mundy Creek catchment.

3.4.12 FORMER FIRE TRAINING AREA (AREA N)

This former fire training area is located in an area north of the OLAs, approximately 450 m east from the northern extent of the main runway (Runway 01/19).



Figure 3.16 Former fire training area (aerial view)

Based on information provided by former fire service personnel at the base, fire training was undertaken in this area during the 1970's. The area currently drains externally to the wetlands west of the OLAs. The surface water drainage in this area during the period of fire training is unknown. However, based on historical aerial photography, it appears to have been south-westerly towards ponds in the current location of the OLAs or westerly to the Town Common.

3.4.13 DEFENCE PLAYING FIELDS (AREA O)

The defence playing fields are located adjacent to the southern side of Ingham Road, east of Duckworth Street.



Figure 3.17 Defence playing fields (aerial view)

Based on information provided by former fire service personnel at the base, AFFF foam was generated during the defence playing fields annual “Open Day Demonstrations”. Approximately one truck load (~200 L) of foam was produced at each event during the 1970s and 1980s. It is unknown when these demonstrations ceased.

Drainage from these fields runs along open drains westwards to join Peewee Creek, upstream of Ingham Road.

3.4.14 FUEL FARM 2 (AREA P)

Fuel Farm 2 was located to the north of Runway 07/25.

The use of AFFF is not known to have occurred in this area. However, there was a potential for equipment testing and sparging of fire truck tanks to have occurred at Fuel Farm 2.

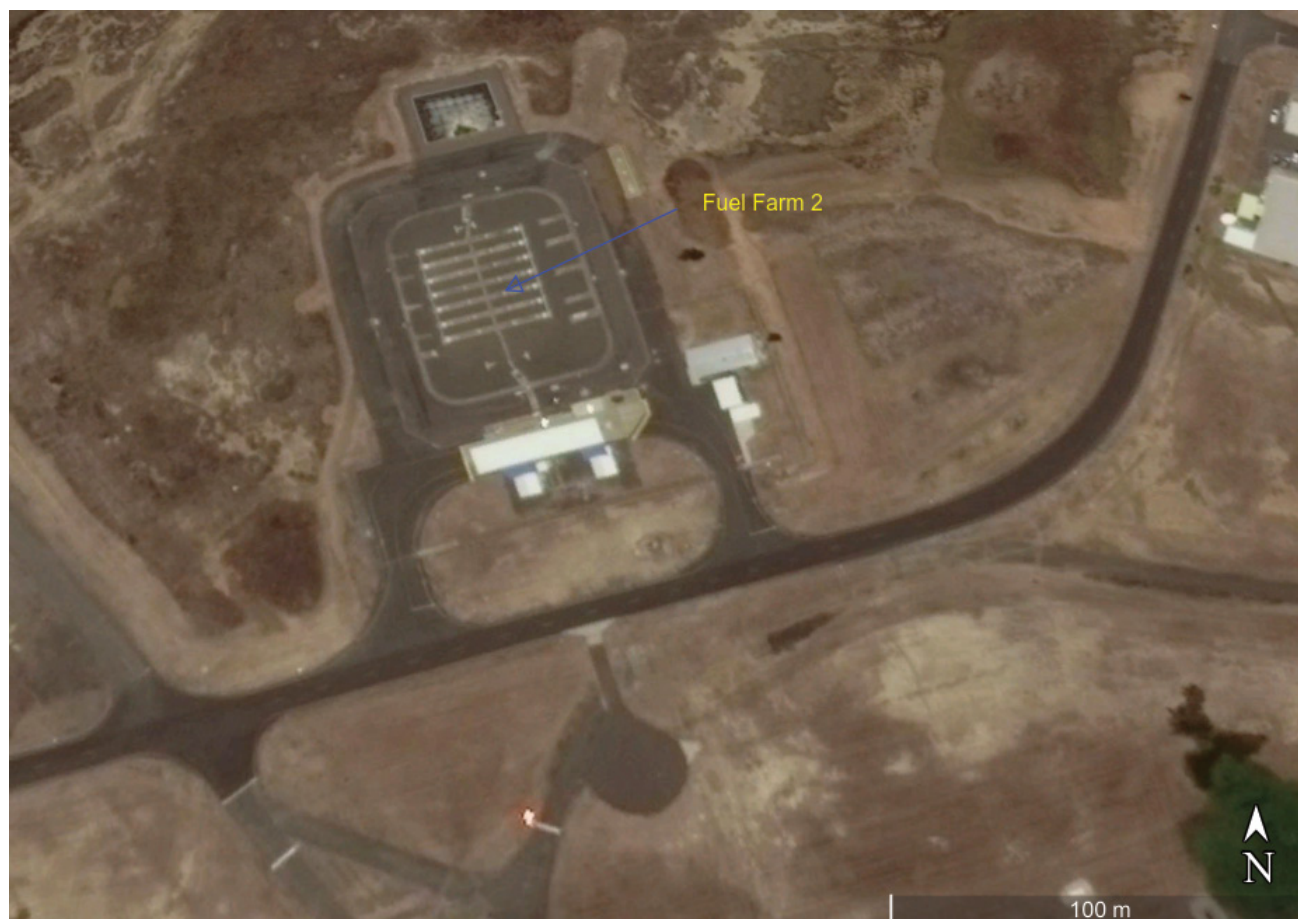


Figure 3.18 Fuel Farm 2 (aerial view)

3.4.15 OTHER POTENTIAL SOURCES OF CONTAMINATION

Other diffuse or unidentified sources may also be present, for example:

- Daily testing of equipment and sparging of tanks; mostly undertaken between the fire station and Runway 01/19, multiple “random” locations along roadways were used on occasion to provide a variety of scenarios.
- Spills, including the following two reported incidents (it is noted that Defence personnel suggested that neither of these spills were ‘cleaned-up; and that the AFFF seeped into the ground):
 - A spill of approximately 200 L of dilute AFFF from a fire truck at the front (eastern side) of the fire station, which ponded in the depression next to the access road to the south-east of the fire station; and
 - A spill of approximately 50 L of dilute AFFF from a fire truck that ran beneath the aircraft body on the southern side of disused Runway 13/31.
- Potential for equipment and sparging of fire truck tanks to have occurred at Fuel Farm 1.

4 IDENTIFICATION OF THE INVESTIGATION AREA

4.1 GENERAL LOCATION

RAAF Base Townsville is located approximately 5 km west-north-west of the Townsville CBD in Queensland. It covers an area of approximately 738 hectares (ha) and is a joint use military and civilian airfield facility.

The Investigation Area is not specifically defined by survey, but is generally the area shown on Figure 4.1 and comprises:

- The RAAF Base Townsville
- Townsville Airport
- Townsville City Council (TCC) areas (including residential communities); and
- The Ecological area, consisting of the Town Common and the Bohle River estuary and banks upstream to the Bruce Highway Bridge (Ingham Road).



Figure 4.1 Nominated investigation area (aerial view). The investigation area is identified as the area within the black dashed line. The Base boundary is shown as the solid black line

The rationale for the selected Investigation Area boundaries is summarised in Table 4.1 below.

Table 4.1 Rationale for nomination of investigation area boundaries

AREA BOUNDARY	DESCRIPTION/RATIONALE
East – off-Base	Description: <i>Townsville Airport</i> Rationale: No confirmed potential PFAS source areas are known on Townsville Airport. However, the grassed area in the northern section of the airport may have been used to clean fire-fighting equipment, including cleaning out AFFF tanks (GHD 2011). Townsville Airport shares the same runway (Runway 01/19) as the Base, the drains near the runway and on the eastern border of the Base, run through Townsville Airport, into Rowes Bay and exit at Mundy Creek. Groundwater flow directions from nearby potential PFAS source zones (namely the Former Training Area NQ0054, the Cadet Training Ground and Fuel Farm 1 (as described in Section 2) were reported to potentially vary from north-westerly to easterly. Therefore, given the above factors, the likelihood of PFAS migrating towards the Townsville Airport from the Base is considered moderate to high.
East, South and West – off-Base	Description: <i>Townsville City Council Areas</i> The TCC areas located within the Investigation Area include the suburbs of Mount St John, Bohle, Pallarenda and Rowes Bay, and parts of Belgian Gardens, Garbutt, West End, Mount Louisa, and Cosgrove, and has an area of approximately 2,506 ha. The suburbs of Pallarenda, Rowes Bay, West End and Belgian Gardens are primarily residential; however, various public facilities and parklands also exist within these suburbs. Rationale: There are likely to be background off-Base sources of PFAS from the TCC areas within the Investigation Area and these are discussed further in Section 4.1.1. Groundwater flow directions from nearby potential PFAS source zones (namely the Former Training Area NQ0054, the Cadet Training Ground and Fuel Farm 1 (as described in Section 2) were reported to potentially vary from north-westerly to easterly. Therefore, given the above factors, the likelihood of PFAS migrating towards the suburb of Garbutt from the Base is considered moderate to high.

AREA BOUNDARY	DESCRIPTION/RATIONALE
North and North-west – off-Base	Description: <i>Ecological Area</i> The part of the Investigation Area referred to as the ‘Ecological Area’ comprises: — The Town Common, which is zoned “Public Utilities – Townsville City Council (Reserves)” and “Special Uses – National Parks” (TCC 2014) — The Bohle River and Bohle River estuary, which is unzoned; and — The banks of the Bohle River and Bohle River Estuary, including parts of the suburbs of Bushland Beach, Mount Low, Burdell, Bohle and Cosgrove. The zoning for this land is either “Vacant Land”, “Rural – Cattle Grazing (Breeding & Fattening)” or “Special Uses – Parks and Recreation (Reserves)” (TCC 2014). The total area of the Ecological Area is approximately 4,460 ha. Rationale: The Town Common was historically used for the grazing of cattle; however, this practice was halted in the 1990s and all “wild” cattle were removed from the Town Common in the 2000s. The Ecological Area of the Investigation Area includes a large part of the estuarine system and drainage from the Bohle River, including Peewee Creek, Louisa Creek, and Three Mile Creek. Within the Town Common, a 1.07 ha perennial lake is located near Causeway Road and Freshwater Lagoon Road. There are approximately three rural water storage areas throughout the Town Common. The Town Common receives surface water run-off from the Base and from the TCC suburbs of Bohle, Mount Louisa and part of Garbutt. Groundwater flow from the Base is partially radial, being westward from 5 AVN, north-westerly from the fire station and OLAs, north-easterly from Townsville Airport and easterly from the domestic area of the Base. Groundwater flows westerly to Peewee Creek/Louisa Creek, north-westerly to the Town Common wetlands and north-easterly and easterly to the Mundy Creek catchment and Rows Bay. Therefore, given the above factors, the likelihood of PFAS migrating towards the Ecological Area from the Base (and potentially the TCC areas) is considered moderate to high.

4.1.1 POTENTIAL OFF-BASE SOURCES WITHIN THE TCC AREA

There are likely to be background off-Base sources of PFAS within the TCC Areas of the Investigation Area, which are discussed below (Table 4.2) for context and depicted within Figure 4.2.

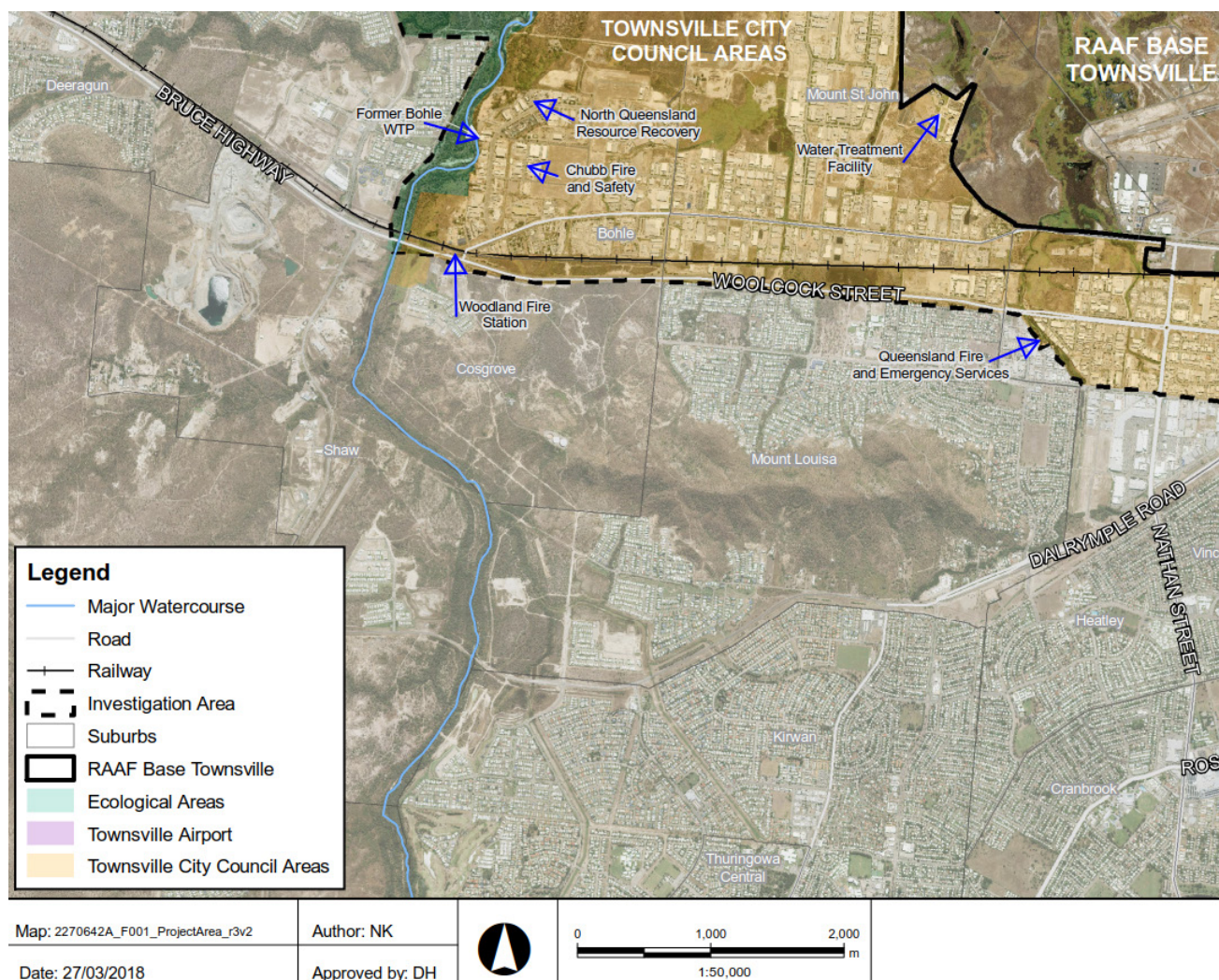


Figure 4.2 Potential background off-Base sources of PFAS within the TCC Areas of the Investigation Area (aerial view)

Table 4.2 Potential off-Base PFAS sources within the TCC areas

FEATURE	DESCRIPTION
Woodlands Fire Station	Where AFFF handling and fire training may occur.
Queensland Fire and Emergency Services Northern Region Mechanical Workshop	Where AFFF handling and fire training may occur.
Mount St John Water Treatment Plant (WTP)	Mount St John WTP where treatment of PFAS contaminated water may have occurred. The plant discharges water to the Town Common and eventually the Bohle River via an open drain/creek. Treated water is also piped to the Rowes Bay Golf Club for irrigation purposes. The PFAS removal efficacy for the WTP is not known. Trade waste from industrial sites in Bohle will be treated at Mount St John WTP and so whilst some point sources may not have discharged to ground, there is the potential that PFAS from their operations may have inadvertently been discharged into the environment via current and former water treatment facilities. The disposal fate of biosolids from the WTP is not currently known and if some or all of this disposal is located within the vicinity of the Investigation Area, it may also serve as a secondary source of PFAS into the environment.
Rowes Bay Golf Club	Irrigation water from the Mount St John WTP is piped to the Rowes Bay Golf Club. The PFAS removal efficacy for the WTP is not known. As the Rowes Bay Golf Club is proximate to the on-Base Rowes Bay Landfill and the surface water discharge point which discharges water from the northern end of the Base, the golf club may be a confounder to the assessment in the northern portion of the Base.
North Queensland Resource Recovery	Waste soil and water received by the facility may contain PFAS.
Chubb Fire and Safety	Where AFFF handling may occur.
The former Bohle WTP	The former Bohle WTP, which was operational prior to the commissioning of the Mount St John WTP, may have treated PFAS-impacted water. The former Bohle WTP discharged directly into the Bohle River.

4.2 OTHER GEOGRAPHIC LANDMARKS NOTED BY THIS REPORT

Several other geographic locations are noted/discussed within this HHRA report; these features are described below in Figure 4.3 and Table 4.3 for context.



Figure 4.3 Geographic features and areas of interest referred to within this report (aerial view)

Table 4.3 Geographic feature and description

FEATURE	DESCRIPTION
Belgian Gardens	Belgian Gardens is primarily a residential suburb, located approximately 1.5 km east from the site.
Bohle River	The Bohle River and estuary (as a receiving body of the Louisa Creek) is one of the four primary receiving surface water catchments of the Investigation Area. The Bohle River is located approximately 5 km east of the operational areas of the Base. The Bohle river traverses north discharging to Halifax Bay, approximately 7.5 km north of the Bruce Highway bridge. Surface water from the western portion of the Base drains directly into Peewee and Louisa Creeks and the Town Common to the Base's west and north-west, eventually discharging to Halifax Bay via the Bohle River estuary. During the assessment works (DSI report, WSP 2018), the upper reaches of the Bohle River was the only watercourse in the Investigation Area to have observable fresh flowing water that was not tidally influenced.
Cleveland Bay	Cleveland Bay is located within the Coral Sea, east of Rowes Bay. Cleveland Bay is expected to receive water from the following receptors: — The Town Common — Three Mile Creek and associated wetlands — Mundy Creek and associated wetlands.
Garbutt	The suburb of Garbutt includes the Base and Townsville Airport and is a mix of approximately 50% residential and 50% commercial/light industrial land use. The suburb also includes Garbutt State School.
Halifax Bay	Halifax Bay receive waters from the following receptors: — The Town Common — Louisa Creek and associated wetlands (including Peewee Creek) — Bohle River.
Louisa Creek	Louisa Creek runs along the western side of the base and is one of the three primary receiving surface water catchments of the Investigation Area. During the assessment works (DSI, 2018), the upper reaches of Louisa Creek had no running water and was heavily reed and weed infested. The discharge from the Mount St John WTP enters Louisa Creek approximately 800 m downstream of the Base, and water was observed to be flowing intermittently downstream of this point. Tidal influence was observed approximately 2 km downstream of the discharge point, and mangroves line the creek banks downstream from this location. Fish and invertebrates were commonly observed downstream of the tidal zone.
Mount Saint John Drain	Drainage of a catchment to the west enters the Base through the Mount St John Drain. The Mount St John Drain is separated from Louisa Creek by an elevated ridge line and the Mount St John water treatment plant (WTP). The primary flow path of the drain is north, away from the Base; however, in high flow event there is potential for flow to back up around the ridge line into Louisa Creek, impacting the Base.

FEATURE	DESCRIPTION
Mundy Creek	Mundy Creek is located east from the Base and is one of the four-primary receiving surface water catchments within the Investigation Area. A network of drains in the south-east corner of the Base flow off-Base to the east and then north into the Mundy Creek catchment and, in turn, Rowes Bay. A drainage network runs north between Runway 01/19 and the eastern boundary of the Base. These drains run north and south and discharge into the drain at the end of Old Common Road. This watercourse flows east into Mundy Creek and then Rowes Bay.
Pallarenda	Pallarenda is primarily a residential suburb, located 3.5 km north from the Base.
Peewee Creek	Peewee Creek drains mostly an urban catchment of 156 ha to the south-east of the Base. It is a small urbanised water course that terminates at Ingham Road and flows into Louisa Creek via culverts under Blakey Street. However, in high flow events it flows directly into the Base, overtopping Ingham Road.
Rowes Bay (suburb)	Rowes Bay is primarily a residential suburb, located adjacent to the eastern Base boundary.
Rowes Bay (water feature)	Rowes Bay receive waters from the following receptors: — The Town Common — Three Mile Creek and associated wetlands — Mundy Creek and associated wetlands.
Three Mile Creek	Three Mile Creek is located north from the Base and is one of the four-primary receiving surface water catchments within the Investigation Area. A drainage network runs north between the OLAs and Runway 01/19, which discharges from the Base through valved pipework on the Base's northern boundary. The discharge then runs northerly through a network of wetlands past the Rowes Bay Golf Club and into Three Mile Creek. A drain runs along the Base's eastern boundary at the northern end of the Base beyond Runway 01/19 and discharges at the Base's north-eastern corner into the wetlands that run north past Rowes Bay Golf Club.
Town Common	The majority of the Town Common is designated a Conservation Park under the <i>Nature Conservation Act 1992</i>. The Town Common and the estuarine reaches of the Bohle River are part of the Bohle River Fish Habitat Area (FHA-027), which is designated 'Management Level B' (NPSR 2012) for its importance to recreational, traditional and commercial fisheries (NPSR 2012). The estuarine reaches of the Town Common are mapped as having a very high aquatic conservation value under the Queensland Aquatic Conservation Assessment (AquaBAAM) mapping (Rollason and Howell 2012). The freshwater wetlands are mapped as having high ecological significance and matters of State environmental significance (MSES) under the State Planning Policy (SPP) (DILGP 2017). The Town Common is classified 'Category B – Remnant vegetation' on the Regulated Vegetation Management Map, with a section at the centre of the Town Common classified as 'Essential Habitat Category A or B'.

5 MOVEMENT OF PFAS WITHIN THE ENVIRONMENT

5.1 GENERAL

As noted in Section 3.2, PFAS have several unique properties that result in its widespread distribution and persistence within the environment.

The first stage of the distribution process occurs following the initial release of foam (containing PFAS) into the environment. The example below provides a simple cross section illustration of how this first stage occurs and results in contamination of **soil**, **surface water** and **groundwater** within the immediate vicinity of the point of release.

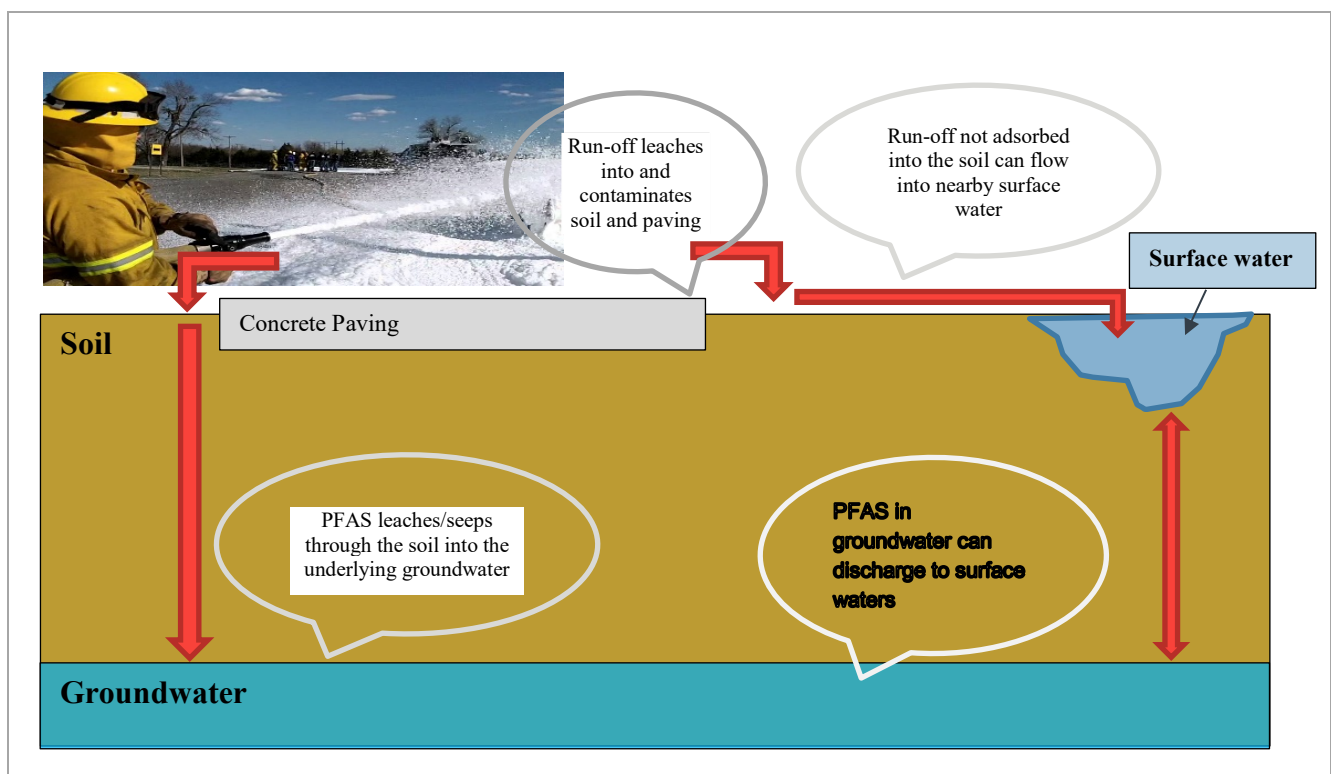


Figure 5.1 Simple illustration depicting the initial release of PFAS into the environment

Following the initial release, PFAS can then move through the environment via the following mechanisms:

- **Surface water movement** – PFAS dissolved in surface water will move in the same direction and at the same rate as surface water flow.
- **Groundwater movement** – PFAS dissolved in groundwater will move in the same direction and at the same rate as groundwater flow. However, the surfactant properties of PFAS can also result in some lateral (or cross hydraulic gradient movement).
- **Interaction between groundwater and surface water:**
 - Surface water – When traveling over permeable soils, surface waters (containing PFAS) will seep into the underlying soils. This water will (in turn) migrate vertically to the underlying groundwater. Therefore, the surface water becomes a ‘secondary’ source of PFAS contamination that can cause groundwater contamination in areas not directly down hydraulic gradient (for groundwater) of the original source/release point.

- Groundwater – Similarly, groundwater containing PFAS may also discharge to a surface water body resulting in contamination of the surface water (e.g. where groundwater discharges into Mundy Creek).
- Seasonal variation – In a tropical climate, the interaction between groundwater and surface water can vary significantly between/during seasons. Therefore, the extent and magnitude of PFAS within groundwater and surface water can also vary.
- **Soil movement** – Natural soil movement (i.e. via wind) is generally not a significant transport mechanism in vegetated (or semi vegetated areas).
- **Biota** – Uptake of PFAS by plants and animals (i.e. biota) can occur via several different mechanisms. However, the predominant pathway is understood to be ingestion of water and consumption of other animals that contain PFAS. As noted in Section 3.2 above, PFAS can bioaccumulate in biota resulting in the biota reporting higher concentrations (of PFAS) than the surrounding environment.
- Movement (or migration) of biota throughout the habitat may also result in the distribution of PFAS within the environment (i.e. via excretion or decay).
- For example, fish will move throughout available waterways. During its lifecycle, it will ingest and excrete PFAS, and at the end of its lifecycle any PFAS stored within the body of the fish will be released back into the environment as it decays. Individually, the amount of PFAS released would not be significant, however, when considering the total biomass across the IA, this potential secondary source may become significant.
- **Human intervention:**
 - Groundwater – extraction and use of groundwater and surface water.
For example, pumping PFAS contaminated groundwater for irrigation can result in PFAS contamination of soil and surface water runoff.
Extraction of contaminated groundwater for domestic use (i.e. irrigation of plants and stock watering) is the primary pathway for PFAS to contaminate domestic food products.
 - Soil – Excavation of PFAS contaminated soils/materials and relocation of these soils/materials may also result in secondary contamination of previously uncontaminated area.

5.2 ENVIRONMENTAL FACTORS RELEVANT TO PFAS DISTRIBUTION WITHIN THE INVESTIGATION AREA

Prescribed environmental values (EVs) for receiving waters from the Base that lie within the area subject to the *Ross River Basin and Magnetic Island Environmental Values and Water Quality Objectives* (EHP, 2013b) were discussed in the DSI Report (WSP, 2018) and have been reproduced in Table 5.1. Furthermore, under the *Environmental Protection Act 1994*, general obligations associated with public safety and amenity (e.g. vapour intrusion, direct contact in a utility trench) also potentially apply where applicable and have been presented in Table 5.1. The objective of the HHRA is to identify current exposure pathways and assess the potential health risks associated with those determined to be complete, thus only EVs that are potentially impacted by complete exposure pathways have been discussed in the sections below.

Table 5.1 Prescribed water environmental values within the IA

PRESCRIBED ENVIRONMENTAL VALUE		GROUNDWATERS	TOWN COMMON FRESH & ESTUARINE WATERS	BOHLE RIVER ESTUARINE WATERS	LOUISA CREEK FRESH & ESTUARINE WATERS	ROSS CREEK FRESH WATERS	PALLARENDA FRESH & ESTUARINE WATERS
	Aquatic ecosystems	✓	✓	✓	✓	✓	✓
	Irrigation	✓					
	Farm supply/use	✗ (incomplete)					
	Stock water	✗ (incomplete)					
	Aquaculture	✗ (incomplete)					
	Human consumer		✓ ⁽²⁾	✓	✓	✓	✓
	Primary recreation					✓	
	Secondary recreation		✓ ⁽¹⁾	✓	✓	✓	✓
	Visual recreation		✓	✓	✓	✓	✓
	Drinking water	✗ (incomplete)					
	Industrial use						
	Cultural & spiritual values	✓	✓	✓	✓	✓	✓
	Public amenity & safety	✓	✓	✓	✓	✓	✓

Notes:

- (1) Fresh water only
- (2) Estuarine water only

Within the NEPM source-pathway-receptor framework, the EVs above have only been assessed where the exposure pathway can be reasonably demonstrated to be complete. As noted in Section 5.1, the distribution of PFAS within the environment is subject to several mechanisms that are dependent upon the media (i.e. soil, surface water and groundwater) that has been contaminated. Environmental factors relevant to each media and therefore the distribution of PFAS from RAAF Base Townsville are discussed in more detail below.

5.2.1 CLIMATE

Townsville (and the surrounding region) has a tropical climate with distinct wet and dry seasons, however due to its geographical location, rainfall is not as high as elsewhere in the tropics.

The dry season generally occurs between September and May, where rainfall events are rare. During the dry season, large rivers (e.g. the Bohle River) maintain a low water level and flow, however non-tidally influenced sections of smaller surface water bodies (e.g. Louisa Creek, Mundy Creek and Three Mile Creek) stop flowing and become dry.

The wet monsoon season occurs between December and March. During the wet season, high surface water flows are experienced with many surface water bodies reporting high levels and flow rates.

The cyclical tropical climate is an important factor to understanding the distribution of PFAS within the Investigation Area (as discussed in the following sections).

5.2.2 SURFACE WATER FLOW AND RUN-OFF

The Investigation Area has four main surface water catchments, the Bohle River drainage sub-basin, Three Mile Creek, Mundy Creek and Louisa Creek, which are shown on Figure 5.2 below.

5.2.2.1 SURFACE WATER RUN-OFF FROM THE BASE

The location of the Bohle River, Louisa Creek, Mundy Creek, Three Mile Creek and wetlands on-Base and within the Town Common are shown in Figure 5.2 below.

An investigation of the Base hydrology by SMEC (2012a; 2012b) reported:

- The internal catchment of the Base catchment is approximately 700 ha, most of which drains towards the north-west into the Louisa Creek flood plain and the Bohle Estuary. The catchment is made up of mostly mix grassed and wetland areas, including Lake Lydeamore, with the remainder being buildings and hardstand. There are localised drainage issues within the south-western section of the Base due to the concentrated proportion of impervious area (5 AVN) and minimum hydraulic capacity of the drainage network. The on-Base wetlands are generally internally draining, only discharging at times of heavy rainfall.
- A network of drains in the south-east corner of the Base flow off-Base to the east and then north into the Mundy Creek catchment and, in turn, Rowes Bay. The catchment consists of a mixture of hardstand, buildings and grassed areas, the largest grassed area being the former firefighting grounds (NQ0054).
- A drainage network runs north between the (OLAs and Runway 01/19, which discharges from the Base through valved pipework on the Base's northern boundary. The discharge then runs northerly through a network of wetlands past the Rowes Bay Golf Club and into Three Mile Creek. A drain runs along the Base's eastern boundary at the northern end of the Base beyond Runway 01/19 and discharges at the Base's north-eastern corner into the wetlands that run north past Rowes Bay Golf Club.
- A drainage network runs north between Runway 01/19 and the eastern boundary of the Base. These drains run north and south and discharge into the drain at the end of Old Common Road. This watercourse flows east into Mundy Creek and then Rowes Bay.
- The area to the north of Runway 01/19 along the eastern boundary of the Base appears to drain east into the watercourse that runs south-east to the north of the Belgian Gardens Cemetery, joining Mundy Creek before flowing into Rowes Bay.

Sections of the Base adjacent to the runways subject to inundation have pumping networks designed to prevent flooding of the runways. Surface waters are pumped from sumps into the wetlands on the western, north-western and northern sides of the Base.

Therefore, any PFAS contaminated surface water run-off from the Base, is likely to have followed a similar collection/distribution pattern as the surface water collection system and discharged to wetlands within the Town Common, Louisa Creek, Mundy Creek and/or Three Mile Creek (and ultimately the Bohle River/Halifax Bay and Rows Bay). As noted in Section 5.2.1, Seasonal rainfall events would likely have also contributed PFAS distribution in a periodic/cyclical manner rather than a continuous one.

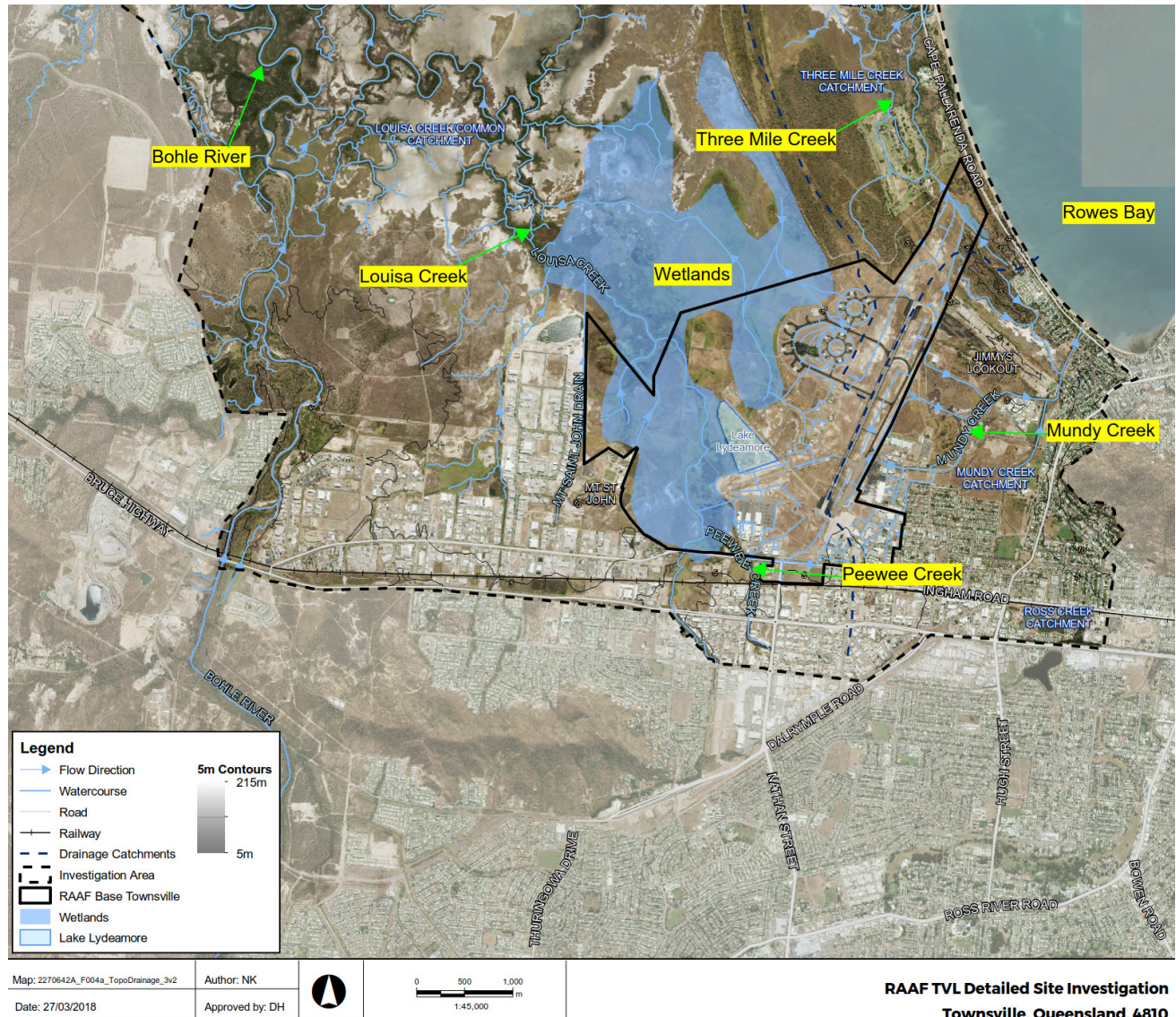


Figure 5.2 Overview of surface water features and flow (aerial view)

5.2.2.2 BOHLE RIVER

The location of the Bohle River is shown on Figure 5.2 above.

Surface water from the Base drains directly into Peewee and Louisa Creeks and the Town Common to the Base's west and north-west, eventually discharging to Halifax Bay via the Bohle River estuary.

Therefore, the Bohle River is a potential receptor of surface water contaminated with PFAS.

5.2.2.3 ROWES BAY AND HALIFAX BAY

The location of Rowes Bay is shown on Figure 5.2 above and the Bohle River discharges in the north to Halifax Bay.

Rowes Bay and Halifax Bay receive waters from one or more of the following receptors:

- The Town Common
- Louisa Creek and associated wetlands (including Peewee Creek)
- Three Mile Creek and associated wetlands
- Mundy Creek and associated wetlands; and
- Bohle River.

The bays (Rowes and Halifax) are considered to be secondary surface water receptors and were not directly assessed as part of the DSI (WSP, 2018).

5.2.2.4 SURFACE WATER USE

Several surface water bodies are present within the Investigation Area including The Bohle River, the Town Common, Three Mile Creek, Mundy Creek, Louisa Creek, Peewee Creek, Halifax Bay and Rowes Bay.

Some recreational use of the Bohle River, the Town Common, Three Mile Creek, Mundy Creek and Louisa Creek for swimming and recreational fishing occurs where the water bodies pass through, or near, private properties located within the TCC residential areas which incorporates the suburbs of Garbutt, Rowes Bay, Belgian Gardens and Pallarenda.

The inshore and offshore waters of the region (i.e. Halifax Bay, Rowes Bay and Cleveland Bay) are considered marginal or non-key production areas for commercial mud crab, spanner crab and blue swimmer crab fisheries (ESP, 2018). A locally important commercial net fishery focussing on barramundi, threadfin salmon and grey mackerel is also known to operate in the region (ESP 2018). Halifax Bay, Rowes Bay and Cleveland Bays are also utilised as recreational fishing areas.

5.2.3 GROUNDWATER

5.2.3.1 HYDROGEOLOGICAL SETTING

The majority of the Base is underlain by coastal plain sediments comprised of interbedded clays, silts and sands, which form a connected, semi-confined aquifer across the Base, with a water depth of approximately 1.5 mBGL to 2.5 mBGL. A deeper aquifer comprised of fluvial sands and gravels is reportedly present beneath the shallow aquifer (SKM 2008) but was not confidently identified during the DSI (WSP 2018). The section of the Base to the north of the main runway (fire training ground NQ0105), along the shoreline of Cleveland Bay and the suburb of Rowes Bay; are underlain by sands described as a strand plain of shallow sand dunes along Rowes Bay (SKM 2008).

The clay/silt/sand aquifer appears to have a depth at least that of the maximum depth of investigation, which was 11 mBGL in Garbutt and 8 mBGL on-Base. Therefore, the clay/silt/sand aquifer has a thickness of at least 5.5 m to 9.5 m. This aquifer was intersected below the coastal sands On-Base, at the Town Common, Rowes Bay and in Belgian Gardens, and is likely to underlie the sands beneath the coastal sand dunes. Similar material was intersected at Bohle, suggesting that the unit extends across the entire coastal plain between the coastal sands and the outcropping granites and volcanics of Castle Hill, Mount Louisa and Many Peaks Range.

The sand-hosted aquifer in Cleveland Bay, Rowes Bay and Pallarenda had a maximum depth of 6.5 mBGL in MW210, which was the maximum depth of investigation in this area. The sand aquifer is likely to be several metres thicker in the centre of the sand dunes running parallel to the coast, thinning both eastwards and westwards. The eastern extent of this aquifer is not known as it extends offshore beneath Cleveland Bay. The sand aquifer extends approximately 2 km inland in the Town Common and narrows to the south, extending approximately 1 km inland at the Base and 500 m inland at Rowes Bay and Belgian Gardens.

5.2.3.2 GROUNDWATER RECHARGE

The majority of the Base has a sandy/silty clay shallow sub-surface, which implies that both rainfall infiltration through the surface soil and groundwater recharge would be slow. However, water level monitoring in 2008 (SKM 2008) revealed near-instantaneous groundwater responses to an 80 mm rainfall event, stabilising approximately 0.8 m higher within three to ten days. This suggests that the permeability of the shallow soils is higher than that expected by the field observations. The shallow depth to groundwater would facilitate recharge of the shallow aquifers. Townsville is subject to heavy rainfall events in the wet season, and standing water is present over much of the Base in a normal wet season, which would help to recharge the aquifer. Surface water discharge from the Base into the Town Common to the west/north-west and into Mundy Creek to the north-east is also expected to provide groundwater recharge from these water bodies.

Rainfall recharge of the sand-hosted aquifer at Cleveland Bay, Pallarenda and Rowes Bay is expected to be rapid due to the sandy nature of the sub-surface and the relatively shallow depth of groundwater. Water level monitoring at the former Rowes Bay landfill (SKM 2008) following an 80 mm rain event showed an approximate increase in groundwater levels of 0.4 m stabilising after 10 days. The response was almost instantaneous, but more subdued than in the monitoring wells screened in the silty/sandy clays on the Base.

5.2.3.3 GROUNDWATER FLOW AND DISCHARGE

Groundwater flow direction (as provided in the DSI report), relative to potential surface water receptors is presented in Figure 5.3 and Figure 5.4 below.

Groundwater flow from the Base is considered partially radial, being westward from 5 AVN, north-westerly from the fire station and OLAs, north-easterly from Townsville Airport and easterly from the domestic area of the Base.

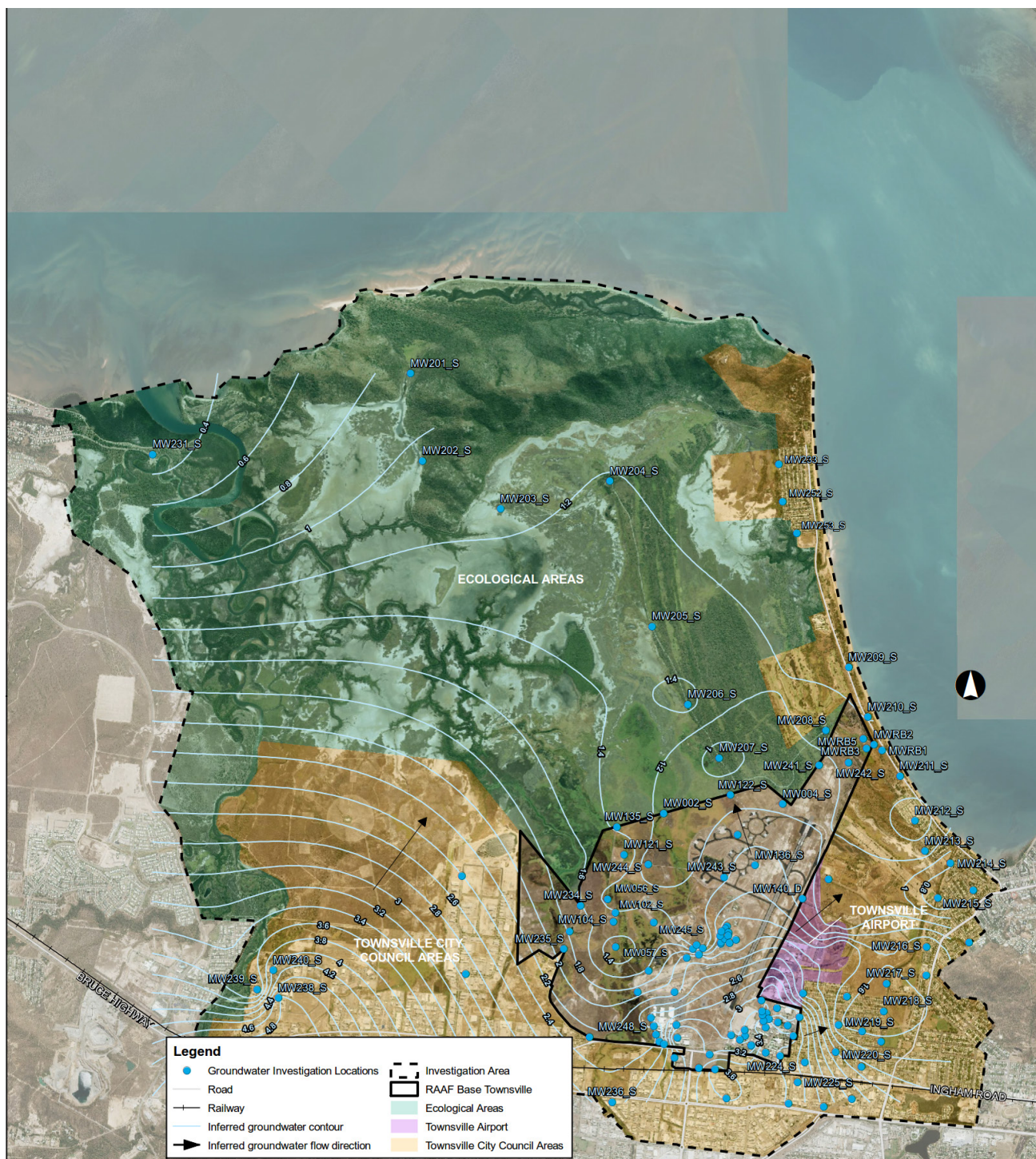


Figure 5.3 Overview of inferred groundwater flow direction across the Investigation Area (aerial view). Depicted groundwater contours are representative of the dry season only

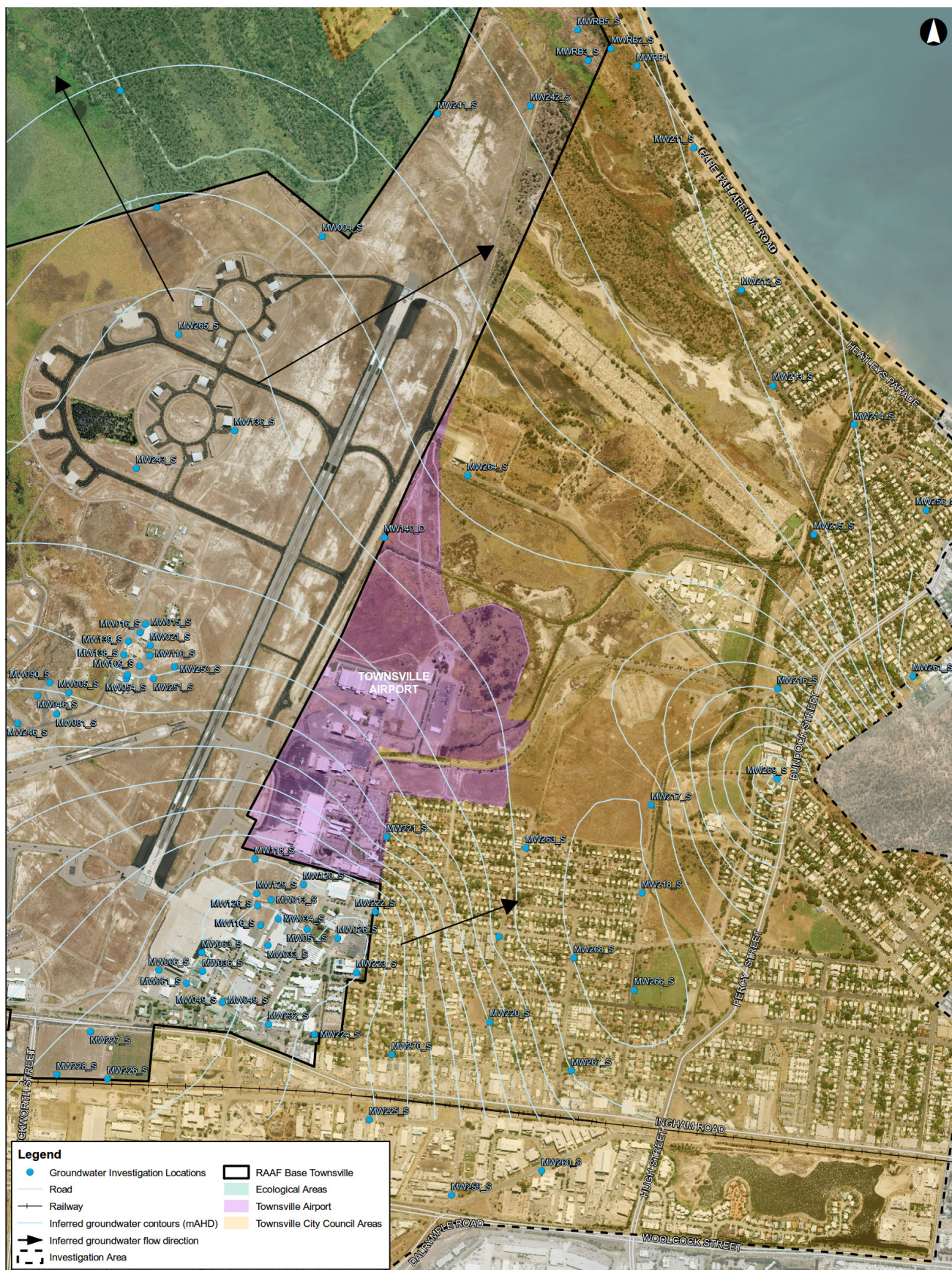


Figure 5.4 Overview of inferred groundwater flow direction from the Base (aerial view). Depicted groundwater contours are representative of the dry season only

In general groundwater flow is considered to observe a similar direction of flow to surface water. With respect to the operational areas of the Base and the identified potential sources of PFAS, groundwater flow direction is considered as follows:

- **North to north-west** – groundwater in the north-west portion of the Base, in the vicinity of the OLA's is expected to flow in a general north and north-westerly direction towards the Town Common and Three Mile Creek and Louisa Creek catchments.
- **North to north-east** – groundwater in the eastern portion of the Base, in the vicinity of the fire station and main runway (Runway 01/19) is expected to flow in a general north and north-easterly direction towards the Townsville Airport, through the residential suburb of Rowes Bay and discharging to the Rowes Bay surface water receptor.
- **East** – groundwater in the south-east portion of the Base, in the vicinity of the Aircraft Washing Facility and Fire Training Ground and Former Cadet Training Ground is expected to flow in a general easterly direction through the residential occupied area of Garbutt, before veering north-east through the residential suburb of Belgian Gardens and eventually discharging into the Rowes Bay surface water receptor.

5.2.3.4 GROUNDWATER QUALITY

With respect to the two aquifers described above in Section 5.2.3.1, groundwater quality is considered as follows:

- **Sandy aquifer:** the average total dissolved solids (TDS) was reported to be 680 mg/L; which is considered to be representative of freshwater conditions.
- **Clayey aquifer:** the average TDS was reported to be 12,780 mg/L; considered to be representative of saline conditions.

5.2.3.5 GROUNDWATER USE

A groundwater bore search of the Investigation Area was conducted prior to WSP drilling works using the Department of Natural Resources and Mines (DNRM) groundwater database, accessed via Queensland Globe, which identified 23 registered groundwater bores within the Investigation Area. The registered bores (indicated to be used for irrigation purposes) are located off-Base within the TCC areas except for one registered bore, which is located within the Base itself. Further details of the bore are provided below.

One registered bore is located within the Base (RN166762) within the south-western corner between 5 AVN and Ingham Road. According to the groundwater database, the bore is a monitoring bore only with a depth of 11 m, screened in silt with a standing water level (SWL) of 3.9 m with saline water.

Additionally, a water use survey (WUS) was distributed to 2,500 residents and businesses within the Investigation Area to identify the presence and use of groundwater bores. As at 27 April 2018, the project team had received 166 WUS returns via mail, email, phone and in person. Twenty-eight respondents to the survey indicated that they had bores on their property, 22 of which were operable and 18 of which were actively in use for water supply. Residential groundwater users have been identified in the surrounding suburbs of Garbutt, Belgian Gardens, Rowes Bay and Pallarenda.

Residential groundwater use is limited to the irrigation of lawns, gardens and vegetable gardens. No extracted groundwater was identified to be used for drinking purposes, other domestic non-potable uses (i.e. washing, cooking, cleaning, watering animals, recreational purposes), stored in tanks or used to fill swimming pools. However, it is noted that currently there is no mechanism that prevents the use of extracted water for these purposes. Details regarding the reported analytical results are discussed as part of the Data Evaluation section, provided in Section 7.

5.3 HUMAN EXPOSURE TO PFAS (EXPOSURE PATHWAYS)

Further to Section 5.1 and 5.2, the following section provides a pictorial representation of how PFAS moves within the environment (i.e. the interaction between soil, groundwater and surface water) and the various human exposure pathways based on groundwater, surface water and land use.

Potential human exposure pathways are noted to include:

- **Drinking Water** – sourced from PFAS contaminated groundwater or surface water.
- **Swimming** – directly swimming in PFAS contaminated surface water (e.g. a river) or filling a pool (public or private) with PFAS contaminated groundwater and/or surface water.
- **Domestic water use** – using PFAS contaminated surface water or groundwater for a range of domestic uses.
- **Irrigation (commercial or domestic)** – using PFAS contaminated surface water or groundwater to irrigate crops and/or water livestock. This can result in the accumulation of PFAS within the food products.
- **Wild Food (non-commercial)** – sources of food growing naturally in the environment (e.g. fish) that have been exposed to PFAS contaminated soil, surface water and/or groundwater. As noted above, PFAS can accumulate in such biota resulting in an exposure pathway for humans where such food is consumed.
- **Land use** – Direct contact with PFAS contaminated soil, groundwater, surface water or sediments under a commercial and/or domestic land use scenario.

For the various human exposure pathways noted above, the primary exposure route is ingestion. Human health exposure scenarios are discussed further in Sections 9 and 10 of this report.

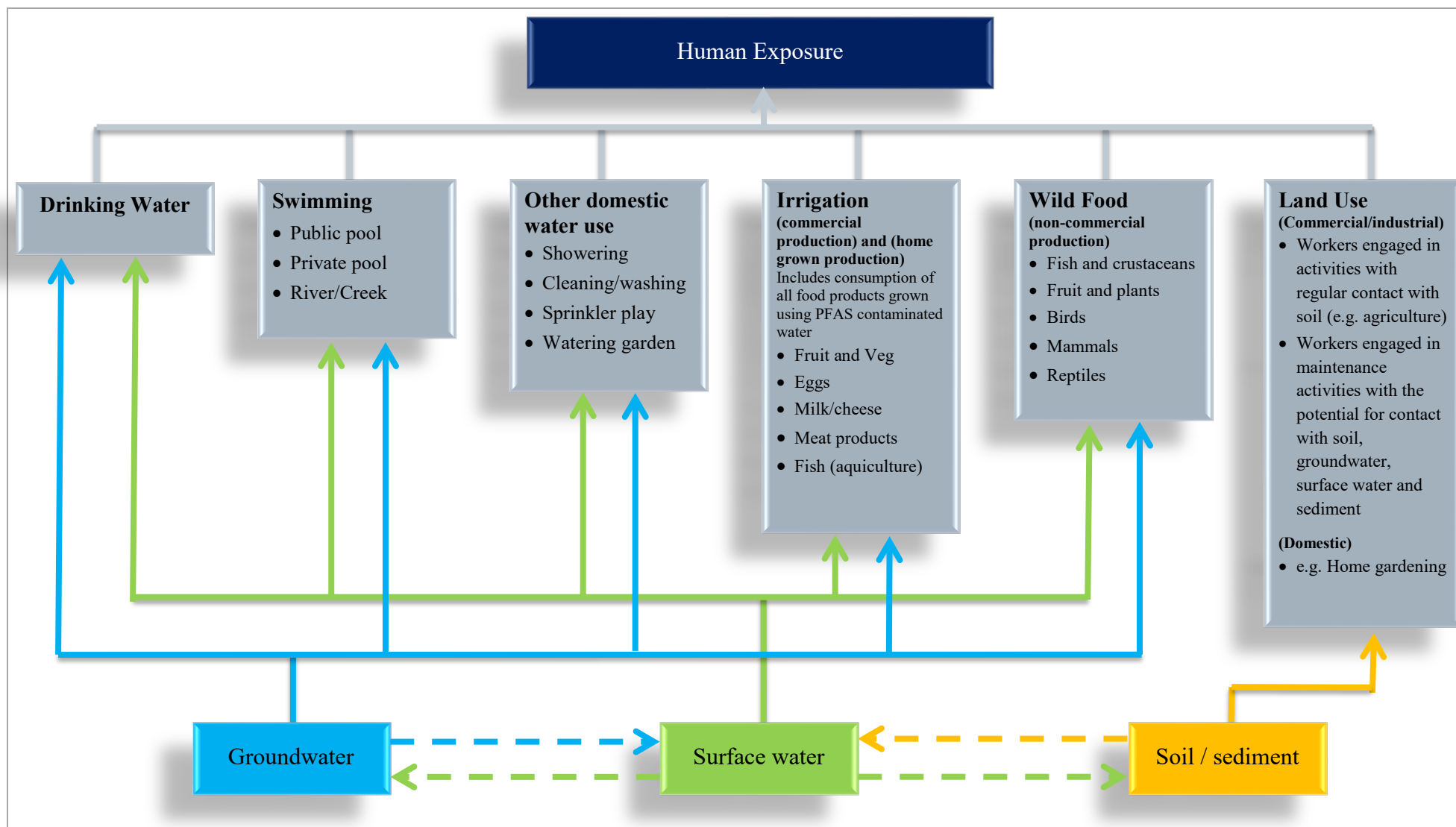


Figure 5.5 PFAS contaminated media and pathways to human exposure

6 ISSUES IDENTIFICATION

6.1 GENERAL

This section of the HHRA provides an overview of the exposure pathways and receptors relevant to the PFAS compounds identified within environmental media both on-Base and off-Base; and considers the properties and likely fate and transport of the identified PFAS compounds in the environment.

6.2 ACTIVITIES CONDUCTED AT THE BASE

Activities which are known or likely to have occurred at the Base where there is a potential for exposure to PFAS to occur include:

- Training activities (excluding firefighting training with AFFF) within former fire training grounds, fuel storage areas and emergency response (i.e. fuel spills, aircraft accidents)
- Maintenance of the on-Base fuel farms and aircraft/vehicle maintenance
- Maintenance of on-Base underground services
- Maintenance of on-Base stormwater drainage channels/systems
- Accidental discharges and spills from AFFF-containing fire deluge systems in hangars (Buildings 236 and 295) at 5 AVN
- Equipment testing and AFFF storage at the 5 AVN wash point (Building 366) and GSE compound
- Historical fire training within various areas at the Base including the former fire training grounds (NQ0105, NQ0106, NQ0107 and NQ0054), Pad Brahman and the fire station (NQ0055)
- Historical fire training, sparging of fire truck tanks, AFFF spills and storage of PFAS impacted soil at disused Runaway 13/31
- Historical fire training by cadets and AFFF discharging to ground at open day demonstrations at the field adjacent to the kindergarten
- Possible emergency response events adjacent to Runway 07/25 and Runway 01/19; and
- Historical discharging of AFFF to ground during open day demonstrations at the Ingham Road sports fields.

Of note, there are no families or children living at the Base on a permanent basis. Base accommodation comprises unit style facilities for individuals or visiting Base personnel. A swimming pool is present on-Base for use by Base personnel but is filled via a municipal (town) water supply. The assessment of potential exposure risks to Defence personnel has been evaluated via exposure during one or more of the abovementioned activities, where the greatest exposure risk is likely to occur. Further details are provided in Section 9.

A kindergarten (located on-Base) is provided for Defence personnel. The kindergarten comprises outdoor play areas that have a mixture of a grass surface (patchy in areas with some exposed soils), raised garden beds; and a sand pit area. A larger raised play area is also present that comprises a large tree, a tan bark surface and play equipment (i.e. swing and slide). Of note, all six surface soil samples (SD992-SD996 and BH995) collected between 0.05 meters below ground level (mBGL) and 0.2 mBGL were below the residential with garden/accessible soil criterion, that is protective of this land use setting.

Two soil samples collected at 0.5 mBGL from MW232 and BH997 (located adjacent to the cubbyhouse) were identified to be above the adopted criterion for PFOS + PFHxS. Deeper soil samples collected from BH997 at 1.0 m and 1.4 mBGL also reported PFOS + PFHxS above the adopted criterion. Whilst impact at depth is present, exposure to deeper soils beneath the kindergarten is considered unlikely as any digging activities by children is only considered to occur within the designated play areas (i.e. sandpit and/or raised playground area surfaced with tanbark). Further details regarding the reported concentrations within the kindergarten are provided in Section 7.3 and Appendix C (Memo dated 14 July 2017 for kindergarten sampling works).

Based on the above, exposure to children attending and adult staff working at the kindergarten is only considered to occur via the inhalation of dust particulates, should there be a nearby open excavation that may result in the generation and transport of contaminated dusts onto the kindergarten. Actual digging into contaminated soil by children is unlikely given the layout and design of the outdoor play area. Further details are provided in Appendix C.

One approach to manage potential future exposures from soil at depth (i.e. > 0.5 mBGL) could be the implementation of a management plan. It is understood that during construction and maintenance activities on the Base, Defence will implement control measures documented in PFAS-specific guidance publications to facilitate effective management of PFAS on the Defence estate.

6.3 IDENTIFIED CONTAMINATION

As indicated in Table 3.2 (Section 3.4) detectable concentrations of PFAS were identified within soil, groundwater, sediment and surface water samples collected on-Base. Off-Base areas investigated as part of the DSI, reported PFAS impacts within groundwater, surface water and sediment samples; as well as aquatic biota samples (namely finfish and crustaceans), collected from both estuarine and freshwater catchments. A detailed data evaluation and screening assessment for on-Base and off-Base areas is provided in Section 7.2 and 7.3.

6.4 PFAS CHEMICALS OF POTENTIAL CONCERN (COPC)

The primary AFFF product use at Defence sites from the 1970s until 2004–2005 was 3M Lightwater™, which is known to contain many PFAS compounds (many of which do not currently have a method for laboratory quantification). The reported analytical results (refer to tables presented in Appendix B) identified the dominant PFAS compounds to be PFOS, PFHxS and to a lesser extent PFOA.

Other PFAS compounds have also been detected less frequently including perfluorohexanoic acid (PFHxA), perfluorobutane sulfonic acid (PFBS), perfluoropentane sulfonic acid (PFPeS), perfluorodecane sulfonic acid (PFDS), perfluorodecanoic acid (PFDA) and 6:2 fluorotelomer sulfonate (6:2 FtS). However most scientific literature reviews and reviews done by the Australian Government have focussed on PFOS, PFHxS and PFOA as these three compounds have been identified to be of most concern from an environmental health viewpoint, based on their toxicity, fate and transport and persistence in the environment.

Based on the above, PFOS, PFHxS and PFOA were selected as the PFAS COPC. Further information regarding the presence of other PFAS compounds is provided in Section 8.4.

6.5 POTENTIAL TRANSPORT AND MIGRATION PATHWAYS

Further to Section 5, potential transport mechanisms for the migration of PFAS across different media located within the Investigation Area are considered to include the following:

- Sorption of PFAS to soil/sediment due to on-Base activities
- The leaching of PFAS impacted soils/sediments and subsequent vertical migration to groundwater or surface water
- Surface water runoff to on-Base drains, open pits and surrounding creeks. PFAS may also sorb onto soils and sediments within surface water drains
- Surface water drainage off-Base into nearby surrounding surface water bodies (downstream areas) via piped networks, concrete lined drains and unlined grassed channels
- Groundwater transport via the shallow unconfined aquifer
- Lateral and vertical migration of PFAS impacted groundwater. This may also create a secondary source of contamination to soil, sediment and surface water where groundwater is discharged. The sorption of PFAS to soil below the water table during groundwater migration may also occur. The PFAS sorbed to any soil below the water table will continue to leach to groundwater and act as a secondary source

- The lateral migration of PFAS in surface waters off-Base. PFAS is then available for uptake via aquatic and terrestrial biota within the human food chain; and
- Extractive use(s) of groundwater for domestic, irrigation and recreational purposes.

PFAS may also be transported through the air as aerosols and dust particulates. The relative contribution to transport fluxes via this mechanism are not well understood. However, completed HHRA reports for other Defence properties have shown the dust inhalation pathway to contribute a negligible amount to the exposure risk in comparison to the transport by surface water and groundwater. The dust particulate exposure pathway was also shown to contribute a negligible amount to the overall exposure risk in this HHRA, refer Appendix F.

The primary exposure pathway that has been identified to drive risk issues from a human health view point is the oral ingestion of PFAS through various media (i.e. soil, water and food products). Further discussion regarding the selected exposure pathways for the HHRA is provided in Section 9.2.

6.6 POTENTIAL RECEPTORS OF CONCERN

Based on the identified transport and migration pathways in Section 6.5, the potential receptors of concern identified for the purposes of the HHRA are provided below.

6.6.1 ON-BASE

- Defence personnel – includes exposure via the recreational use of the Ingham Road Sports Field (i.e. Defence rugby matches). No Defence personnel (or children) live (permanently) on the Base. Hence, a separate residential exposure scenario for personnel was not quantified. Rather potential exposure risks to Base personnel were assumed to occur via the various activities conducted at the Base (i.e. training within former fire training grounds and the fuel farms/storage areas.
- Maintenance/utility workers who may be incidentally exposed to impacted soils/sediments, groundwater and surface water whilst conducting shallow trench excavations or service pit inspections etc. This receptor is also considered to provide a conservative estimate for ground-keeping activities that would occur around the Base, should there be a requirement to undertake ad-hoc maintenance works.
- Child attending and adult staff working at the on-Base kindergarten, who may be exposed incidentally through the inhalation of dust particulates. Exposure via the ingestion and/or dermal contact with soil is considered incomplete for these receptors (refer Section 6.2 above).

In addition to the above, the following is noted:

- It is expected that any Base visitors will spend less time on the Base in comparison to Defence personnel. Hence, the evaluation of Defence personnel is adequately protective of any visitors (including contractors).
- An evaluation of potential risks to workers during firefighting training works/activities with AFFF was not conducted as part of the HHRA. Any such evaluation would be highly dependent on the type of AFFF product used and the training activities and practices undertaken. Generally, firefighting training would require the implementation of specific occupational health and safety procedures and control measures to prevent exposure to the workers involved.
- Whilst it is expected that many of the activities undertaken by Defence personnel would require the use of appropriate health and safety procedures, including the use of personal protective equipment (PPE), the approach adopted in the HHRA has (as a conservative measure) not considered PPE in the evaluation of Defence personnel.
- The Base is supplied with municipal town water.
- The on-Base swimming pool is supplied with municipal town water.
- There are no groundwater bores installed for extractive purposes on-Base (monitoring purposes only).

As sediments were not directly sampled from equipment or wastewater drainage systems on the Base, one approach to manage potential exposures from handling equipment used within source areas; and/or any maintenance works of wastewater drainage systems by workers, could be the implementation of an environmental management plan (EMP).

6.6.2 OFF-BASE

- Off-Base residents (child and adult) in suburbs surrounding the Base and affected catchments (i.e. Pallarenda, Rowes Bay, Belgian Gardens, West End and Garbutt).
- Aquatic biota consumers (child and adult) who may consume locally caught seafood including finfish, crustaceans and/or molluscs that are impacted with PFAS compounds. This exposure pathway only includes the consumption of aquatic biota, by residents and/or recreational fishers.
- Recreational users (child and adult) – who may be incidentally exposed to PFAS during sports activities that are held at the Ingham Road Sports Field.
- Recreational fishers (child and adult).
- Maintenance/utility workers conducting ad-hoc maintenance works off-Base.

Of note, a municipal (town) water supply is understood to be available for the local suburbs surrounding the Base. Hence, the potential for public swimming pools to be filled with PFAS contaminated groundwater has not quantitatively been evaluated for this HHRA.

The evaluation of direct contact (ingestion and dermal) with surface water and sediments by recreational swimmers has not been quantitatively assessed as PFAS has not been reported in excess of the health based guideline values for recreational use at likely points of exposure (i.e. boat ramps, discharge points of the waterways, etc.). Furthermore, the surface waters present within the Investigation Area are potentially not safe for swimming due to the presence of crocodiles and other wildlife. Likewise, it is considered that any recreational fishing would occur in boats, given the presence of crocodiles and/or other wildlife. Hence, recreational fishers are unlikely to wade out into any water bodies and be directly exposed to PFAS in surface water and/or sediments. However, recreational fishers are considered to potentially be exposed to PFAS impacts via the consumption of locally caught fish/crustaceans. Further details are provided in Table 6.1 below and Section 9.2.

The evaluation of exposure risks to the Aboriginal and Torres Strait Islander population of Townsville (Happy Valley Community) have not been quantified in this HHRA as it is understood that a Defence representative met with the Happy Valley Community representative on the 18 April 2018 and confirmed that the community are connected to the Towns water supply, do not have private groundwater bores they are using for extractive purposes, do not keep stock and do not routinely fish or catch wild foods from the Investigation Area. Hence, potential risks to the Happy Valley Community group were not considered further in the HHRA.

6.7 CONCEPTUAL EXPOSURE SCENARIOS

The conceptual exposure scenarios as presented in Table 6.1 (overleaf) includes the potential transport mechanisms, exposure pathways and receptors that were selected for further evaluation as part of the HHRA. Further commentary regarding the selected exposure pathways is provided in Section 9.2.

Table 6.1 Conceptual exposure scenarios

SOURCE – PRIMARY	MEDIA CONTAMINATED WITH PFAS	TRANSPORT MECHANISM	EXPOSURE PATHWAY	RECEPTORS (CURRENT)							
				On-Base				Off-Base			
				Defence personnel	Maintenance/Utility workers	Kindergarten (child and adult)	Residents (Child and Adult)	Consumers of locally caught aquatic biota	Recreational users of sports field (child and adult)	Recreational fishers (child and adult)	Maintenance/Utility workers
— Former Fire Training Area (NQ0054) — Former Cadet Training Area — Former Fire Training Ground (NQ0105) — The possible former fire training area at Curtin Aviation — Former Fire Training Area (NQ0106) — Pad Brahman — Disused Runway 13/31 — Fire Station (NQ0055) — Fuel Farm 1 (NQ0052) — Fuel Farm 2 (NQ0099) — 5 Aviation (AVN) — Former Fire Training Area Site Q (NQ0107) — Ingham Road Sports Field — Possible Former Fire Training Area (now Off-Base)	ON-BASE										
	Soil	Sorption of PFAS to soil from on-Base work activities – including the dispersion of soil and dust from wind	Direct contact ⁽¹⁾ with soil during Base works, trench excavations and/or recreational activities Incidental exposure via the inhalation of dust particulates	✓	✓	✓	NA	NA	NA	NA	NA
	Groundwater	Transport of PFAS from soil to groundwater via leaching	Direct contact with extracted groundwater during maintenance/utility related work activities	✖	✓	✖	NA	NA	NA	NA	NA
	Surface water and sediment	Transport of particulate and dissolved concentrations of PFAS via surface water run-off and discharge	Direct contact including incidental ingestion of surface water and sediments during on-Base activities	✓	✓	✖	NA	NA	NA	NA	NA
	OFF-BASE										
	Soil	Sorption of PFAS to soil – from impacted irrigation water	Direct contact ⁽¹⁾ with soil during domestic and/or recreational activities (i.e. gardening and playing sports)	NA	NA	NA	✓	NA	✓	NA	NA
		Transport of PFAS via dust generated on-Base to off-Base areas	Inhalation of dusts by off-Base residents, recreational users, commercial and maintenance/utility workers	NA	NA	NA	✓	NA	✓	NA	✓
	Groundwater	Transport of PFAS from extracted groundwater for irrigation purposes	Direct contact ⁽²⁾ with extracted groundwater for domestic garden irrigation	NA	NA	NA	✓	NA	NA	NA	NA
		Transport of PFAS in groundwater aquifer	Direct contact with groundwater during excavations/digging of trenches	NA	NA	NA	NA	NA	NA	NA	✓
	Terrestrial biota	Transport of PFAS from impacted soil and irrigation water to terrestrial biota ⁽³⁾ (bioaccumulation)	Consumption of terrestrial biota including home-grown fruit vegetables and eggs	NA	NA	NA	✓	NA	NA	NA	NA
	Surface water and sediment	Transport of PFAS from groundwater to surface water and sediments	Direct contact ⁽²⁾ during recreational fishing/swimming and/or ad-hoc maintenance works	NA	NA	NA	NA	NA	NA	✖	✓
	Aquatic biota	Transport of PFAS from surface water to aquatic biota (bioaccumulation)	Consumption of locally caught biota including fish, crustaceans and molluscs	NA	NA	NA	NA	✓ ⁽⁴⁾	NA	NA ⁽⁴⁾	NA

Notes:

- (1) Direct contact includes the incidental ingestion of soil, dermal contact and dust particulate inhalation. For children and adults attending and working at the On-Base kindergarten, exposure from soil impacts is only considered to occur via dust inhalation
- (2) Direct contact with water includes ingestion and dermal contact.
- (3) Terrestrial biota includes home-grown vegetables, fruit and eggs from home-raised chickens. Further discussion regarding poultry and poultry egg is provided in Section 7.2.1.
- (4) Exposure via the consumption of aquatic biota has been assessed as a separate receptor group (i.e. consumers of aquatic biota only) and not via off-Base residents or recreational fishers. It is considered that both residents and/or holiday makers may fish recreationally and subsequently eat locally caught fish/seafood.

✓ - Exposure pathway considered to be complete for relevant receptor.

✖ - Exposure pathway considered to be incomplete.

NA – denotes not applicable.

7 DATA REVIEW AND SCREENING ASSESSMENT

A review of the data obtained for soil, groundwater, surface water, sediment and biota has been undertaken to identify the characteristics and associated limitations of the data collected within each media, how data limitations are addressed; as well as a review of the quality and reliability of the data for use in the HHRA. This step also reviews the data against the identified screening criteria for each media being assessed.

7.1 AVAILABLE DATA

The data obtained as part of the DSI (WSP, 2018) was used as the primary dataset for the HHRA.

Data obtained for the key PFAS compounds (i.e. PFOS + PFHxS and PFOA) where screening level criteria are available have been presented and discussed in the following sections of the HHRA report.

Consideration of other PFAS compounds that were reported within the various media was also given in the context of their potential toxicity to humans. Whilst limited information is available, what is available shows that most other PFAS compounds (included within the current laboratory analytical suite) are approximately 10 to 100 times less toxic than PFOS, PFHxS and PFOA (Borg et. al. 2013). A discussion regarding available toxicity information for PFAS compounds other than PFOS, PFHxS and PFOA is provided in Section 8.4.

A wet season sampling event was undertaken during March 2018, which included groundwater, surface water and sediment sampling. A quantitative assessment of the wet season data has been incorporated for this revision, refer to Sections 7.2, 7.3 and 10 for further details.

The review of available data has included both on-Base and off-Base results including groundwater samples collected from private bores located off-Base.

Aquatic biota sampling and analysis was completed by ESP (2018a, 2018b, 2018c) as part of a broader assessment to evaluate both human health and ecological risks within the Investigation Area. The risk to ecological receptors is being addressed as part of a separate assessment currently being completed by WSP.

The available aquatic biota data (i.e. finfish, crustaceans, molluscs, plants) for use in the HHRA includes samples obtained from both freshwater, estuarine and/or marine environments during four survey (sampling) rounds at impact and comparative sites as follows:

- **Survey 1:** 17 January 2017 and 12–18 July 2017 (Survey 1)
- **Survey 2:** 30 November to 03 December 2017 (Survey 2)
- **Survey 3:** 12–15 December 2017 (Survey 3); and
- **Survey 4:** 22–25 March 2018 (Survey 4) – marine sampling event.

Of note, the sampling strategy undertaken for fish species included the preparation of samples for the whole fish, flesh and liver. Whole fish samples were only collected and analysed during Survey 1, from samples collected at expected impacted waterways (i.e. Town Common, Bohle River and drainages of Rowes Bay). One whole fish sample (Queenfish) was also sampled from a comparative location (Sandfly Creek) during Survey 3.

Likewise, for crustaceans, samples were prepared for the whole crustacean only during Survey 1, with flesh and/or organ samples prepared during the completion of all sampling events (i.e. Survey 1 to Survey 4). As the flesh component of both fish and crustaceans is considered the primary edible component by most human population groups, the available results are considered to provide appropriate data in which to quantify potential exposures, via the consumption of fish and crustaceans.

The exposure pathway for the consumption of fish has focussed on fish (flesh) only to quantify potential exposure risks given this is the primary edible component for humans. Hence, the data for whole fish was not discussed further in the HHRA (whole fish data was considered as part of the ERA).

As there is a potential that some crustaceans such as prawns can be eaten whole (if deep fried), the HHRA has assessed exposure pathways for consuming the whole and the flesh component of the crustacean.

In addition to the above, many of the finfish/crab species surveyed will actively move in and out of the various estuaries present within the Investigation Area, depending on the life history stage (i.e. fish size and stage of life). Actual fish movement is not well studied for many marine species. However, an example of one species that does move is Mullet. This species will move between estuaries particularly to spawn as adults, with smaller juveniles staying within the estuary, or even moving into freshwater areas. The aquatic plants, macro-algae and the oysters/barnacles that were surveyed are considered to provide useful information as potential point sources for contamination as they are stationary. Further information regarding the movements of the various fish species (including movements in and out of comparative site locations) could not be obtained at this time. For this reason, comparative site data was separated out from impact site data in calculating exposure point concentrations (refer Appendix D). As most of the comparative site results were either below detect or reported at or just above the detection limit, this is considered a conservative approach, as the inclusion of comparative site data results in lower exposure point concentrations being calculated. Comparative site data has been included within Appendix B (Table 15 for reference purposes only).

7.2 SCREENING CRITERIA AND ASSESSMENT

A screening assessment identifies the chemicals that require further evaluation and if the identified concentrations are sufficiently elevated to require a detailed assessment of risk (i.e. above screening criteria). The screening assessment for the identified soil, groundwater and surface water impacts was conducted based on the reported concentrations for each media and the numerical criteria provided in the PFAS NEPM (January 2018) (HEPA, 2018). For aquatic biota results, the dataset was compared against the FSANZ (2017c) proposed trigger points for the relevant food groups. Further details regarding the adopted screening criteria are provided below in Sections 7.2.1 to 7.2.3.

The screening assessment for soil (on-Base and off-base) has considered results separately for shallow soils (i.e. ≤ 0.5 mBGL) and deeper soils (i.e. > 0.5 mBGL and up to 2 mBGL). Based on the nature of works and activities on-Base, exposure to shallow soils (up to and including 0.5 mBGL) is considered most relevant to Defence personnel, as this depth is where there is the most potential for direct contact. For maintenance workers who may dig trenches/excavations exposure to both shallow and deeper soils (up to 2 mBGL) was considered relevant. Further details are provided in Section 9.3. Soil samples deeper than 2 mBGL were collected at several on-Base and off-Base areas (refer to Tables 1 and 3, Appendix B). However, these results were not evaluated as part of the HHRA, given there is limited potential for direct contact to occur with soil at depths greater than 2 mBGL.

For kindergarten receptors (children and staff), exposure is considered possible via surface and shallow soils (i.e. up to 0.5 mBGL). However as indicated in Section 6.2, only exposure via the dust inhalation pathway is considered complete for these receptors.

Of note, the exact locations of sampled private water bores and commercial properties (located in Garbutt, Mount St John, Rowes Bay, Bohle, Cosgrove and Mount Louisa) have not been identified in this report as privacy agreements with property owners preclude the identification of some property addresses.

7.2.1 SOIL AND SEDIMENT

The adopted screening criteria for soil/sediment are the PFAS NEPM (January 2018) human health screening values for:

- Residential with garden/accessible soil
- Public open space; and
- Commercial/industrial.

The following is noted below with respect to their application for on-Base exposure scenarios:

- For the on-Base kindergarten/domestic area, the health screening value for residential with garden/accessible soil was adopted. This is conservative as the guideline was developed based on a child or adult being exposed for 20 hours indoors and 4 hours outdoors, for 365 days/year, for 6 and 35 years respectively; as well as including (up to 10%) home-grown produce intake. The consumption of home-grown produce on-Base is an incomplete exposure pathway. In addition, no children or adults are living at the Base permanently. However, the criteria have conservatively been adopted without adjustment as an initial screening tool.
- For data collected within the Ingham Road Sports Field, the public open space criteria was adopted.
- All other areas on the Base were compared against the industrial/commercial criteria.
- No screening criteria was available for intrusive maintenance works (i.e. excavations). Therefore, potential exposures to this receptor were quantified in this HHRA.

The following is noted below with respect to their application for off-Base exposure scenarios:

- For off-Base residences, the adopted residential screening criteria includes the consumption of home-grown fruit and vegetables and assumes that 10% of the total produce intake comes from home-grown fruits and vegetables. However, the actual intake of home-grown produce and what percentage this may contribute to an individual's total daily intake (i.e. home-grown versus bought produce), is not known at any of the off-Base residential properties. Hence, consideration of higher intakes of fruit and vegetables from home-grown produce has been considered as part of the HHRA and is discussed further in Section 9.2.
- The adopted residential screening criteria do not consider potential exposure from the consumption of chicken/eggs that have been raised on properties with impacted PFAS soil and water. This exposure pathway is considered incomplete as no evidence for stock watering including poultry was identified during the DSI (WSP, 2018a). Further details regarding the exclusion of poultry, including poultry eggs is provided in Section 9.2.
- In the absence of available criteria for sediments, the residential with garden/accessible soil as well as public open space and commercial/industrial have been utilised. Whilst the residential criteria is noted to be conservative (given it includes home-grown produce consumption), it was adopted as an initial screening tool.

7.2.2 GROUNDWATER AND SURFACE WATER

The adopted screening criteria for water exposures (groundwater and surface water) are the PFAS NEPM (January 2018) health-based guidance values for:

- Drinking water; and
- Recreational water.

The following is noted below with respect to their application for the on-Base exposure scenarios:

- The selected screening criteria for on-Base exposure to groundwater and surface water is the health-based criteria for drinking and recreational water respectively. The adopted screening criteria are noted to be conservative for the purposes of screening potential risks to defence personnel and maintenance/utility workers via incidental ingestion, as workers on the Base will not be drinking extracted groundwater on the Base, nor swimming in on-Base surface water bodies or drains. Likewise, a maintenance/utility worker will not be swimming in an excavation that has the potential to accumulate with water via groundwater seepage, or surface water runoff.
- The guideline for drinking water assumes that an individual consumes 2 L of water every day and the recreational water quality guideline assumes that a person can consume 0.2 L of water per day during recreational activities. Both of these assumptions (i.e. 2 L and 0.2 L) are considered to be overly conservative for workers who may be exposed via incidental ingestion/dermal contact with water on the Base. Also of note, the aquifer (on-Base) is too saline for drinking water purposes (i.e. TDS > 600 mg/L) (WSP 2018).

The following is noted below with respect to their application for the off-Base exposure scenarios:

- While groundwater and/or surface water are not known to be extracted for potable use(s), to account for the potential future use, the available water data was screened against the drinking water criteria. Of note, high salinity within the areas of Garbutt, Mount St John and Bohle is likely to prevent the potable use of groundwater. However, bores located in Rowes Bay and Pallarenda may have potable water quality, based on salinity concentrations (WSP 2018).
- For other domestic and recreational use(s), the recreational water criteria was adopted for screening purposes. This is considered to be conservative as the criteria assumes that 0.2 L of water is consumed every day during recreational activities and is considered to be sufficient to cover exposure via incidental ingestion during domestic activities (such as garden watering) and recreational activities including swimming and sprinkler play.

7.2.3 AQUATIC BIOTA – FINFISH, CRUSTACEANS, MOLLUSCS AND PLANTS

An evaluation of PFAS in edible biota species (including fish, crustaceans and molluscs) was included in the HHRA. In addition, sampling of an aquatic (edible) plant known as ‘samphire’ was undertaken. Samphire is a native succulent and is also referred to as ‘sea asparagus’ and is known to grow locally within the Investigation Area. A part of the marine survey event, a brown macro-algae (seaweed) known as ‘sargassum’ was sampled at Rowes Bay and Magnetic Island (comparative marine site). Sargassum is edible and can be made into a tea and has been used in Chinese medicine.

For screening potential risks associated with the consumption of aquatic biota the FSANZ (2017c) proposed trigger points for investigation of the following fish and seafood products were adopted:

- Finfish (all)
- Fish liver
- Crustaceans and Molluscs; and
- Vegetables (all): adopted as a screening criterion for the edible aquatic plants ‘samphire’ and ‘sargassum’.

Given the potential for some recreational fishing activities to be occurring within the Town Common, Bohle River, drainages of Rowes Bay, Three Mile Creek, Mundy Creek and Louisa Creek; the adopted trigger points are considered appropriate for the purposes of screening potential human health risks. Comparative sampling sites (Alligator Creek, Althaus Creek, Gordon Creek, Sandfly Creek and Magnetic Island), were also reviewed for the purposes of evaluating background concentrations of PFAS in aquatic biota.

The criteria for finfish (all) has been applied to all available fish (flesh) results.

7.3 ON-BASE SCREENING ASSESSMENT

7.3.1 SOIL AND SEDIMENT

A review of the soil (dry season only) and sediment data (dry and wet seasons) collected within different areas across the base has been undertaken to further consider potential risk issues on-Base. A summary of the results and comparison against adopted screening criteria is presented in Table 7.1.

Sediment data on-Base was collected from source areas and down-gradient of source areas as well as at selected up-gradient locations (i.e. drainage points coming onto Defence property). Where possible, sediment samples were collected as collocated samples with surface water samples.

Figures 2A and 2B, Appendix A, show the locations of the soil sample locations; sediment sample locations are depicted on Figure 8, Appendix A. Tabulated soil and sediment results for the dry season are presented as Table 1 and Table 2 respectively, Appendix B. Tabulated sediment results for the wet season are presented as Table 3.

Table 7.1 Review of on-Base soil and sediment concentrations

ADOPTED SCREENING CRITERIA ^(1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
RESIDENTIAL WITH GARDEN/ ACCESSIBLE SOIL	0.009 – criteria only relevant for kindergarten/domestic area	0.1 - criteria only relevant for kindergarten/domestic area	
PUBLIC OPEN SPACE	1 – criteria only relevant for Ingham Road Sports Field	10- criteria only relevant for Ingham Road Sports Field	
INDUSTRIAL/COMMERCIAL	20	50	
Base area and media	Reported Concentration Range (mg/kg) ⁽³⁾		
Fuel Farm 1 (NQ0052) and Former Fire Training Area (NQ0054)			
Soil – ≤0.5 mBGL ⁽³⁾	0.06 – 100	0.003 – 4.6	9
Soil – >0.5 mBGL ⁽⁵⁾	0.0038 – 5.47	<0.0002 – 0.36	10
Sediment ⁽⁶⁾	Not collected		
Kindergarten and Domestic Area			
Soil – ≤0.5 mBGL ⁽³⁾	<0.0002 – 0.0185	<0.0002 – 0.0011	15
Soil – >0.5 mBGL ⁽⁵⁾	0.0002 – 0.025	<0.0002 – 0.0004	11
Sediment – dry season ⁽⁷⁾	0.05 – 0.107	0.0008 – 0.0013	2
Sediment – wet season ⁽⁷⁾	0.0144	0.0006	1
38 Squadron (SQN)			
Soil – ≤0.5 mBGL ⁽³⁾	0.0279	0.0011	1
Soil – >0.5 mBGL	Not collected		
Sediment – dry season ⁽⁶⁾	Not collected		
Sediment – wet season ⁽⁷⁾	0.006	<0.0002	1
Ingham Road Sports Field			
Soil – ≤0.5 mBGL ^(3,4)	0.0006 – 0.109	<0.0002 – 0.0008	5
Soil – >0.5 mBGL ⁽⁵⁾	<0.0002	<0.0002	1
Sediment – dry season ⁽⁷⁾	<0.0002 – 0.0021	<0.0002	2
Sediment – wet season ⁽⁷⁾	0.0006 – 0.0039	<0.0002	2
5 AVN (including Building 266, Building 295 and Building 366 & GSE Compound)			
Soil – ≤0.5 mBGL ⁽³⁾	0.009 – 0.035	0.0006 – 0.0014	2
Soil – >0.5 mBGL ⁽⁵⁾	0.15 – 0.37	0.005 – 0.02	4
Sediment – dry season ⁽⁷⁾	0.05 – 2.93	0.0013 – 0.025	3
Sediment – wet season ⁽⁷⁾	0.09 – 0.150	0.0011 – 0.0025	3

ADOPTED SCREENING CRITERIA ^(1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
RESIDENTIAL WITH GARDEN/ ACCESSIBLE SOIL	0.009 – criteria only relevant for kindergarten/domestic area	0.1 - criteria only relevant for kindergarten/domestic area	
PUBLIC OPEN SPACE	1 – criteria only relevant for Ingham Road Sports Field	10- criteria only relevant for Ingham Road Sports Field	
INDUSTRIAL/COMMERCIAL	20	50	
Base area and media	Reported Concentration Range (mg/kg) ⁽³⁾		
Fire Station (NQ0055) and Runway 01/19			
Soil – ≤0.5 mBGL ⁽³⁾	Not collected		
Soil – >0.5 mBGL ⁽⁵⁾	0.006 – 4.53	<0.0002 – 0.106	9
Sediment – dry season ⁽⁶⁾	Not collected		
Sediment – wet season ⁽⁷⁾ (sample labelled as SD039)	12.4	0.129	1
Fuel Farm 2 (NQ0099)			
Soil – ≤0.5 mBGL ⁽³⁾	0.12 – 8.54	0.004 – 0.08	3
Soil – >0.5 mBGL ⁽⁵⁾	0.016	0.0003	1
Sediment – dry season ⁽⁶⁾	Not collected		
Sediment – wet season ⁽⁷⁾	93.6	0.625	1
Disused Runway 13/31			
Soil – ≤0.5 mBGL ⁽³⁾	0.204 – 4.7	0.001 – 0.078	5
Soil – >0.5 mBGL ⁽⁵⁾	0.0013 – 0.024	<0.0002 – 0.0007	5
Sediment – dry season ⁽⁶⁾	Not collected		
Sediment – wet season ⁽⁷⁾ (samples labelled as SD015 and SD125 and includes emergency response areas)	0.0017 – 0.942	<0.0002 – 0.0056	2
Former Fire Training Area (NQ0107)			
Soil – ≤0.5 mBGL ⁽³⁾	0.0004 – 13.6	<0.0002 – 0.34	8
Soil – >0.5 mBGL ⁽⁵⁾	0.018 – 0.27	0.0005 – 0.0009	2
Sediment – dry season ⁽⁶⁾	Not collected		
Sediment – wet season ⁽⁷⁾	Data point SD039 was included in Base area above – Fire Station (NQ0055) and Runway 01/19		
Former Fire Training Area (NQ0106) and Ordnance Loading Aprons (OLAs) – OLA8 and OLA9			
Soil – ≤0.5 mBGL ⁽³⁾	0.01 – 16.6	0.0003 – 0.39	6
Soil – >0.5 mBGL ⁽⁵⁾	0.06 – 3.23	0.003 – 0.07	5
Sediment – dry season ⁽⁷⁾	5.9	0.08	1
Sediment – wet season ⁽⁷⁾	0.384 – 2.64	0.0028 – 0.0721	3

ADOPTED SCREENING CRITERIA ^(1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
RESIDENTIAL WITH GARDEN/ ACCESSIBLE SOIL	0.009 – criteria only relevant for kindergarten/domestic area	0.1 - criteria only relevant for kindergarten/domestic area	
PUBLIC OPEN SPACE	1 – criteria only relevant for Ingham Road Sports Field	10- criteria only relevant for Ingham Road Sports Field	
INDUSTRIAL/COMMERCIAL	20	50	
Base area and media	Reported Concentration Range (mg/kg) ⁽³⁾		
Pad Brahman			
Soil – ≤0.5 mBGL ⁽³⁾	0.04	<0.0002	1
Soil – >0.5 mBGL ⁽⁵⁾	<0.0002 – 0.0139	<0.0002	2
Sediment – dry season ⁽⁶⁾	Not collected		
Sediment – wet season ⁽⁷⁾	0.0257	<0.0002	1
Ordnance Loading Aprons (OLAs)			
Soil – ≤0.5 mBGL ⁽³⁾	0.014 – 0.12	<0.0002 – 0.002	3
Soil – >0.5 mBGL	Not collected		
Sediment – dry season only ⁽⁷⁾	0.08	0.0009	1
Former Fire Training Area (NQ0105)			
Soil – ≤0.5 mBGL ⁽³⁾	0.029 – 2.62	0.0002 – 0.052	3
Soil – >0.5 mBGL ⁽⁵⁾	0.002 – 0.5	<0.0002 – 0.0084	8
Sediment – dry season ⁽⁷⁾	0.0052 – 0.071	<0.0002 – 0.0004	4
Sediment – wet season ⁽⁷⁾	0.0116 – 0.105	<0.0002 – 0.0009	6
Mount St John			
Soil – ≤0.5 mBGL ⁽³⁾	<0.0002	<0.0002	1
Soil – >0.5 mBGL ⁽⁵⁾	0.058	0.0004	1
Sediment ⁽⁶⁾	Not collected (dry and wet season)		
East of Mundy Creek Drain (BH061 and BH062)			
Soil – ≤0.5 mBGL ⁽³⁾	0.0008 – 0.0014	<0.0002	2
Soil – >0.5 mBGL	Not collected		

Notes:

- (1) Ref: HEPA (January 2018) – NEMP human health screening values.
- (2) Shading indicates a concentration is above the adopted screening criteria.
- (3) Includes soil data between 0 and 0.5 mBGL. Refer Table 1, Appendix B.
- (4) Dataset includes additional surface soil samples collected at Ingham Road Sports Field during June 2018 (BH063 – BH066).
- (5) Includes soil data greater than 0.5 mBGL and up to 2 mBGL. Refer Table 1, Appendix B.
- (6) No sediment data collected within relevant area as no surface water body/drainage channel present.
- (7) Sediment results are presented as Table 2 (dry season) and Table 3 (wet season), Appendix B.

A review of the data indicates that reported PFAS concentrations within primary source areas on the Base (soil and sediment) were reported below the adopted screening criteria for PFOS + PFHxS and PFOA, except for the following:

- Two shallow soil samples (BH025 and BH026) collected at 0.5 mBGL from the Former Fire Training Area (NQ0054) (one result being the maximum concentration identified On-Base), were reported above the industrial/commercial health screening value for PFOS + PFHxS.
- All surface soil samples collected from the kindergarten area were below the residential screening criterion. Samples collected from within the kindergarten/domestic area reported two soil samples BH997 and MW232 at 0.5 mBGL, above the 'residential with garden/accessible soil' screening criterion for PFOS + PFHxS. Deeper soil samples collected at 1 mBGL and 1.4 mBGL from BH997 and MW224 were also reported above the adopted residential criterion for PFOS + PFHxS.
- The reported soil results from the Ingham Road Sports Field were below the adopted screening criteria for public open space. Including the additional soil results collected in June 2018.
- Two sediment samples collected from the domestic area (SD010S and SD121) during the dry season were reported above the adopted residential criterion for PFOS + PFHxS. One sample (SD010S) collected during the wet season was above the residential screening criterion for PFOS + PFHxS.

PFOA in soil was not considered to warrant further evaluation of potential health risks On-Base.

PFOS + PFHxS soil impact plans are provided as Figures 3A to 3C, Appendix A.

7.3.2 GROUNDWATER AND SURFACE WATER

A review of the groundwater and surface water data collected within the various source areas across the Base was undertaken to further consider potential risk issues on-Base. A summary of the results and comparison against adopted screening criteria is presented in Table 7.2 below. Where possible, surface water samples were collected as collocated samples with sediment/soil samples however there were instances (especially in the dry season) where surface water was absent at the time of sampling.

Figures 4 and 5, Appendix A show the groundwater sample locations. Surface water sample locations are depicted on Figure 8, Appendix A as co-located samples with sediment and aquatic biota investigation locations. Tabulated groundwater and surface water data sets for the dry season are presented as Tables 4 and 5 and for the wet season as Tables 6 and 7, Appendix B.

Table 7.2 Review of on-Base groundwater and surface water data

ADOPTED SCREENING CRITERIA (µg/L) ^(1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
DRINKING WATER	0.07	0.56	
PRIMARY CONTACT RECREATIONAL WATER	0.7	5.6	
Base area and media	Reported Concentration Range (µg/L) ⁽³⁾		
Former Fire Training Area (NQ0054) and Fuel Farm 1 (NQ0052)			
Groundwater – dry season	1.8 – 777	0.02 – 30.7	19
Groundwater – wet season	<0.01 – 424	0.02 – 16.1	14
Surface water (as runoff) – dry season	67	1.8	1
Surface water (as runoff) – wet season	85.4	4.66	1
Domestic Area and 38 Squadron			
Groundwater – dry season	0.25 – 30	<0.01 – 1	11
Groundwater – wet season	<0.01 – 43.6	<0.05 – 1.2	11

ADOPTED SCREENING CRITERIA (µg/L) ^(1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
DRINKING WATER	0.07	0.56	
PRIMARY CONTACT RECREATIONAL WATER	0.7	5.6	
Base area and media	Reported Concentration Range (µg/L) ⁽³⁾		
Surface water – dry season	0.29	0.04	1
Surface water – dry season	0.15 – 1.93	0.17 – 0.27	2
Ingham Road Sports Field			
Groundwater – dry season	<0.05 – 0.08	<0.01 – <0.05	4
Groundwater – wet season	0.09 – 0.22	0.0013 – 0.0056	4
Surface water (south-west of sports field) – dry season	0.3	0.02	1
Surface water (south-west of sports field) – dry season	0.045	0.0027	1
5 Aviation (including Building 236, Building 295 and Building 366 & GSE Compound)			
Groundwater – dry season	<0.05 – 1,170	<0.05 – 37	15
Groundwater – wet season	<0.01 – 2,240	0.024- 61	13
Surface water – dry season	25 – 59	0.64 – 3	2
Surface water – wet season	<0.01 - 131	0.07 – 4.4	13
Fire Station (NQ0055) and Former Fire Training Area (NQ0107)			
Groundwater – dry season	1.2 – 2,270	<0.05 – 68	18
Groundwater – wet season	<0.01 – 3,540	<0.1 – 86.3	15
Surface water – dry season	30	0.6	1
Surface water – wet season	455	14.1	1
Fuel Farm 2 (NQ0099)			
Groundwater – dry season	7.1 – 11,800	0.05 – 348	5
Groundwater – dry season	4 – 5,120	0.06 – 146	6
Surface water	Not collected (dry and wet seasons)		
Former Runway 13/31			
Groundwater – dry season	<0.05 – 416	<0.05 – 33	10
Groundwater – wet season	<0.1 – 319	1.3 – 21	4
Surface water (south of runway) – dry season	5.21	0.18	1
Surface water – wet season	<0.01 – 6.7	0.03 – 0.17	2
Former Fire Training Area (NQ0106) and Ordnance Loading Aprons (OLAs)			
Groundwater – dry season	0.06 – 58	<0.01 – 0.98	4
Groundwater – wet season	<0.1 – 1,380	0.03 – 49	3
Surface water – dry season	6.8	0.19	1

ADOPTED SCREENING CRITERIA (µg/L) ^(1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
DRINKING WATER	0.07	0.56	
PRIMARY CONTACT RECREATIONAL WATER	0.7	5.6	
Base area and media	Reported Concentration Range (µg/L) ⁽³⁾		
Surface water – wet season	<0.01 – 5.7	0.08 – 0.13	2
Pad Brahman			
Groundwater – dry season	0.12 – 218	<0.01 – 7.7	5
Groundwater – dry season	<0.1 – 42	<0.1 – 0.84	5
Surface water – dry season	0.5	0.04	1
Surface water – wet season	<0.0003 – 0.17	0.0023 – 0.0062	2
Ordnance Loading Aprons (OLAs)			
Groundwater – dry season	0.2	<0.01	1
Groundwater – wet season	0.1 – 2.5	<0.05 – <0.1	2
Surface water – dry season	Surface water data for OLAs is presented above with the former fire training area (NQ0106)		
Surface water – wet season	<0.01 – 9.5	0.04 – 0.19	3
Former Fire Training Area (NQ0105)			
Groundwater – dry season	0.08 – 1.74	<0.05 – 0.05	2
Groundwater – wet season	0.01 – 2.3	<0.005 – 0.01	3
Surface water – dry season	0.9 – 1	<0.01	2
Surface water – wet season	<0.01 – 1.39	<0.01 – 0.03	13
Mount St John			
Groundwater – dry season	0.06 – 0.82	<0.01 – 0.09	2
Groundwater – wet season	0.2 – 1.34	<0.02 – 0.08	2
Surface water – dry season (collected from the on-Base wetland area that extends onto the Base from the Common)	0.1	0.04	1
Surface water – wet season	<0.0003 – 0.3	<0.01 – 0.038	4

Notes:

- (1) Ref: HEPA (January 2018) – NEMP Health-based guidance values for drinking and recreational water.
- (2) Shading indicates a concentration is above the adopted screening.
- (3) on-Base groundwater and surface water data is presented on Tables 4 and 5 for the dry season and Tables 6 and 7 for the wet season, Appendix B.

A review of the on-Base groundwater and surface water data indicates that most of areas on the Base reported concentrations of PFOS + PFHxS above one or both of the adopted screening criteria during both the dry and/or wet seasons. PFOS + PFHxS groundwater and surface water impact plans are provided as Figures 6A, 6B and 7 in Appendix A respectively.

PFOA was reported above the screening criteria in groundwater during the dry and wet seasons.

For the dry season, PFOA was reported below the screening criteria in surface water samples. Hence, exposure to PFOA in surface water on-Base was not evaluated further for the dry season results. However, for the wet season PFOA was above one or more of the screening criteria in the following areas:

- Former Fire Training Area (NQ0054) and Fuel Farm 1 (NQ0052)
- 5 Aviation (including Building 236, Building 295 and Building 366 & GSE Compound); and
- Fire Station (NQ0055) and Former Fire Training Area (NQ0107).

Based on the above, further evaluation of PFOA in surface water on-Base was undertaken for the wet season risk estimates. Further details are provided in Section 9.2.

7.4 OFF-BASE SCREENING ASSESSMENT

7.4.1 SOIL AND SEDIMENT

A review of the soil (dry season only) and sediment data (dry and wet season) collected within different off-Base areas has been undertaken to further consider potential risk issues off-Base. A summary of the results and comparison against adopted screening criteria is presented in Table 7.3 below. Where possible, sediment samples were collected as collocated samples with surface water and aquatic biota samples.

Figures 2A and 2B (Appendix A) shows the soil sampling locations and Figure 8 (Appendix A) shows the off-Base sediment samples co-located with surface water and aquatic biota sampling sites. Tabulated soil results are presented on Table 8, Appendix B. Sediment results are presented on Tables 9 (dry season) and 10 (wet season), Appendix B.

Table 7.3 Review of off-Base soil and sediment concentrations

ADOPTED SCREENING CRITERIA ^(1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
RESIDENTIAL WITH GARDEN/ ACCESSIBLE SOIL	0.009	0.1	
PUBLIC OPEN SPACE	1	10	
INDUSTRIAL/COMMERCIAL	20	50	
Off-Base area and media	Reported Concentration Range (mg/kg) ⁽³⁾		
Bohle			
Soil – ≤0.5 mBGL ⁽³⁾	<0.0002	<0.0002	2
Soil – >0.5 mBGL ⁽⁴⁾	<0.0002	<0.0002	1
Sediment – dry season (collected at Bohle River)	<0.0002	<0.0002	5
Sediment – wet season (collected at Bohle River)	<0.0002 – 0.0012	<0.0002	5
Belgian Gardens			
Soil – ≤0.5 mBGL ⁽³⁾	<0.0002	<0.0002	2
Soil – >0.5 mBGL ⁽⁴⁾	Not collected		
Sediment ⁽⁵⁾	Not collected (dry and wet seasons)		

ADOPTED SCREENING CRITERIA ^(1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
RESIDENTIAL WITH GARDEN/ ACCESSIBLE SOIL	0.009	0.1	
PUBLIC OPEN SPACE	1	10	
INDUSTRIAL/COMMERCIAL	20	50	
Off-Base area and media	Reported Concentration Range (mg/kg) ⁽³⁾		
Cleveland Bay/Rowes Bay			
Soil – ≤0.5 mBGL ⁽³⁾	<0.0002 – 0.0012	<0.0002	3
Soil – >0.5 mBGL ⁽⁴⁾	<0.0002	<0.0002	1
Sediment – dry season	<0.0002 – 0.017	<0.0002 – 0.0004	6
Sediment – wet season	0.0015 – 0.053	<0.0002 – 0.001	9
The Common			
Soil – ≤0.5 mBGL ⁽³⁾	Not collected		
Soil – >0.5 mBGL ⁽⁴⁾	<0.0002 – 0.0026	<0.0002	5
Sediment	<0.0002 – 0.0083	<0.0002 – 0.001	3
Garbutt Community			
Soil – ≤0.5 mBGL ⁽³⁾	<0.0002 – 0.013	<0.0002 – 0.0003	6
Soil – >0.5 mBGL ⁽⁴⁾	<0.0002 – 0.0004	<0.0002	3
Sediment – dry season	<0.0002 – 0.0007	<0.0002	5
Sediment – wet season	<0.0002 – 0.001	<0.0002 – 0.0004	7
Pallarenda			
Soil – ≤0.5 mBGL ⁽³⁾	0.0012	<0.0002	1
Soil – >0.5 mBGL ⁽⁴⁾	<0.0002	<0.0002	2
Sediment ⁽⁵⁾	Not collected (dry and wet seasons)		
SEDIMENT ONLY DATA ⁽⁶⁾			
Mundy Creek Catchment			
Sediment – dry season	0.001	<0.0002	1
Garbutt Community – commercial properties			
Sediment – dry season	0.0014 – 0.022	<0.0002 – 0.0008	2
Commercial Property – Garbutt			
Sediment – dry season	0.0049 – 0.0052	<0.0002 – 0.0012	2
Sediment – wet season	0.08 – 0.24	0.0016 – 0.0033	2
Ecological Area (located within The Town Common)			
Sediment – dry season	0.0074 – 0.076	<0.0002 – 0.0009	3
Sediment – wet season	0.0018 – 0.105	<0.0002 – 0.0009	5
East of Former Fire Training Area (NQ0105)			
Sediment – dry season	0.021	<0.0002	1

ADOPTED SCREENING CRITERIA ^(1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
RESIDENTIAL WITH GARDEN/ ACCESSIBLE SOIL	0.009	0.1	
PUBLIC OPEN SPACE	1	10	
INDUSTRIAL/COMMERCIAL	20	50	
Off-Base area and media	Reported Concentration Range (mg/kg) ⁽³⁾		
Downstream of Fuel Farm 1 (NQ0052) & Former Fire Training Area NQ0054			
Sediment – dry season	0.21	0.0008	1
Sediment – wet season	0.0009	<0.0002	1
Background (outside of Investigation Area)			
Sediment – dry season	<0.0002 – 0.0031	<0.0002	3
Sediment – wet season	<0.0002 – 0.0022	<0.0002	3

Notes:

- (1) Ref: HEPA (January 2018) – NEMP human health screening values for residential with garden/accessible soil.
- (2) Shading indicates a concentration is above the adopted screening criteria.
- (3) Includes soil data between 0 and 0.5 mBGL. Refer Table 8, Appendix B.
- (4) Includes soil data greater than 0.5 mBGL and up to 2 mBGL. Refer Table 8, Appendix B.
- (5) No sediment data collected within relevant area as no surface water body/drainage channel present.
- (6) Refer Tables 9 and 10, Appendix B for sediment data.

A review of the off-Base shallow soil data (i.e. ≤ 0.5 mBGL) identified concentrations of PFOS + PFHxS to be above the residential garden/accessible soil in one surface sample collected from one residential property located in Garbutt Community (SS204), where irrigation with groundwater occurs. No exceedances of the PFOS + PFHxS residential criterion were reported in the remaining residential sampling dataset, which includes properties where groundwater irrigation or surface water inundation occurs in Garbutt, Rowes Bay and Pallarenda.

No concentrations of PFOA were identified to be above the residential screening criteria in the soil sampling undertaken on residential land.

All deeper soil samples (i.e. >0.5 mBGL) from off-Base locations reported concentrations of PFAS (PFOS + PFHxS and PFOA) below the adopted screening criteria.

PFOS and PFHxS soil impacts plans are shown as Figures 3A to 3C, Appendix A.

A review of the off-Base sediment data reported all PFAS concentrations below the adopted screening criteria, except for the following:

- Concentrations of PFOS + PFHxS in sediment samples SD107 and SD114, collected at Cleveland Bay/Rowes Bay located to the east of the Base, were reported above the residential screening criteria.
- Sediment samples SD107 and SD114 are both co-located with surface water samples (i.e. SW107 and SW114 respectively) and whilst the surface water results (refer to Table 7.4) for PFAS exceeded the drinking water guideline of $0.07 \mu\text{g/L}$, they are below the recreational water guideline. It is unlikely that surface water is being used by residents for domestic purposes (potable and non-potable including irrigation). Further discussion is provided in Section 7.4.2.

A PFOS + PFHxS sediment impact plan (on-Base and off-base) is provided as Figure 9, Appendix A.

7.4.2 GROUNDWATER AND SURFACE WATER

A review of the groundwater and surface water data collected Off-Base was undertaken to further consider potential risk issues Off-Base. A summary of the results and comparison against adopted screening criteria is presented in Table 7.4 below.

Figure 4, Appendix A shows the off-Base groundwater locations; and Figure 8 shows the off-Base surface water locations (co-located with sediment and aquatic biota sampling sites).

Tabulated groundwater and surface water results are presented in Tables 11 to 14, Appendix B.

Table 7.4 Review of off-Base groundwater and surface water data

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
DRINKING WATER	0.07	0.56	
RECREATIONAL WATER	0.7	5.6	
Off-Base area and media	Reported Concentration Range (µg/L) ⁽³⁾		
Belgian Gardens			
Groundwater – dry season	0.01 – 0.35	<0.01 – 0.02	5
Groundwater – wet season	0.04 – 0.57	0.0014 – 0.01	6
Bohle			
Groundwater – dry season	<0.01 – 0.09	<0.01 – 0.05	4
Groundwater – wet season	<0.0003 – 0.422	0.0019 – 0.0386	5
Surface water (collected from Bohle River) – dry season	<0.01 – 0.19	0.01 – 0.02	5
Surface water (collected from Bohle River) – wet season	0.0039 – 0.278	0.0007 – 0.011	5
Bushland Beach			
Groundwater – dry season	<0.05	<0.05	1
Groundwater – wet season	0.0313	<0.0005	1
Cleveland Bay			
Groundwater – dry season	0.02 – 0.19	<0.01 – 0.02	3
Groundwater – wet season	0.07 – 0.44	<0.01 – 0.02	2
Surface water – dry season	<0.05 – 0.29	<0.05 (x2 samples reported at <0.05)	2
Surface water – wet season	0.0764	0.0028	1
Garbutt Community			
Groundwater – dry season	<0.01 – 11.6	<0.01 – 0.23	21
Groundwater – wet season	0.0011 – 14.5	<0.0005 – 0.37	18
Surface water – dry season	0.1 – 0.26	<0.01 – 0.04	5
Surface water – wet season	<0.0003 – 0.25	<0.01 – 0.04	6

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
DRINKING WATER	0.07	0.56	
RECREATIONAL WATER	0.7	5.6	
Off-Base area and media	Reported Concentration Range (µg/L) ⁽³⁾		
Mount St John			
Groundwater – dry season	<0.05 (x2 samples reported at <0.05)	<0.05 (x2 samples reported at <0.05)	2
Groundwater – wet season	0.0062	0.0005	2
Commercial properties (located in Garbutt, Belgian Gardens and/or Rows Bay)			
Groundwater	0.09 – 1.5	<0.01 – <0.05	5
Pallarenda			
Groundwater – dry season	<0.05 – 0.05	<0.01 – 0.05	3
Groundwater – wet season	0.0055 – 0.01	<0.0005 - <0.01	3
Private Land Extraction Bores (suburbs of Pallarenda, Rows Bay, Belgian Gardens, West End and Garbutt)			
Groundwater – dry season only	<0.01 – 1.24	<0.01 – 0.04	58
Mundy Creek Catchment (Off-Base)			
Surface Water – dry season only	0.02	<0.01	1
Rows Bay			
Groundwater – dry season	<0.01 – 0.09	<0.01 – 0.02	4
Groundwater – wet season	<0.01 – 0.95	<0.0005 – 0.017	4
Surface Water – dry season	<0.05 – 0.07	<0.01 - <0.05	4
Surface water – wet season	0.3 – 13.2	0.0085 – 0.5	8
Rows Bay Landfill			
Groundwater – dry season	0.05 – 0.47	<0.01	4
Groundwater – wet season	0.03 – 0.14	0.0006 – 0.0021	5
The Common			
Groundwater – dry season	<0.01 – 15.9	<0.01 – 0.08	8
Groundwater – wet season	0.0041 – 4.5	<0.0005 – 0.03	8
Surface Water – dry season	0.1 – 0.39	<0.05 – 0.04	4
Surface Water – wet season	0.4 – 0.87	<0.05 – <0.1	3
Commercial Property (located in Garbutt Community)			
Groundwater – dry season	0.05 – 5.2	<0.01 – 0.06	13
Groundwater – wet season	<0.01 – 8.3	<0.01 – 0.39	14
Surface Water – dry season	3.8 – 25	0.05 – 1.1	2
Surface Water – wet season	<0.01 – 36	0.25 – 2.7	4

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
DRINKING WATER	0.07	0.56	
RECREATIONAL WATER	0.7	5.6	
Off-Base area and media	Reported Concentration Range (µg/L) ⁽³⁾		
Ecological Area (within The Common)			
Surface Water – dry season	6.06 – 28	0.12 – 1.2	3
Surface Water – wet season	4.2 – 6.3	0.1 – 0.2	2
East of Former Fire Training Area (NQ0105)			
Surface Water – dry season only	0.68	<0.05	1
Background (outside of Investigation Area – SW211, SW212 and SW213)			
Surface Water – dry season	<0.01 – <0.05	<0.01 – <0.05	3
Surface Water – wet season	0.0005 – 0.0156	<0.0005 – 0.0009	3

Notes:

- (1) Ref: HEPA (January 2018) – NEMP Health-based guidance values for drinking and recreational water.
- (2) Shading indicates a concentration is above the adopted screening criteria.
- (3) off-Base groundwater and surface water results for the dry and wet season sampling events are presented on Tables 11 to 14 Appendix B.

A review of the off-Base groundwater data indicated the following:

- Reported concentrations of PFOA were below the adopted screening criteria for both dry and wet seasons. Hence, no further evaluation of PFOA was undertaken.
- Reported concentrations during the wet and dry season sampling events for PFOS + PFHxS were above the adopted drinking water and/or the recreational screening criteria in samples collected from:
 - Belgian Gardens, Bohle, Cleveland Bay, Garbutt Community (including both residential and commercial properties), Rowes Bay, Rowes Bay landfill and The Common.
 - Private extraction bores (BW006 and BW015 located in Garbutt and BW018 located in Rowes Bay) were above the drinking water criterion. However, the private extraction bores are not in use for drinking water purposes as residences are provided with municipal (town) water for drinking and other domestic uses. The private extraction bore BW015 also exceeded the recreational water guideline.
 - The private extraction bores sampled from Pallarenda (BW021 and BW022) that have a confirmed irrigational use for garden watering, reported detectable concentrations of PFOS + PFHxS (ranging between 0.01 µg/L and 0.05 µg/L) and detectable concentrations of PFOA (ranging between <0.0005 µg/L to 0.002 µg/L). Reported concentrations are below the adopted groundwater screening criteria.
 - For dry season sampling, the maximum PFOS + PFHxS groundwater concentration of 15.9 µg/L was identified at MW206, located within The Common wetland area. However, the wetland area is not used for potable water supply or recreational uses(s).
 - For wet season sampling, the maximum PFOS + PFHxS groundwater concentration of 14.5 µg/L was identified at MW223 located in Garbutt.
 - In general, the sampling performed during the wet season reported concentrations of PFOS + PFHxS to be slightly higher in most off-Base areas sampled.

Groundwater impact plans for PFOS + PFHxS are provided as Figures 6A and 6B, Appendix A.

A review of the off-Base surface water data collected during dry and wet season sampling events indicated the following:

- Reported concentrations of PFOA in all surface water samples were below the adopted screening criteria except for surface water samples collected at the commercial property located in Garbutt, where PFOA exceeded the recreational criteria. As the commercial property is not in use for recreational purposes, no further evaluation of PFOA was undertaken.
- Reported concentrations during the wet and/or dry season for PFOS + PFHxS were above the adopted drinking and/or recreational water screening criteria in samples collected from:
 - The Common (including the Ecological Area)
 - Bohle
 - Cleveland Bay
 - Rowes Bay
 - Garbutt Community (including residential and commercial properties); and
 - The off-Base area to the east of the former fire training ground (NQ0105).
- PFOS + PFHxS concentrations at all other surface water locations were reported below the recreational water screening criteria.

Of note, surface water is not being extracted for drinking water purposes within the above-mentioned areas. The private extraction bore BW015 (located in Garbutt) that exceeded the recreational water guideline is understood to not be in use for recreational purposes. Hence, no further assessment for the extraction of groundwater for recreational purposes was undertaken.

A surface water impact plan for PFOS + PFHxS is provided as Figure 7, Appendix A.

7.4.3 AQUATIC BIOTA

A review of the aquatic biota data collected off-Base was undertaken to further consider potential risk issues off-Base and the contribution of exposure from edible aquatic biota. A summary of the results and comparison against adopted screening criteria is presented in Table 7.5 below.

Figure 8, Appendix A shows the aquatic biota samples (collection sites) co-located with surface water and sediment locations off-Base. The tabulated aquatic biota dataset (as reported by ESP) is presented as Table 15, Appendix B. The ESP (2017, 2018) aquatic biota sampling reports are provided in Appendix C.

Based on the assessments completed by ESP (2018a, 2018b and 2018c) and consistent with the findings of other studies (SA EPA 2017 and Faxneld et al. 2014), PFOS + PFHxS was identified at higher concentrations in 'liver' samples as opposed to fish 'flesh' samples. The results suggest that accumulation of PFOS+ PFHxS occurs in the liver tissue, rather than fish 'flesh'. Hence, results for fish were summarised as flesh and liver respectively. For crustaceans, results were summarised according to 'whole' or 'flesh'.

Table 7.5 Review of off-Base aquatic biota data

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
FINFISH (ALL)	5.2	41	
FISH LIVER	280	2240	
CRUSTACEANS/MOLLUSCS	65	520	
VEGETABLES (ALL)	1.1 µg/kg (OR LOD ⁽³⁾ IF HIGHER)	8.8	
SAMPLE LOCATION	REPORTED CONCENTRATION RANGE (µg/kg WET WEIGHT) ^(4,5)		
Bohle River (Estuarine):			
Grunter/Silver javelin (<i>Pomadasys argenteus</i>)	<1	<1	1
Pikey/Yellowfin bream (<i>Acanthopagrus australis</i>)	<1	<1	4
Catfish (<i>Neoarius graffei</i>)	<1	<1	1
Mullet (<i>Mugil cephalus</i>)	<1 – 9	<1	10
Flathead (<i>Platycephalus fiscus</i>)	<1 – 3	<1	4
Mangrove jack (<i>Lutjanus agentimaculatus</i>)	<1	<1	1
Total Finfish (Flesh)	<1 – 9	<1	21
Finfish (Liver)	<1 – 60	<1 – 1	20
Banana prawn – whole (<i>Fenneropenaeus merguensis</i>)	65	<1	1
Total Crustaceans (Whole)	65	<1	1
Crab flesh (<i>Scylla serrata</i>)	<1 – 4	<1	13
Banana prawn flesh (<i>Fenneropenaeus</i> spp.)	1 – 9	<1	4
Total Crustaceans (Flesh)	<1 – 9	<1	17
Oyster (<i>Saccostrea</i> spp.)	<1	<1	2
Total Molluscs	<1	<1	2
Samphire	<1	<1	1
Bohle River (Freshwater):			
Finfish (Flesh)	No fish flesh and crustaceans sampled due to the lack of success in capturing species within the freshwater waterway		
Finfish (Liver)			
Crustaceans (Whole)			
Crustaceans (Flesh)			
Molluscs (Oyster)	No oyster samples collected		
Samphire	No plant samples collected		

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
FINFISH (ALL)	5.2	41	
FISH LIVER	280	2240	
CRUSTACEANS/MOLLUSCS	65	520	
VEGETABLES (ALL)	1.1 µg/kg (OR LOD ⁽³⁾ IF HIGHER)	8.8	
SAMPLE LOCATION	REPORTED CONCENTRATION RANGE (µg/kg WET WEIGHT) ^(4,5)		
Bohle River (Marine):			
Barramundi (<i>Lates calcarifer</i>)	<1 – 3	<1	11
Barred javelin (<i>Pomadasys kakaan</i>)	<1	<1	1
Grunter/Silver javelin (<i>Pomadasys argenteus</i>)	<1	<1	5
Barred queenfish (<i>Scomberoides tala</i>)	<1 – 2	<1	6
Pikey/Yellowfin bream (<i>Acanthopagrus australis</i>)	<1 – 2	<1	4
Diamond scale mullet (<i>Liza vaigiensis</i>)	<1 – 2	<1	4
Northern sand flathead (<i>Platycephalus endrachtensis</i>)	<1 – 2	<1	3
Golden trevally (<i>Gnathanodon speciosus</i>)	<1	<1	4
Mangrove jack (<i>Lutjanus agentimaculatus</i>)	<1	<1	4
Total Finfish (Flesh)	<1 – 3	<1	42
Finfish (Liver)	3 – 235	<1 – <2	37
Crustaceans (Whole)	No whole samples collected		
Blue swimmer crab flesh (<i>Portunus armatus</i>)	<1 – 6	<1	4
Total Crustaceans (Flesh)	<1 – 6	<1	4
Molluscs (Oyster)	No oysters collected		
Samphire	No plant samples collected		
Mundy Creek (Estuarine only – drains from the Base into Rows Bay):			
Mullet (<i>Mugil cephalus</i>)	1	<1	1
Total Finfish (Flesh)	1	<1	1
Finfish (Liver)	62	<1	1
Banana prawn – whole (<i>Fenneropenaeus merguensis</i>)	39	<1	1
Total Crustaceans (Whole)	39	<1	1
Mud crab flesh (<i>Scylla serrata</i>)	<1 – 3	<1	2

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
FINFISH (ALL)	5.2	41	
FISH LIVER	280	2240	
CRUSTACEANS/MOLLUSCS	65	520	
VEGETABLES (ALL)	1.1 µg/kg (OR LOD ⁽³⁾ IF HIGHER)	8.8	
SAMPLE LOCATION	REPORTED CONCENTRATION RANGE (µg/kg WET WEIGHT) ^(4,5)		
Total Crustaceans (Flesh)	<1 – 3	<1	2
Molluscs (Oyster)	No oysters caught at this location		
Samphire (includes samples collected from Mundy Creek and Mundy Creek Wetland)	<1	<1	2
Rowes Bay (Estuarine):			
Cod (<i>Epinephelus malabaricus</i>)	<1	<1	1
Mangrove jack (<i>Lutjanus argentimaculatus</i>)	<1	<1	1
Mullet (<i>Mugil cephalus</i>)	<1	<1	1
Total Finfish (Flesh)	<1	<1	3
Finfish (Liver)	<1 – 12	<1	2
Crustaceans (Whole)	No whole samples collected at this location		
Crab flesh (species unknown)	<1	<1	1
Total Crustaceans (Flesh)	<1	<1	1
Molluscs (Oyster)	No oysters caught at this location		
Sargassum	No plant samples collected from this location		
Rowes Bay (Marine):			
Barred javelin (<i>Pomadasys kakaan</i>)	<1	<1	1
Grunter/Silver javelin (<i>Pomadasys argenteus</i>)	<1 – 2	<1	3
Barred queenfish (<i>Scomberoides tala</i>)	<1	<1	4
Blue catfish (<i>Neoarius graffei</i>)	<1	<1	4
Blue threadfin salmon (<i>Eleutheronema tetradactylum</i>)	<1	<1	5
Golden snapper (<i>Lutjanus johnii</i>)	<1	<1	3
Northern sand flathead (<i>Platycephalus endrachtensis</i>)	<1	<1	3
Spanish mackerel (<i>Scomberomorus commerson</i>)	<1 - 2	<1	3
Spotted scat (<i>Scatophagus argus</i>)	<1	<1	4

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
FINFISH (ALL)	5.2	41	
FISH LIVER	280	2240	
CRUSTACEANS/MOLLUSCS	65	520	
VEGETABLES (ALL)	1.1 µg/kg (OR LOD ⁽³⁾ IF HIGHER)	8.8	
SAMPLE LOCATION	REPORTED CONCENTRATION RANGE (µg/kg WET WEIGHT) ^(4,5)		
Total Finfish (Flesh)	<1 – 2	<1	30
Finfish (Liver)	2 – 184	< 1 – <2	25
Crustaceans (Whole)	No whole samples collected at this location		
Blue swimmer crab flesh (<i>Portunus armatus</i>)	<1 – 4	<1	4
Total Crustaceans (Flesh)	<1 – 4	<1	4
Molluscs (Oyster)	No oysters collected at this location		
Sargassum	<1	<1	3
Three Mile Creek (Estuarine only – drains from the Base into Rows Bay):			
Finfish (Flesh)	No fish flesh sampled from Three Mile Creek, only whole fish samples		
Finfish (Liver)	No fish liver sampled from Three Mile Creek		
Crustaceans (Whole)	No whole samples caught at this location		
Mud crab flesh (<i>Scylla serrata</i>)	<1	<1	3
Total Crustaceans (Flesh)	<1	<1	3
Molluscs (Oyster)	No oysters caught at this location		
Samphire	<1	<1	1
Town Common (Estuarine):			
Anchovy (<i>Engraulis australis</i>)	8	<1	1
Bream (<i>Acanthopagrus australis</i>)	<1 – 7	<1	5
Catfish (<i>Neoarius graffei</i>)	<1 – 11	<1	4
Cod (<i>Epinephelus malabaricus</i>)	<1 – 1	<1	3
Grunter (<i>Pomadasys argenteus</i>)	2 – 4	<1	2
Mullet (<i>mugil cephalus</i>)	39 – 59	<1	2
Queenfish (<i>Scomberoides</i> spp.)	6	<1	1
Whiting (<i>Sillago sihama</i>)	8	<1	1

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
FINFISH (ALL)	5.2	41	
FISH LIVER	280	2240	
CRUSTACEANS/MOLLUSCS	65	520	
VEGETABLES (ALL)	1.1 µg/kg (OR LOD ⁽³⁾ IF HIGHER)	8.8	
SAMPLE LOCATION	REPORTED CONCENTRATION RANGE (µg/kg WET WEIGHT) ^(4,5)		
Total Finfish (Flesh)	<1 – 59	<1	19
Finfish (Liver)	33 – 984	<1 – 5	14
Banana prawn – whole (<i>Fenneropenaeus merguensis</i>)	51	<1	1
Total Crustaceans (Whole)	51	<1	1
Mud crab flesh (<i>Scylla serrata</i>)	<1 – 8	1	19
Banana prawn flesh (<i>Fenneropenaeus merguensis</i>)	1	<1	4
Rose barnacle (<i>Tessieropora rosea</i>)	55	<1	1
Total Crustaceans (Flesh)	<1 – 55	<1 – 1	24
Molluscs (Oyster)	No oysters caught at this location		
Samphire	0.5	<1	1
Alligator Creek (Comparative Site – Estuarine and Freshwater):			
Bream (<i>Acanthopagrus australis</i>)	<1	<1	1
Grunter (<i>Pomadasys argenteus</i>)	<1	<1	4
Mullet (<i>mugil cephalus</i>)	<1	<1	4
Queenfish (<i>Scomberoides</i> spp.)	<1	<1	2
Total Finfish (Flesh)	<1	<1	11
Finfish (Liver)	<1 – <2	<1 – <2	8
Long-clawed freshwater prawn – whole (<i>Macrobrachium</i> spp.)	<1	<1	1
Total Crustaceans (Whole)	<1	<1	1
Mud crab flesh (<i>Scylla serrata</i>)	<1	<1	9
Banana prawn flesh (<i>Fenneropenaeus merguensis</i>)	<1	<1	2

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
FINFISH (ALL)	5.2	41	
FISH LIVER	280	2240	
CRUSTACEANS/MOLLUSCS	65	520	
VEGETABLES (ALL)	1.1 µg/kg (OR LOD ⁽³⁾ IF HIGHER)	8.8	
SAMPLE LOCATION	REPORTED CONCENTRATION RANGE (µg/kg WET WEIGHT) ^(4,5)		
Total Crustaceans (Flesh)	<1	<1	11
Molluscs (Oyster)	No oysters caught at this location		
Samphire	No samphire collected at this location		
Althaus Creek (Comparative Site – Estuarine):			
Bream (<i>Acanthopagrus australis</i>)	<1	<1	1
Mullet (<i>Mugil cephalus</i>)	<1	<1	2
Total Finfish (Flesh)	<1	<1	3
Finfish (Liver)	<1 – 8	<1	3
Crustaceans (Whole)	No whole samples collected at this location		
Mud crab flesh (<i>Scylla serrata</i>)	<1	<1	10
Total Crustaceans (Flesh)	<1	<1	10
Oyster (<i>Saccostrea</i> spp.)	<1	<1	2
Total Molluscs	<1	<1	2
Samphire	<1	<1	1
Althaus Creek (Comparative Site – Marine):			
Barramundi (<i>Lates calcarifer</i>)	<1 – 2	<1	8
Barred queenfish (<i>Scomberoides tala</i>)	<1 – 1	<1	4
Diamond scale mullet (<i>Liza vaigiensis</i>)	<1 – 5	<1	5
Northern sand flathead (<i>Platycephalus endrachtensis</i>)	<1	<1	3
Pikey bream (<i>Acanthopagrus pacificus</i>)	<1	<1	3
Grunter/Silver javelin (<i>Pomadasys argenteus</i>)	<1 – 6	<1	4
Spanish mackerel (<i>Scomberomorus commerson</i>)	<1 – 2	<1	3
Spotted scat (<i>Scatophagus argus</i>)	<1	<1	2

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
FINFISH (ALL)	5.2	41	
FISH LIVER	280	2240	
CRUSTACEANS/MOLLUSCS	65	520	
VEGETABLES (ALL)	1.1 µg/kg (OR LOD ⁽³⁾ IF HIGHER)	8.8	
SAMPLE LOCATION	REPORTED CONCENTRATION RANGE (µg/kg WET WEIGHT) ^(4,5)		
Total Finfish (Flesh)	<1 – 6	<1	32
Finfish (Liver)	<1 – 255	<1 – 4	27
Blue swimmer crab flesh (<i>Portunus armatus</i>)	<1	<1 – 2	4
Total Crustaceans (Flesh)	<1	<1 – 2	4
Gordon Creek (Comparative Site Estuarine – referred to as Stuart Creek in the DSI report (WSP 2018)):			
Mullet (<i>Mugil cephalus</i>)	<1	<1	2
Total Finfish (Flesh)	<1	<1	2
Finfish (Liver)	2 – 3	<1	2
Banana prawn – whole (<i>Fenneropenaeus merguensis</i>)	2	<1	1
Total Crustaceans (Whole)	2	<1	1
Mud crab flesh (<i>Scylla serrata</i>)	<1	<1	3
Total Crustaceans (Flesh)	<1	<1	3
Oyster (<i>Saccostrea</i> spp.)	<1	<1	1
Total Molluscs	<1	<1	1
Samphire	<1	<1	1
Sandfly Creek (Comparative Site Estuarine):			
Anchovy (<i>Engraulis australis</i>)	<1	<1	1
Bream (<i>Acanthopagrus australis</i>)	<1	<1	4
Grunter (<i>Pomadasys argenteus</i>)	<1	<1	1
Mangrove jack (<i>Lutjanus argentimaculatus</i>)	<1	<1	2
Mullet (<i>Mugil cephalus</i>)	<1	<1	5
Threadfin salmon (<i>Eleutheronema tetradactylum</i>)	<1	<1	1
Whiting (<i>Sillago ciliata</i>)	<1	<1	1

ADOPTED SCREENING CRITERIA (µg/L) (1,2)	PFOS + PFHXS	PFOA	NUMBER OF SAMPLES
FINFISH (ALL)	5.2	41	
FISH LIVER	280	2240	
CRUSTACEANS/MOLLUSCS	65	520	
VEGETABLES (ALL)	1.1 µg/kg (OR LOD ⁽³⁾ IF HIGHER)	8.8	
SAMPLE LOCATION	REPORTED CONCENTRATION RANGE (µg/kg WET WEIGHT) ^(4,5)		
Total Finfish (Flesh)	<1	<1	15
Finfish (Liver)	<1 – 3	<1	5
Crustaceans (Whole)	No whole samples collected at this location		
Banana prawn flesh (<i>Fenneropenaeus merguensis</i>)	<1	<1	6
Total Crustaceans (Flesh)	<1	<1	6
Molluscs (Oyster)	No oysters caught at this location		
Samphire	No samphire collected at this location		
Magnetic Island (Comparative Site Marine):			
Crimson snapper (<i>Lutjanus erythropterus</i>)	<1	<1	3
Diamond scale mullet (<i>Liza vaigiensis</i>)	<1	<1	1
Garfish (Snub nose) (<i>Arrhamphus sclerolepis</i>)	<1	<1	4
Saddletail snapper (<i>Lutjanus malabaricus</i>)	<1	<1	2
Sea mullet (<i>Mugil cephalus</i>)	<1	<1	3
Whiting (<i>Sillago ciliate</i>)	<1	<1	1
Total Finfish (Flesh)	<1	<1	14
Finfish (Liver)	<1 – 66	<1 – <4	7
Sargassum	<1	<1	4

Notes:

- (1) Ref: FSANZ (2017). Proposed trigger points.
- (2) Aquatic biota trigger points are based on the protection of the 90th percentile consumption rates of children aged 2-6 years.
- (3) LOD = limit of detection
- (4) Shading indicates a concentration is above the adopted screening criteria.
- (5) Aquatic biota data (as reported by ESP) is presented on Table 15, Appendix B.

The review of the off-Base aquatic biota data identified the following:

- Reported concentrations of PFOS + PFHxS within one finfish (flesh) sample was reported above the adopted screening criteria in mullet collected from the Bohle River (estuarine). PFAS concentrations (PFOS + PFHxS and PFOA) in all other finfish (flesh) samples were reported below the screening criteria.
- Fourteen (individual) finfish (flesh) samples including anchovy, bream, catfish, mullet, queenfish and/or whiting from the Town Common (estuarine) reported PFOS + PFHxS above the screening criteria. PFAS concentrations (PFOS + PFHxS and PFOA) in all other finfish (flesh) samples were reported below the screening criteria.
- Reported concentrations of PFOS + PFHxS and PFOA within finfish (flesh) marine samples collected from Rowes Bay and Bohle River were below the FSANZ screening criterion in all species sampled.
- Reported concentrations of PFOS + PFHxS within finfish (liver) samples were reported above the adopted screening criteria in samples (Mullet and Catfish) collected from the Town Common, PFOA concentrations were reported below the screening criteria. It is acknowledged that liver results generally showed higher PFAS concentrations than flesh samples. The fish (liver) results at all other sampling locations reported PFOS + PFHxS and PFOA below the adopted screening criteria.
- Crustacean (flesh) samples reported concentrations of PFOS + PFHxS below the adopted screening criteria in all samples collected. A crustacean (whole) sample collected from the Bohle River reported PFOS + PFHxS at the screening criteria. All other crustacean samples (whole and flesh) reported PFAS concentrations (PFOS + PFHxS and PFOA) below the adopted screening criteria.
- Reported PFAS concentrations (PFOS + PFHxS and PFOA) in mollusc (oyster) samples were below the laboratory limit of reporting (LOR). Given the limited number of available samples (i.e. x 2 for Bohle River) the results for shell and flesh were evaluated together. Hence, no further consideration of molluscs in the HHRA was undertaken.
- Samphire and sargassum samples reported PFAS concentrations (PFOS + PFHxS and PFOA) below the laboratory LOR. Hence, no further consideration of samphire or sargassum in the HHRA was undertaken.
- All reported PFOA concentrations in finfish and crustaceans were below the adopted screening criteria. Hence, PFOA concentrations in finfish and crustaceans was not considered further in the HHRA. Crustaceans (whole and flesh) were not evaluated further as PFAS was not identified above the FSANZ screening criteria of 65 µg/kg.

In summary, for fish (flesh) samples, the reported PFOS + PFHxS concentration was approximately twice that of the FSANZ screening criteria within one sample of mullet from the Bohle River (estuarine). This suggests there is a potential for elevated exposures to occur should recreational fishing and subsequent consumption of locally caught fish be occurring.

For finfish (flesh) samples, concentrations of PFOS and PFHxS exceeded the screening criteria by up to 11 times within three individual samples of Mullet from the Town Common (estuarine). Two individual samples of catfish caught within the Town Common (estuarine) exceeded the screening criteria by approximately 6 times for PFOS + PFHxS. The results indicate that elevated exposures have a potential to occur within certain fish species (i.e. mullet and catfish) habiting this area.

Based on the above data evaluation for aquatic biota samples, particularly the edible biota (i.e. fish) collected and sampled from known recreational (estuarine) fishing areas located downstream from the Base (i.e. Bohle River, Town Common), some elevated exposure above the FSANZ (2017) recommended trigger points may potentially occur.

7.5 DATA QUALITY

Some data quality issues were identified as part of the DSI, notably the soil results for some PFAS compounds varied between the primary (ALS) and secondary (Eurofins) laboratories. Results reported by the secondary laboratory in some instances were higher than the primary laboratory result. It is expected that both sample heterogeneity and differences in analytical procedures are both contributing to the variation observed in the results. This is not considered to make a material difference to the dataset adopted for the HHRA. The purpose of the secondary laboratory sample is to provide a check on the primary laboratory result and reproducibility of the data. Irrespective of the primary or secondary laboratory result, a mean and 90th percentile concentration was utilised in the HHRA to represent typical and upper limit exposure settings respectively and hence, is considered to provide a conservative estimate and representation of PFAS concentrations in soil. The calculated mean and 90th percentile concentrations for PFOS + PFHxS and PFOA are presented for each dataset are presented in Section 9.3 (Table 9.3) and Appendix D.

7.6 DATA GAPS AND LIMITATIONS

The DSI (WSP 2018) collected samples of soil, groundwater, surface water, sediment and locally sourced foods including finfish, crustaceans, molluscs and one type of edible aquatic plant (samphire). No terrestrial (edible) biota (i.e. fruit, vegetables, chickens or eggs) were sampled as part of the DSI (WSP, 2018). However, theoretical PFAS concentrations were calculated for use in the HHRA for certain edible terrestrial biota, based on the results of the WUS and in consideration of the future use of groundwater for extractive uses (including irrigation of home-grown fruits and vegetables). Further details regarding terrestrial biota data is provided below in Table 7.6.

7.7 ADEQUACY OF THE DATASET

Based on a review of the datasets including soil, groundwater, surface water, sediment and aquatic biota, collectively the data is considered adequate to provide an initial characterisation of potential human health risks, within the Investigation Area. Whilst, limitations and data gaps have been identified above as per Table 7.6 below, efforts to address them adequately have been undertaken as part of this iteration of the HHRA. Where additional sampling of a media or biota is considered to be required, recommendations regarding this have been provided in the forthcoming sections of this report.

Of note, so specific sampling was completed within Areas M and N, former fire training areas as depicted on Figure 3.2 (Section 3.4). Both areas were indicated to have possible AFFF use and whilst no specific sampling was undertaken, known sources areas on the Base were targeted during the DSI. An absence of sampled media from these areas is not considered to preclude the reliability of the HHRA findings or outcomes.

Table 7.6 Summary of data gaps and limitations

DATA GAP/LIMITATION	POTENTIAL IMPACT ON THE HHRA	HOW ADDRESSED IN THE HHRA
Water Use Survey (WUS)		
Low response rate for the WUS issued to residents and businesses located within the Investigation Area) (i.e. 7% of surveys were responded to).	Given the low number of responses regarding water use, there is a potential that some extractive uses of groundwater or surface water have not (yet) been identified. Thus, providing an incomplete conceptual understanding of use and exposures to PFAS in groundwater/surface water.	Residential properties that showed evidence of bore water use were approached to complete the WUS. As residents are supplied with municipal (town) water for general drinking and domestic uses, the HHRA has assumed that residents may extract groundwater for recreational play and irrigation of gardens including vegetable gardens. Further details regarding exposure pathways and receptors of concern is provided in Section 9.2.
Soil Assessment and Sampling Program		
Not all areas on the Base could be accessed and therefore sampled.	Some areas that could not be accessed were not assessed and/or delineated for soil PFAS impacts. This may result in an incomplete characterisation of impacts in certain areas.	Although shallow soil PFAS impact may not have been delineated in some areas of the Base, WSP's understanding of the mechanisms for contamination of soil by PFAS suggests that significant shallow soil impacts are limited to areas where direct contact with AFFF has occurred. The investigation conducted by WSP targeted operational areas and identified sources areas as detailed within Table 3.2, Section 3.4 of this report. The soil assessment program also delineated samples to the eastern Base boundary.
The contamination status of non-irrigated shallow soils off-Base is not known. No soil samples collected in residential areas between the eastern Base boundary and delineation locations off-site to the east in Garbutt. Hence, no assessment of shallow soils that may have been impacted from rising (impacted) groundwater conditions during the wet season and the subsequent transport of PFAS off-Base; and/or other historical transport mechanisms off-Base.	This may result in the incomplete characterisation of the direct contact exposure risk to non-irrigated shallow soils present within the residential areas of Garbutt.	Whilst this exposure pathway is not considered to drive the overall health risk in comparison to other exposure pathways that were quantified as part of the HHRA, including the consumption of home-grown produce and locally caught fish. The contamination status and resulting health risk contribution from non-irrigated shallow soil impacts, within off-Base residential areas of Garbutt remains an unknown. Some additional shallow soil sampling would assist in providing data to close out this gap.

DATA GAP/LIMITATION	POTENTIAL IMPACT ON THE HHRA	HOW ADDRESSED IN THE HHRA
Aquatic Biota		
Some aquatic biota types (i.e. various fish species) comprised less than 10 samples, which is considered to be less than the desired sample size (n) for statistical analysis.	Limited samples sizes for aquatic biota types may contribute to an increased margin of error, resulting in over or under-estimation of potential risks to human health.	The data utilised for finfish (flesh) and crustaceans (whole and flesh) at the sampled locations has incorporated all finfish data (for all species) collectively; and all crustacean data (for all species) collectively. Reported PFOS + PFHxS and PFOA concentrations for individual finfish, crustacean and mollusc species has been presented in Table 7.5 for completeness. However, due to small datasets for some individual fish species (following multiple sampling events), the total of each group (i.e. finfish, crustaceans and/or molluscs) was then compared against the available relevant FSANZ (2017) trigger point concentration. No further quantification of potential health risks from consuming specific finfish species (i.e. Mullet or Bream) from certain locations has been undertaken at this stage. Both a mean and 90th percentile concentration for finfish flesh consumption (considered to warrant further assessment based on the screening assessment in Section 7.2.3), was calculated for results reported within the impact sites only (i.e. Bohle River, Town Common, Mundy Creek and Rowes Bay) to evaluate a typical and upper limit exposure estimate for the identified receptors; and is considered reasonable based on the limitations regarding sample size for most fish species.
No aquatic biota data collected during the wet season	Potential health risks from the consumption of aquatic biota have been quantified without consideration of temporal/seasonal variability and the resulting distribution of impacts within aquatic biota species. This may not capture what happens to PFAS concentrations within biota during a wet season/flooding event.	The adopted exposure point concentrations reflect both a typical and upper limit exposure setting respectively (i.e. calculated mean and 90 th percentile concentrations were adopted to represent these scenarios) during the season have been used to infer/represent the potential maximum exposure during the wet season.

DATA GAP/LIMITATION	POTENTIAL IMPACT ON THE HHRA	HOW ADDRESSED IN THE HHRA
Terrestrial Biota (fruit and vegetables)		
No terrestrial (edible) biota data that can be consumed by residents was collected as part of the DSI program. This specifically relates to private residences that have indicated they are currently extracting groundwater to irrigate their vegetable gardens. Currently, two residents located in the suburb of Pallarenda have indicated this. <i>Of note, where a residential property showed evidence of home-grown produce, the property owner/occupier was approached to complete the WUS.</i>	No direct measurements from terrestrial biota samples results in an increased uncertainty in quantifying risk associated with this exposure pathway (i.e. consumption of produce). The outcome of which may under or overestimate the human health risk associated with the consumption pathways.	This has been addressed in the HHRA by calculating a theoretical concentration within various home-grown produce including fruit and vegetables, utilising available soil and groundwater data. Potential human health risks have then been quantified based on the estimated concentration present within fruits and vegetables. Several fruit and vegetables (including a green leafy vegetable) were sampled from a property in Garbutt. Samples collected included lemons, limes, cherries, tomatoes, cucumber and silver beet. PFOS was only detected in one sample (silver beet) at a concentration below the FSANZ trigger limit for leafy green vegetables.

8 TOXICITY ASSESSMENT

8.1 INTRODUCTION

Toxicity assessment provides an evaluation of the inherent toxicity of chemicals. It is a process of determining whether human exposure to a chemical could cause an increase in the incidence of an adverse health condition, either cancerous or non-cancerous in nature (ANZECC/NHMRC, 1992). It considers:

- The nature of adverse effects related to the exposure
- Dose-response relationships
- The weight of evidence for effects such as carcinogenicity; and
- The relevance of animal data to humans.

The results of the toxicity assessment include a set of chemical specific toxicity criteria, known as toxicity reference values (TRVs) that are used in the assessment of health risks from chemical exposures.

The toxicology assessment of PFOS, PFOA and PFHxS presented in this section provides a summary of the recent evaluation of available human and animal studies undertaken by FSANZ (2017b). FSANZ have conducted the most recent review of PFAS toxicity to humans on behalf of the Department of Health, for the purpose of establishing Australian guidelines (trigger points) for various food groups that are protective of human health. The FSANZ review specifically addressed PFOS, PFOA and PFHxS.

As part of their evaluation, FSANZ reviewed several comprehensive international assessments on the health effects of PFAS including works completed by the United Kingdom Committee on Toxicity (UKCOT), the European Food Safety Authority (EFSA), the Swedish Environmental Protection Agency (Swedish EPA), the Danish EPA and the Agency for Toxic Substances and Disease Registry (ATSDR). Also considered in the FSANZ review was the findings of the recent US EPA (2016) studies, the enHealth documents relating to the interim national PFAS guidance (enHealth 2016a, 2016b) and the literature review undertaken by ToxConsult (2016).

8.2 HEALTH EFFECTS

As indicated above, the toxicity summary provided herein has focussed on the findings provided in the FSANZ report titled “*Hazard assessment report – Perfluorooctane Sulfonate (PFOS), Perfluorooctanoic Acid (PFOA), Perfluorohexane Sulfonate (PFHxS)*” (FSANZ 2017b). Where specific information relating to PFOS, PFOA and/or PFHxS was not provided, the toxicology summary has been based on information relating to PFAS in general. Given that PFAS have not been found to readily volatilise, the toxicity summary focuses on the oral and dermal routes of exposure.

8.2.1 HUMAN MODELS

Study populations for human studies thus far have focussed on occupationally exposed workers at 3M manufacturing facilities in Decatur, Alabama and Antwerp, Belgium; as being representative of communities with high exposure due to contamination of drinking water by leakages from a production plant in the US; and general populations in a range of geographical locations including North America, the UK and Scandinavian countries.

The following provides a general summary of the findings that have been associated with PFOS, PFOA and PFHxS as per FSANZ (2017b):

- The blood levels of PFASs of occupationally exposed workers has been found to be two to three orders of magnitude (100 – 1000-fold) higher than those of the general population. However, despite this, epidemiology studies have generally failed to draw conclusive links between exposure to PFOS and adverse health effects. Associations between PFOS exposure and several health effects include:
 - Increased total cholesterol levels (reviewed by ATSDR 2015 and US EPA 2016) and changes in serum liver enzyme levels and increased liver weight
 - Chronic kidney disease
 - Changes in thyroid function and immune function
 - Effects on sex hormone levels and fertility (i.e. later menarche and earlier menopause)
- Pregnancy and birth outcomes (including birth weight and gestational age); and
- None of the agencies considered that epidemiological studies provided convincing evidence of a correlation between PFOS and any cancer type.

Overall the FSANZ report found the evidence for adverse health effects to humans from PFOS exposure as reported in several epidemiological studies, to be inconsistent between the studies and the biological significance of some of the observed effects was indicated to be questionable.

FSANZ advised these studies were based on observations and it was not clear whether other factors may be involved; therefore, the study outcomes are questionable. Immunotoxicity studies regarding the effect of PFOS (and PFOA) on the production of antibodies in humans were also inconclusive and further research is required to provide more convincing evidence either way.

FSANZ concluded that the available human epidemiological data were not suitable to support the development of toxicity criteria for PFOS and recommended the use of toxicological studies in laboratory animals to derive a TRV.

8.2.2 ANIMAL MODELS

The database relating to the toxicity of PFOS in animals includes acute and short term studies with mice, rats and monkeys, sub-chronic studies with rats and monkeys, chronic studies with rats and reproductive / developmental studies with mice, rats and rabbits. The critical health effects identified in animal toxicity studies and as summarised by FSANZ (2017b) are provided below as follows:

- PFOS and PFOA were found to be toxic to laboratory animals producing reproductive, developmental and systemic effects in laboratory tests including:
 - Increased liver weights, loss of appetite, decreased body weight, reduced body weight gain, changes to liver weight including increases in liver weight, altered cholesterol levels, lower foetal weights and abortions, delayed eye-opening and reduced pup viability and weight/weight gain and reduced gestation length.
- The weight of evidence from a range of genotoxicity studies suggests that PFOS and PFOA are not genotoxic.

Several studies have shown humans and animals react differently to PFOS (and PFOA) (ATSDR 2015), therefore making extrapolation difficult. For example, the half-life of PFOS in mice, rats, monkeys and humans varies significantly, with studies finding that the half-life of PFOS to range between 37, 48, 121, 1,500–3,165 days respectively. Animals are therefore considered to be poor surrogates for extrapolating health effects (particularly rodents) relating to PFAS contaminants to humans. However, in deriving TRVs, FSANZ has applied uncertainty factors to extrapolate health effects to humans.

8.2.3 CANCER CLASSIFICATION

A review of the International Agency for Research on Cancer (IARC) and U.S. Environmental Protection Agency (USEPA) cancer classifications was undertaken. In addition, information provided in the FSANZ (2017b) report regarding carcinogenic health effects from exposure to PFOS, PFOA and PFHxS compounds was conducted. The potential for PFAS to cause cancer is discussed below.

As referenced in FSANZ (2017b) both EFSA (2008), the US EPA (2016) have noted that human epidemiology studies did not find a correlation between PFOS exposure and cancer incidence in occupational populations, and general population studies found no statistically significant trends for any cancer type.

In July 2016, the IARC classified PFOA as Group 2B: *possibly carcinogenic to humans* (IARC 2016). The IARC concluded that there was limited evidence in human and experimental animals for the carcinogenicity of PFOA. The overall classification assigned to PFOA was Group 2B (possibly carcinogenic).

The US EPA have found that there is *suggestive evidence* that PFOS and PFOA may cause cancer (US EPA 2016a, 2016b) and have assigned an overall classification of SE (suggestive evidence of carcinogenic potential).

The FSANZ report (2017b) concluded the following with respect to the potential for PFAS to cause cancer:

- *Epidemiological studies have not provided convincing evidence of a correlation between PFOS and PFHxS and any cancer type in human beings.*
- *Associations between PFOA and some human cancers have been suggested from some epidemiological studies, results have often been contradictory, and a causal relationship cannot be established with reasonable confidence.*

8.2.4 DERMAL EXPOSURE

Anionic surfactants (i.e. PFOS/PFOA), are generally thought to penetrate the whole skin poorly. Experimental values presented by Scala et al. (1968) confirm that even at the highest surfactant concentrations studied (0.03 M or 1%), non-detectable concentrations of surfactants passed through the skin in the first two hours of exposure. Diffusion curves were observed to be non-linear (exponential), with surfactant able to be measured on the underside of the skin four hours following exposure.

As reported in ToxConsult (2016) and ATSDR (2015) dermal exposures with rat and human epidermal membranes (no dermis) showed negligible amounts of PFOA passed through the membranes. In human skin 0.05% ± 0.01% penetrated after 48 hours, with a permeability coefficient of $9.49 \pm 2.86 \times 10^{-7}$ cm/hr (i.e. 0.000001 cm/hr). Steady state was achieved after 12 hours. For rat skin, 1.44 ± 1.13% had penetrated the membrane with a permeability constant of $3.25 \pm 1.51 \times 10^{-5}$ cm/hr (Fasano et al. 2005). Franko et al. (2012) showed that under certain conditions, PFOA can penetrate the skin membranes of humans and mice, however in this study PFOA was applied as the pure acid and so pH may have been a contributing factor to the heightened penetration (the conditions of which is unlikely to be observed in the Investigation Area). The data indicates that rat and mouse skin may be more permeable to PFOA than human skin with negligible absorption of PFOA through the skin demonstrated by the above experimental data. Experimental studies of dermal exposure of PFOS in rabbits showed that absorption was not detected at an applied concentration of 0.3 mg/kg of potassium PFOS (ATSDR, 2015).

Based on the limited information from experimental studies in humans and given that animals are generally considered to be poor surrogates for humans when assessing PFAS toxicity, it has been conservatively assumed that PFOS + PFHxS and PFOA may penetrate through the skin. Hence, dermal exposure via soil and/or the various water exposure pathways has been included in this HHRA.

A complete summary of the human toxicity to PFOS, PFOA and PFHxS is presented in Appendix E.

8.3 DOSE-RESPONSE ASSESSMENT

The purpose of a dose-response assessment is to describe the health effects (i.e. adverse and non-adverse) from exposure to a chemical as well as identifying the toxicity values that are being adopted as part of the HHRA. The numerical values derived from toxicity dose-response studies are referred to collectively as toxicity reference values (TRV). The derivation of TRVs are based on two different approaches to the characterisation of dose-response (NHMRC, 1999 and US EPA 2005). These are as follows:

- A non-threshold dose-response relationship. This is for chemicals that have the potential to produce a carcinogenic effect with a genotoxic mechanism. Any level of exposure is assumed to result in some incremental lifetime cancer risk. To date, PFAS have not been identified to be genotoxic (FSANZ 2017b).
- A threshold dose-response relationship. This for chemicals that have a potential to produce non-carcinogenic health effects or other carcinogenic effects that are not produced via a genotoxic mechanism. Hence, a threshold dose is considered appropriate. Exposure below the threshold value is not considered to result in any adverse effects over a lifetime of exposure (including non-genotoxic carcinogenicity). If the threshold value is exceeded this does **not** necessarily imply that an adverse effect will occur, as there are several uncertainty and safety factors that are incorporated into the derived threshold value that is then applied in a risk assessment. Rather, it indicates that further evaluation is required.

A threshold approach has been adopted to assess the potential health risks of PFOS, PFHxS and PFOA to humans. Health effects that are assessed based on a threshold dose-response, utilise a threshold value (i.e. TRV) which is typically termed an acceptable or tolerable daily intake (i.e. ADI or TDI) or a reference dose (RfD). For the purposes of this assessment, the threshold value or TRV has been termed ‘TDI’ and is defined as “an estimate of the intake of a substance that can occur over a lifetime without appreciable health risk” (WHO, 1994). The TDI relates to intakes from all sources, including source related impacts as well as background intakes (where relevant).

The TDI is determined based on the lowest No Observed Adverse Effect Level (NOAEL), typically from human (occupational) or animal studies with the application of several safety or uncertainty factors (UFs). Alternatively, a Lowest Observed Adverse Effect Level (LOAEL) or Benchmark Dose (BMD) may be used. A BMD is the dose associated with a given percent incidence of an effect. For example, the dose associated with the health effect occurring in 5% or 10% of subjects. The BMD is related to a measurable or reliably predictable outcome (or benchmark) at a specified low level of increase above background levels (NHMRC 1999). A Human Equivalent Dose (HED) can also be calculated to avoid the use of a several UFs. A HED is the quantity of a chemical which, when administered to humans, produces an effect equal to that produced in test animals by a smaller dose.

The inherent uncertainty in the extrapolation between and within species, is then addressed by dividing the relevant NOAEL, LOAEL, BMD or HED by UFs. The applied UFs can range from 10 to 10,000 depending on the source and quality of data, the biological relevance of the endpoint; and the hazard assessment (enHealth, 2012a).

In contaminated land health risk assessment, the estimated exposures from oral ingestion, dermal and inhalation pathways are compared to the corresponding TDI/RfD or ADI (for this assessment TDIs have been adopted). This process is further described in Section 10. The adopted TDIs for PFOS, PFHxS and PFOA are presented below.

8.3.1 ADOPTED TOXICITY REFERENCE VALUES (TRVs)

The TDI values as developed by the FSANZ (2017b) were adopted for the HHRA.

For PFOS, FSANZ has recommended a TDI of 20 ng/kg bw/day based on decreased parental and offspring body weight gains in a multigeneration reproductive toxicity study in rats. The TDI was derived by applying pharmacokinetic modelling to the serum PFOS concentrations measured in experimental animals at the NOAELs in these and other critical studies, to calculate HEDs. An uncertainty factor of 30 was applied to the HEDs, which comprised a default factor of 3 to account for interspecies differences in toxicodynamics and a default factor of 10 for intra-species differences in the human population.

For PFOA, FSANZ has recommended a TDI of 160 ng/kg bw/day based on a NOAEL for foetal toxicity in a developmental and reproductive study in mice. Pharmacokinetic modelling was applied to the serum concentrations at the NOAEL and above to calculate the HED. An uncertainty factor of 30 was applied to the HED, which comprised a default factor of 3 to account for interspecies differences in toxicodynamics and a default factor of 10 for intra-species differences in the human population.

For PFHxS, a review of the available toxicity and epidemiological studies by FSANZ concluded there were significant deficiencies in both, to develop a TRV for PFHxS or perfluoroalkyl compounds as a group. Of the studies undertaken only one study on rats was considered adequate, which concluded there was no evidence of reproductive or developmental toxicity. On the basis PFHxS also displayed similar toxicokinetic differences between laboratory animals and humans, like PFOS and PFOA, the establishment of a TRV for PFHxS was not recommended given the limited data. FSANZ adopted the same approach as enHealth in recommending the use of the TRV for the sum of PFOS +PFHxS as a conservative interim measure. Effectively, this means that PFHxS and PFOS should be summed for the purposes of exposure assessment and risk characterisation (FSANZ, 2017b).

8.3.2 BACKGROUND EXPOSURE

Background levels of contamination comprising PFAS chemical concentrations are present in the environment as a direct result of everyday activities and various manufacturing processes. PFAS compounds may be present in food, air (as dust particulates), water and consumer products. This is commonly referred to as 'background exposure'. Schedule B4 of NEPC (2013) and eHealth (2012a) require that background exposure be considered during the assessment of potential human health risks. This has been undertaken via the adjustment of the TDI thresholds to account for non-site related exposure. Background exposure is only applied to threshold contaminants (i.e. non-carcinogens) as intakes associated with non-threshold contaminants (i.e. carcinogens) are considered based on an increase in risk, irrespective of background exposure.

The HHRA has reviewed available literature studies including ATSDR (2015) and the reviews and findings presented by ToxConsult (2016a and 2016b). A literature review of PFAS concentrations present in serum of Australian subjects, undertaken by ToxConsult, calculated the upper estimate for background intakes for PFOS and PFOA. No data on background intake rates are available for PFHxS. However, for the purposes of the HHRA, PFOS and PFHxS have been summed together. The adopted background intakes are presented in Table 8.1.

Table 8.1 Adopted background intakes

ANALYTE	BACKGROUND INTAKE ⁽¹⁾ (µg/kg/day)	BACKGROUND INTAKE AS A PERCENTAGE OF THE ORAL TDI
PFOS+ PFHxS	0.0014	7%
PFOA	0.00078	<1%

Notes:

(1) Ref: ToxConsult (2016a, 2016b). Based on the upper estimate of background intakes in Australians.

To account for background exposure, the adopted threshold TDI was reduced by subtracting the background exposure before being utilised in the risk characterisation step of the HHRA, as presented in Table 8.2 below.

8.3.3 ADOPTED TOLERABLE DAILY INTAKES (TDIs)

The adopted TDIs by FSANZ for the assessment of PFOS + PFHxS and PFOA are summarised in Table 8.2 below. This table also includes the background intakes that have been adopted; and the resulting adjusted TDI utilised in the risk characterisation step of the HHRA.

Table 8.2 Summary of adopted toxicity values

ANALYTE	ORAL TDI ⁽¹⁾ (µg/kg bw/day)	BACKGROUND INTAKE ⁽²⁾ (µg/kg/day)	ADJUSTED TDI ⁽³⁾ (µg/kg/day)
PFOS + PFHxS	0.00002	0.0000014	0.0000186
PFOA	0.00016	0.00000078	0.000159

Notes:

- (1) Ref: FSANZ (2016a, 2016b).
- (2) Ref: ToxConsult (2016a, 2016b).
- (3) Adjusted TDI is calculated by subtracting the background intake from the oral TDI value.

Of note, the adopted criteria for screening purposes (as presented in Section 7.2 of this report) are based on the TDIs presented in Table 8.2 above.

For assessment of the inhalation of dust particulates an inhalation reference concentration (RfC) was calculated from the TDI assuming a body weight of 70kg and an inhalation rate of 20 m³/day. For dermal exposures, the oral TDI was adopted.

8.4 OTHER PFAS COMPOUNDS

For other PFAS compounds, limited information is available in which to evaluate the toxicity of many of the individual compounds. A review of a comparative study for the cumulative effects of 17 different PFAS compounds, indicated that most of the other PFAS compounds are between 10 to 100 times less toxic than PFOS and PFOA (Borg et. al., 2013). Other PFAS compounds detected within the various media sampled include PFHxA, PFBS, PFPeS, PFDS, PFDA and 6:2 FtS.

It is noted that of the total PFAS reported within the Investigation Area, PFOS + PFHxS comprised most the total PFAS report, with PFOA and PFHxA contributing less to the total concentrations observed.

With respect to PFHxA, ToxConsult (2016a) have derived a provisional TDI of 100 µg/kg/day. However, this has yet to be ratified by FSANZ. Hence, the focus of evaluating the toxicity of PFAS to humans has been PFOS, PFHxS and PFOA.

9 EXPOSURE ASSESSMENT

9.1 GENERAL

Exposure assessment involves the estimation of the magnitude, frequency, extent and duration of exposure to contamination (enHealth, 2012a). The following components have been evaluated as part of the exposure assessment to estimate the exposure or intake of PFAS:

- Identification of potential exposure pathways and receptors of concern
- Estimation of exposure concentrations for each pathway
- Identification of exposure parameters for each identified exposure pathway and receptor.

The exposure assessment has been based on the exposure pathways and receptors of concern identified in the CSM provided in Table 6.1, Section 6.7.

9.2 EXPOSURE PATHWAY ANALYSIS

For contaminated media to pose a risk to human health, a complete exposure pathway must exist between the source of the impact and the receptor. Where the exposure pathway is incomplete, there is no exposure, hence no risk. A complete exposure pathway requires each of the following elements:

- A source and mechanism for release
- A storage and/or transport medium
- An exposure point, where the receptor encounters the contamination; and
- An exposure route (i.e. inhalation or direct contact).

Due to the nature and type of PFAS present within the IA, the HHRA has focussed on the potential health risks associated with direct contact pathways (i.e. incidental ingestion, dermal contact and dust inhalation) as deemed relevant for the impacts identified across the various media (i.e. soil, sediment, groundwater, surface water and biota).

As PFAS do not volatilise readily at environmental temperatures, exposures via the vapour inhalation pathway are considered negligible. PFAS can be transported through the air as dust particulates. However, as indicated in Section 6.5, the dust inhalation pathway has been shown to contribute a negligible amount to the exposure risk, based on completed HHRA reports for other Defence properties and as indicated in this risk assessment.

In addition, PFAS compounds are not readily adsorbed into the systemic system when exposed via dermal contact. However, as dermal absorption of PFAS may be possible (as indicated in Section 8.2.4), this pathway has been evaluated as part of the overall direct contact exposure risk. The contribution of the dermal contact pathway to the overall risk to human health is less significant and/or is negligible by comparison to the direct ingestion of media (as demonstrated by the risk estimates presented in Section 10 and the health risk calculations presented in Appendix F).

The exposure pathways evaluated as part of the HHRA for On-Base are summarised in Table 9.1.

Table 9.1 Summary of exposure pathways and receptors – on-Base

EXPOSURE PATHWAY AND MEDIA	EXPOSURE PATHWAY SIGNIFICANT?	RECEPTOR	COMMENTS
Incidental ingestion of PFAS in soil	✓✓	— Defence personnel — Maintenance/utility workers	Direct contact exposures (i.e. incidental ingestion, dermal contact with soil and the inhalation of dusts) may occur during daily work activities at the Base including any <i>ad-hoc</i> sports days and use of the Ingham Road Sports Field. Exposure to surface soil (up to 0.5 mBGL) is the most relevant pathway of exposure for Defence personnel. For maintenance/utility workers soils from the surface (up to 0.5 mBGL) and deeper soils (i.e. >0.5 mBGL) are considered relevant for the exposure that may occur via excavations and trenches.
Dermal contact with PFAS in soil	✓	— Defence personnel — Maintenance/utility workers	
Inhalation of PFAS in dust generated from soil on the Base	✓	— Defence personnel — Maintenance/utility workers — Children/adults attending and working at the kindergarten	No families live on the Base and it is understood that the Base accommodation comprises unit style facilities for individual workers and/or visiting Base personnel. The kindergarten facility is there to accommodate personnel/families that live off-Base in the nearby surrounding suburbs and work at the Base. Potential exposure to PFAS for children attending and adults working at the kindergarten is considered to occur via the inhalation of dusts only, as kindergarten attendees (children and adults) have no direct access to contaminated soils within the kindergarten, which are located at depths beyond the near-surface (i.e. at ≥ 0.5 mBGL). No near-surface soils reported concentrations above the screening criteria (residential with garden accessible soil).
Incidental ingestion of PFAS in groundwater	✓✓	— Maintenance/utility workers	Direct contact exposure (i.e. incidental ingestion and dermal contact) may occur during maintenance works only. Groundwater is not being extracted by Defence personnel to carry out work activities.
Dermal contact with PFAS in groundwater	✓		

EXPOSURE PATHWAY AND MEDIA	EXPOSURE PATHWAY SIGNIFICANT?	RECEPTOR	COMMENTS
Incidental ingestion of PFAS in surface water/stormwater and irrigation water	✓✓	- Defence personnel - Maintenance/utility workers	Direct contact exposures (including the incidental ingestion and dermal contact with water) may occur during daily work activities at the Base, the maintenance of drains and/or during the irrigation of on-Base garden/lawn areas.
Dermal contact with PFAS in surface water/stormwater and irrigation water	✓		Inhalation exposures are incomplete as (i) PFAS are not volatile and (ii) whilst aerosols may be generated from irrigation activities, it is considered that the aerosols formed will be large enough to be swallowed and ingested as opposed to being inhaled into the lungs.
Inhalation of PFAS in surface water/stormwater and irrigation water	✗		Of note, the HHRA has not evaluated potential exposures associated with the inhalation of fine aerosols if generated during any dust suppression works or other spraying works. This is considered to fall outside of daily work activities by Defence personnel and/or general maintenance requirements. Should the application/use of fine aerosols be required by Defence personnel and/or maintenance workers, then an approach could be to manage potential exposure via an EMP.
Incidental ingestion of PFAS in sediments	✓✓	Maintenance/utility workers	Direct contact exposure (i.e. incidental ingestion, and dermal contact with sediment) may occur during maintenance activities. This pathway was screened out for Defence personnel as sediments are below the screening criteria (i.e. commercial/industrial).
Dermal contact with PFAS in sediments	✓		
Inhalation of PFAS from sediment generated dust	✗		It is assumed that as sediments are usually wet (noting that sampling was completed during the dry season) there is little to no potential for the generation of dust. Hence, this exposure pathway is not considered complete and was not evaluated or discussed further in the HHRA (on or off-Base).

Notes:

‘✓✓’ denotes exposure pathway is of major significance

‘✓’ denotes exposure pathway is of moderate significance

‘✗’ denotes that exposure pathway is considered negligible and therefore incomplete.

As indicated in Section 6.5, exposures by visitors will be less than Defence personnel which includes contractors. Hence, the HHRA has focussed on potential health risks to Defence personnel, with an understanding that this is also protective of any Base visitors and contractors.

The exposure pathways evaluated as part of the HHRA for off-Base are summarised in Table 9.2. Whilst no terrestrial biota sampling was undertaken as part of the DSI (including chickens or eggs), assessment works to date have not identified any properties where chickens are present. Hence, this pathway is considered incomplete.

Table 9.2 Summary of exposure pathways and receptors – off-Base

EXPOSURE PATHWAY AND MEDIA	EXPOSURE PATHWAY SIGNIFICANT?	RECEPTOR	COMMENTS
Residents			
Incidental ingestion of PFAS in soil irrigated with PFAS impacted water	✓✓	off-Base residents (child and adult)	Direct contact exposures including incidental ingestion, dermal contact and the inhalation of dusts are considered complete as the measured concentrations within the off-Base area of Garbutt was above the adopted residential screening criteria in one sample (SS204) collected from the back garden of a residential property, refer to Table 8, Appendix B.
Dermal contact with PFAS in soil irrigated with PFAS impacted water	✓		
Inhalation of PFAS from dust generated from soil irrigated with PFAS impacted water	✓✗		
Incidental ingestion of PFAS in sediments	✗	off-Base residents (child and adult)	The evaluation of direct contact exposures to PFAS in sediments (i.e. incidental ingestion, and dermal contact) is incomplete for residents. Similarly, to on-Base, it is assumed that as sediments are usually wet there is little to no potential for the generation of dust. Hence, this exposure pathway is not considered complete and was not evaluated as part of the HHRA.
Dermal contact with PFAS in sediments	✗		
Inhalation of PFAS from sediment generated dust	✗		
Ingestion of home-grown produce – fruits and vegetables	✓✓	off-Base residents (child and adult)	Based on the responses received from nearby residents, two properties located in the suburb of Pallarenda were identified to have vegetable gardens. Where produce is grown in PFAS impacted shallow soil (i.e. ≤ 0.5 mBGL), or if produce is irrigated with extracted water that is impacted with PFAS, there is a potential that PFAS may accumulate in the edible components of fruits and vegetables, which in turn can be consumed by residents. No direct measurements of produce have been sampled or analysed to date. Hence, the evaluation of this exposure pathway has been undertaken by first calculating a theoretical exposure concentration within fruits and vegetables and then adopting this as the exposure point concentration that residents may be exposed to whilst consuming home-grown produce.
Ingestion of home-grown produce – eggs	✗	off-Base residents (child and adult)	No chickens were identified to be present within the off-Base properties evaluated as part of the DSI (based on the returned WUS responses). Hence, this exposure pathway was considered incomplete and not evaluated as part of the HHRA.

EXPOSURE PATHWAY AND MEDIA	EXPOSURE PATHWAY SIGNIFICANT?	RECEPTOR	COMMENTS
Potable use of private bore water or surface water	✘		Evidence indicates that residences located within the Investigation Area are on a municipal water supply and hence are unlikely to be using bore water for regular drinking water purposes. The results of the WUS also support this. Hence, the use of private bore water or surface water for drinking purposes was considered incomplete and not evaluated further.
Incidental ingestion of PFAS in bore water utilised for domestic purposes (i.e. garden watering)	✓		Direct contact exposures via extracted groundwater use (including incidental ingestion and dermal contact with water) is considered complete for garden watering. Hence, this pathway was assessed further.
Dermal contact with PFAS in water utilised for domestic purposes (i.e. garden watering)	✓		The direct contact exposure via other domestic extractive uses including bathing/showering, house hold cleaning, food preparation and/or recreational uses are incomplete and hence, were not assessed further.
Incidental ingestion of water whilst swimming in private pools (filled from bore water)	✘	off-Base residents (child and adult)	Direct contact exposures (including incidental ingestion and dermal contact with pool water) is considered incomplete and hence, was not evaluated further in the HHRA.
Dermal contact with PFAS whilst swimming in private pools (filled from bore water)	✘		Based on the responses of the WUS, groundwater was not identified to be extracted/stored in tanks for the purpose to fill swimming pools and so this pathway is considered incomplete and not evaluated further in the HHRA.
Consumers of aquatic biota– child and adult			
Ingestion of fish/crustaceans/molluscs samphire and sargassum (edible aquatic plants)	✓✓	Consumers of aquatic biota – child and adult – this includes recreational fishers who consume their catch	The consumption of locally caught fish, crustaceans, molluscs and samphire from waterways may occur. Hence, this pathway is considered complete. Available aquatic biota data has been utilised to evaluate exposure to PFAS via this pathway. Of note, risks from consuming crustaceans (flesh), molluscs and edible aquatic plants (i.e. samphire) were not evaluated further as reported concentrations were either below the laboratory LOR or below the FSANZ (2017c) screening criteria. For crustaceans (whole), whilst the reported maximum concentration was at the screening criterion of 65 µg/kg but not above within samples collected from the Bohle River, this exposure pathway was not evaluated further.

EXPOSURE PATHWAY AND MEDIA	EXPOSURE PATHWAY SIGNIFICANT?	RECEPTOR	COMMENTS
Recreational Users			
Incidental ingestion of PFAS in soil	✘	Recreational users of the Ingham Road Sports Field (child and adult)	Direct contact exposures (including incidental ingestion, dermal contact and dust inhalation) may occur during recreational use of the Ingham Road Sports Field. The current understanding is that this facility is used by Defence for sports days (including rugby matches) but is also used intermittently by local sports clubs. Available soil results have identified PFAS concentrations to be below the adopted screening criteria. Hence, this exposure pathway was not evaluated further in this risk assessment. Please note, additional surface soil samples were collected from the Ingham Road Sports Field on 26 June 2018, that confirmed PFAS concentrations to be below the public open space screening criteria.
Dermal contact with PFAS in soil	✘		
Inhalation of PFAS in dust generated from soil	✘		
Incidental ingestion of PFAS in surface water during swimming	✘	Recreational users of surface waters (child and adult)	This pathway is considered incomplete on the basis that no surface water bodies are deemed safe for swimming within the Investigation Area, due to the presence of crocodiles and/or other wildlife.
Dermal contact with PFAS in surface water during swimming	✘		
Incidental ingestion of PFAS in sediments during recreational swimming	✘	Recreational users of surface waters (child and adult)	Direct contact exposures (i.e. incidental ingestion and dermal contact with sediments) are considered incomplete for this receptor as no surface water bodies within the Investigation Area are safe for swimming, due to the presence of crocodiles and/or other wildlife.
Dermal contact with PFAS in sediments during recreational swimming	✘		
Incidental ingestion of water whilst swimming in a public pool	✘	Recreational users of public swimming pools (child and adult)	Direct contact exposures (i.e. incidental ingestion and dermal contact with pool water) is considered incomplete during swimming in public pools as a municipal water supply is understood to be available for the purposes of filling a public swimming pool. Hence, this exposure pathway was not assessed further in the HHRA.
Dermal contact with PFAS whilst swimming in a public pool	✘		
Maintenance/utility workers			
Incidental ingestion of PFAS in soil	✓✓	Maintenance/utility workers (off-Base)	Direct contact exposures (i.e. incidental ingestion, dermal contact with soil and the inhalation of dusts) may occur during any ad-hoc maintenance works off-Base. For maintenance/utility workers surface soils (up to 0.5 mBGL) and deeper soils (i.e. >0.5 mBGL) are considered relevant for exposure that may occur via excavations and trenches.
Dermal contact with PFAS in soil	✓		
Inhalation of PFAS from dust generated from soil	✓		

EXPOSURE PATHWAY AND MEDIA	EXPOSURE PATHWAY SIGNIFICANT?	RECEPTOR	COMMENTS
Incidental ingestion of PFAS in surface water/stormwater and irrigation water	✓✓		Direct contact exposures (including the incidental ingestion and dermal contact with water) may occur during the maintenance of drains etc or irrigation systems.
Dermal contact with PFAS in surface water/stormwater and irrigation water	✓		Inhalation exposures from aerosols are incomplete as (i) PFAS are not volatile and (ii) whilst aerosols may be generated from irrigation activities, it is considered that the aerosols formed will be large enough to be swallowed and ingested as opposed to being inhaled into the lungs.
Incidental ingestion of PFAS in sediments	✓✓		Direct contact exposure (i.e. incidental ingestion, and dermal contact with sediment) may occur during the maintenance of drains and/or surface water bodies.
Dermal contact with PFAS in sediments	✓		
Incidental ingestion of PFAS in groundwater	✓✓		Direct contact exposure (i.e. incidental ingestion and dermal contact) may occur during maintenance works, if trench excavations encounter groundwater off-Base.
Dermal contact with PFAS in groundwater	✓		

Notes:

‘✓✓’ denotes exposure pathway is of major significance

‘✓’ denotes exposure pathway is of moderate significance

‘✗’ denotes that exposure pathway is considered negligible and therefore incomplete, pathway ruled out.

9.2.1 SUMMARY OF ON-BASE AND OFF-BASE EXPOSURE PATHWAYS AND RECEPTORS

9.2.1.1 ON-BASE

The following exposure pathways and receptor groups (are considered complete) have been selected for further evaluation on-Base:

- Direct contact exposure to PFAS in soil (inclusive of incidental ingestion, dermal contact and inhalation of dusts) by Defence personnel and maintenance/utility workers.
- Inhalation of PFAS impacted dusts generated from soil by children attending and adults working at the on-Base kindergarten. Incidental ingestion and dermal contact with PFAS in soil is incomplete and hence, was not evaluated further.
- Direct contact with PFAS in surface water/stormwater and irrigation water (inclusive of incidental ingestion and dermal contact) by Defence personnel and maintenance/utility workers.
- Direct contact exposure to PFAS in sediments (inclusive of incidental ingestion and dermal contact) by maintenance/utility workers, conducting maintenance works within On-Base waterways/drainage channels.
- Direct contact with PFAS in groundwater (inclusive of incidental ingestion and dermal contact) is only considered to be a complete exposure pathway for maintenance/utility workers conducting maintenance/trenching works, with a potential to encounter impacted groundwater.

9.2.1.2 OFF-BASE

The following exposure pathways and receptor groups (are considered complete) have been selected for further evaluation off-Base:

- Direct contact within PFAS in groundwater (inclusive of incidental ingestion and dermal contact) by residents watering domestic gardens. This exposure pathway was quantified for adult residents only, as young children are not expected to be maintaining home gardens.
- Ingestion of home-grown produce including fruits and vegetables by residents (child and adult).
- Ingestion of aquatic biota including locally caught fish, crustaceans (including prawns and crabs) by children and adults.
- Direct contact with PFAS in soil ((inclusive of incidental ingestion, dermal contact and inhalation of dusts) by off-Base residents.
- Direct contact with PFAS in soil ((inclusive of incidental ingestion, dermal contact and inhalation of dusts) by off-Base maintenance/utility workers.
- Direct contact with PFAS in groundwater (inclusive of incidental ingestion and dermal contact) by off-Base maintenance/utility workers.
- Direct contact with PFAS in surface water and sediments (inclusive of incidental ingestion and dermal contact) by maintenance/utility workers.

9.3 EXPOSURE POINT CONCENTRATIONS (EPC)

Exposure point concentrations (EPC) are the concentrations of PFAS in the medium to which the populations are exposed, at the point of exposure (NEPC 2013). The EPC have been determined based on the data collected for the relevant environmental media (i.e. soil, groundwater, biota). The approach to the evaluation of potential health risks, has considered both typical and upper limit exposure intake concentrations by the identified receptor groups.

An average (mean) concentration was calculated to represent a 'typical' exposure intake for the identified receptors. A 90th percentile concentration was calculated to represent an 'upper limit' exposure intake for all media quantified as part of the HHRA. In calculating the mean and 90th percentile concentrations (refer Appendix D), where a result was reported as less than the LOR, then half of the LOR was adopted as the result for the relevant PFAS compound (i.e. PFOS, PFHxS and/or PFOA). This is considered appropriate as samples that report a concentration below the LOR are treated as non-detect results. The adoption of a zero concentration for each non-detect sample, may result in the underestimation of potential contaminant intakes. Likewise, the adoption of the LOR concentration, is likely to overestimate the potential intake. Hence, the adoption of half of the LOR was considered a reasonable approach and is consistent with NEPC (2013).

In addition, the following is provided below in regards to the adoption of appropriate EPCs:

- An average concentration and a 90th percentile concentration has been calculated for both shallow and deeper soils (i.e. ≤ 0.5 mBGL and > 0.5 mBGL). It is assumed that Defence personnel would be exposed to shallow soils only, whilst conducting their daily work activities at the Base.
- For children and adults attending and/or working at the on-Base kindergarten, it is assumed that they would only be exposed to PFAS in dust generated from exposed shallow soils only (i.e. ≤ 0.5 mBGL). Hence, the EPC for shallow soil was applied to evaluate the dust inhalation exposure pathway.
- For maintenance/utility workers there is a potential that they may be exposed to deeper soil impacts (i.e. > 0.5 mBGL) should there be a requirement to excavate a shallow trench (i.e. exposure to both shallow and deeper soils). Hence, soil data for both shallow and deeper soil was included in the data set when calculating the mean and 90th percentile PFAS exposure concentrations for deeper soil (i.e. > 0.5 mBGL). Soil results up to a depth of 2 mBGL were included in the deeper soil dataset, as this is considered to have the most potential for direct contact during excavation activities.

- For aquatic biota, the EPCs for finfish (flesh and liver) and crustaceans (whole) are based on the calculated average and 90th percentile concentrations for impact sites only (i.e. Bohle River, Town Common, Three Mile Creek, Mundy Creek and Louisa Creek). Comparative site data has been excluded from estimating an EPC, given that recreational fishing has been confirmed to occur at the impacted site locations only; and the limited information currently known about the fish species movements within the Investigation Area and comparative site locations.
- For evaluating the shallow (i.e. ≤ 0.5 mBGL) off-Base soil dataset for resident exposure pathways, approximately 50% of the results for PFOS + PFHxS were reported as <LOR (i.e. 8 out of 15 results). When datasets comprise more than 15% of non-detect results this can cause statistical calculations to become skewed. This is particularly relevant for the calculated average concentration for the off-Base shallow soil dataset, where an increased average concentration was calculated due to the large number of non-detect results, versus a higher PFAS result reported in sample SS204 from Garbutt Community in comparison to the adjusted results for the LOR. Hence, the dataset is left censored due to the higher proportion of non-detects.

In evaluating exposure scenarios for off-Base residents from exposure to PFAS in shallow soil including the evaluation of home-grown fruit and vegetables, the average concentration was adopted as the representative EPC for typical exposure settings. For upper limit exposure settings, the 90th percentile was adopted. It is noted that the 90th percentile concentration for PFOS + PFHxS (0.0013 mg/kg) was slightly lower than the average (0.0014 mg/kg). In this instance, the 90th percentile was still considered appropriate to adopt as the small number of higher results reported occurs less than 10% of the time and hence, does not impact on the calculated 90th percentile concentration. A summary of the adopted exposure point concentrations for each media is presented in Table 9.3 below.

Table 9.3 Adopted exposure point concentrations

EXPOSURE SCENARIO	EXPOSURE SETTING	UNITS	PFOS + PFHxS CONCENTRATION	PFOA CONCENTRATION	COMMENT
On-Base					
Direct contact with PFAS in shallow soil (i.e. ≤ 0.5 mBGL). This includes incidental ingestion/dermal contact and dust inhalation.	Typical	mg/kg	4	0.1 ⁽¹⁾	Highest concentrations were reported at Fuel Farm 1 (NQ0052) and the former fire training area (NQ0054)
	Upper Limit	mg/kg	13.1	0.3 ⁽¹⁾	
Direct contact with PFAS in deeper soil (i.e. > 0.5 mBGL). This includes incidental ingestion/dermal contact and dust inhalation.	Typical	mg/kg	2.2	0.08 ⁽¹⁾	Only relevant for evaluating exposure risk to maintenance/utility workers.
	Upper Limit	mg/kg	4.1	0.14 ⁽¹⁾	
Direct contact exposure to PFAS in sediments. Includes incidental ingestion and dermal contact.	Dry season – Typical	mg/kg	0.6	0.0007 ⁽¹⁾	Highest concentrations in sediments collected within the vicinity of the kindergarten/domestic areas on the Base.
	Dry season – Upper Limit	mg/kg	1.6	0.01 ⁽¹⁾	
	Wet season – Typical	mg/kg	4.3	0.0004	Highest concentration in the sample collected from Fuel Farm 2.
	Wet season – Upper Limit	mg/kg	10	0.001	The Upper limit exposure concentration is the 95 th percentile as opposed to the 90 th .
Direct contact with PFAS in surface water/stormwater and/or irrigation water	Dry season – Typical	mg/L	0.014	–	The maximum concentrations were identified at the Former Fire Training Area (NQ0054) and Fuel Farm 1 (NQ0052).
	Dry season – Upper Limit	mg/L	0.047	–	
	Wet season – Typical	mg/L	0.0215	0.001	The maximum concentrations were identified at the Fire Station (NQ0055) and 5AVN
	Wet season – Upper Limit	mg/L	0.045	0.003	

EXPOSURE SCENARIO	EXPOSURE SETTING	UNITS	PFOS + PFHxS CONCENTRATION	PFOA CONCENTRATION	COMMENT
Direct contact with PFAS in groundwater	Dry season – Typical	mg/L	0.36	–	The highest groundwater concentrations were reported at:
	Dry season – Upper Limit	mg/L	0.77	–	— Former Fire Training Area (NQ0054) and Fuel Farm 1 (NQ0052) — 5 Aviation (including Building 236, Building 295 and Building 366 & GSE Compound) — Fire Station (NQ0055) and Former Fire Training Area (NQ0107) — Fuel Farm 2 (NQ0099) — Runway 13/31 — Pad Brahman
	Wet season – Typical	mg/L	0.276	0.009	The highest groundwater concentrations were reported at:
	Wet season – Upper Limit	mg/L	0.924	0.035	— Former Fire Training Area (NQ0054) and Fuel Farm 1 (NQ0052) — 5 Aviation (including Building 236, Building 295 and Building 366 & GSE Compound) — Fire Station (NQ0055) and Former Fire Training Area (NQ0107) — Fuel Farm 2 (NQ0099) — Runway 13/31

EXPOSURE SCENARIO	EXPOSURE SETTING	UNITS	PFOS + PFHxS CONCENTRATION	PFOA CONCENTRATION	COMMENT
Off-Base					
Direct contact (inclusive of incidental ingestion and dermal contact) with PFAS in bore water utilised for garden watering	Dry season – Typical	mg/L	0.0006	–	Includes all groundwater results and groundwater results obtained from private bores
	Dry season – Upper Limit	mg/L	0.001	–	
	Wet season – Typical	mg/L	0.001	–	
	Wet season – Upper Limit	mg/L	0.004	–	
Direct contact (inclusive of incidental ingestion and dermal contact) with PFAS in shallow soil by residents	Typical	mg/kg	0.0014	-	Includes all shallow off-Base soil results. Refer Appendix D for the calculated average and 90 th percentile concentrations.
	Upper Limit	mg/kg	0.0013	-	

EXPOSURE SCENARIO	EXPOSURE SETTING	UNITS	PFOS + PFHxS CONCENTRATION	PFOA CONCENTRATION	COMMENT
Ingestion of home-grown produce including fruits, vegetables	Typical	mg/kg	Fruit: 0.000062 Vegetable: 0.00082	Fruit: 0.000003 Vegetable: 0.000042	No direct measurements for terrestrial biota samples. Hence, theoretical intake concentrations were calculated and adopted to quantify potential health risks from the consumption of home-grown produce. Refer Appendix F for details. In calculating the theoretical intake concentrations for fruit and vegetables, both the average and 90th percentile PFOS + PFHxS concentration for soil were adopted. For PFOA, as most of the soil results were reported as <LOR, then half of the LOR was adopted in calculating the soil EPCs. For groundwater, half the LOR was adopted to calculate a mean PFOA concentration. For upper limit exposures, the maximum reported off-Base groundwater result for PFOA was adopted. Refer Appendix F.
	Upper Limit	mg/kg	Fruit: 0.0001 Vegetable: 0.00077	Fruit: 0.00005 Vegetable: 0.000006	
Ingestion of locally caught fish (only quantified for the dry season as no aquatic biota sampling was conducted during the wet season as part of the DSI)	Typical	mg/kg	Fish (flesh): 0.003 Fish (liver): 0.06	—	EPC is based on the calculated mean and 90 th percentile concentrations for finfish (flesh or liver). Refer Appendix D.
	Upper Limit	mg/kg	Fish (flesh): 0.004 Fish (liver): 0.15	—	

EXPOSURE SCENARIO	EXPOSURE SETTING	UNITS	PFOS + PFHxS CONCENTRATION	PFOA CONCENTRATION	COMMENT
Direct contact with soil during off-Base maintenance work (EPCs used to reflect dry season conditions only as no soil sampling as part of the DSI was conducted off-Base during the wet season)	Typical	mg/kg	0.0003	0.0002 ⁽¹⁾	Dataset comprises both shallow and deeper soil samples for evaluating potential exposures to maintenance/utility workers. For PFOS, the maximum concentration was adopted to represent the upper limit as most results were reported as <LOR. For PFOA, as all results were reported as <LOR. The LOR was adopted as the typical EPC; and the maximum concentration was adopted for the upper limit EPC.
	Upper Limit	mg/kg	0.0004	0.0002 ⁽¹⁾	
Direct contact with groundwater during off-Base maintenance works	Dry season – Typical	mg/L	0.0006	–	Relevant for evaluating exposure risk to off-Base maintenance/utility workers. Where a result was reported as <LOR, then half of the LOR was adopted as the result. Refer Appendix D.
	Dry season – Upper limit	mg/L	0.001	–	
	Wet season – Typical	mg/L	0.001	0.00004	
	Wet season – Upper Limit	mg/L	0.004	0.0001	
Direct contact with surface water during off-Base maintenance works	Dry season – Typical	mg/L	0.0026	–	
	Dry season – Upper limit	mg/L	0.0062	–	
	Wet season – Typical	mg/L	0.0034	–	
	Wet season – Upper Limit	mg/L	0.0082	–	

EXPOSURE SCENARIO	EXPOSURE SETTING	UNITS	PFOS + PFHxS CONCENTRATION	PFOA CONCENTRATION	COMMENT
Direct contact with sediments during off-Base maintenance works	Dry season – Typical	mg/kg	0.02	0.0003 ⁽¹⁾	
	Dry season – Upper Limit	mg/kg	0.04	0.001 ⁽¹⁾	
	Wet season – Typical	mg/kg	0.02	0.0004	This exposure pathway was only quantified for maintenance/utility workers.
	Wet season – Upper Limit	mg/kg	0.06	0.003	For PFOS + PFHxS the mean EPC was adopted for the typical exposure setting and the calculated 90 th percentile was adopted for the upper limit EPC. For PFOA, both the mean and maximum concentrations were adopted for the typical and upper limit EPCs. Refer Appendix D for details.

Notes:

(1) Potential health risks from exposure to PFOA in shallow/deeper soil and sediment was quantified for maintenance/utility workers **only** as no appropriate screening criteria to rule out.

‘–’ denotes that PFOA was reported below adopted screening criteria and hence was not evaluated further.

9.4 EXPOSURE PARAMETERS

The approach adopted for the exposure assessment has considered both typical exposure scenarios for the identified child and adult receptors; as well as upper limit exposure settings to account for differences in human behaviours and exposure patterns, which can vary amongst individuals in any setting. The upper limit estimate of exposures also allows for an evaluation of a 'worst-case' exposure intake.

With regards to a child receptor, the relevant exposure scenarios have been calculated for young children aged between 1-6, noting that young children are the most sensitive receptors (NEPC 2013). This is due to their behaviours and activities which result in higher levels of intake in comparison to adults. In addition, younger children have a lower body weight, so their intake per unit body weight is higher than that of an adult. As a conservative approach, the parameters for (young) children were generally based on a child aged 2-3 years (i.e. the most sensitive age within the child receptor group).

To evaluate the typical and upper limit exposure settings, the selected exposure parameters were based on average and 95th percentile values as detailed in enHealth (2012b) respectively. The 95th percentile exposure parameters represent the upper limit exposure for each receptor group.

The selection of exposure parameters has been based on information published by one or more of the Australian sources as listed below, where site-specific data is not available:

- National Environment Protection Measure (Assessment of Site Contamination), as amended 2013 (NEPC 2013)
- Australian Exposure Factor Guide (enHealth 2012b)
- Food Standards Australia and New Zealand (FSANZ, 2017c); and
- Australian Bureau of Statistics (ABS, 2014).

Some uncertainty exists in relation to the suitability of some exposure parameters adopted from Australian guidance for residential receptors, particularly those living in more tropical climates such as Townsville. Accordingly, some parameters have been adjusted to account for an increase in water consumption and increased time spent swimming.

9.4.1 ADOPTED EXPOSURE PARAMETERS

The adopted exposure parameters for soil/sediment, water and dietary exposures are provided in Table 9.4 to Table 9.6. Unless otherwise specified, the values adopted generally represent the suggested average for the typical exposure setting and the 95th percentile for the upper limit exposure setting, as per enHealth (2012b).

For the kindergarten setting, anecdotal information obtained from the kindergarten on 27 June 2018 confirmed they operate 5 days/week between the hours of 8.30 am and 2.30 pm. A higher exposure time for outdoors was conservatively adopted (i.e. 3 hours). Due to warmer climate conditions in Townsville, it was considered that children attending the kindergarten may spend a larger portion of their time within outdoor play areas, pending the curriculum that is proposed for the day; and also weather conditions.

Specific information relating to the parameters adopted for dermal contact are provided below:

- Dermal contact with soil contaminants and absorption across the skin is highly dependent on the nature of the contamination in question and the presence of an (exposed) abrasion on the skin. For PFAS compounds exposure via the dermal pathway is considered less significant in comparison to the ingestion pathway. However, as per the recommendations by ToxConsult (2016a, 2016b) a dermal absorption factor of 0.05% was adopted.
- As indicated above, the likelihood of this exposure being realised depends on the presence of abrasions, cuts, etc. that complete the pathway. Realistically there is only a small likelihood of a worker having abrasions, cuts, etc. to their skin throughout the entire period of exposure (i.e. 30 years).

Table 9.4 Soil and sediment exposure parameters

PARAMETERS	UNITS	WORKERS (ON AND OFF-BASE)		KINDERGARTEN ATTENDEES (ON-BASE)		RESIDENTS	
		Defence personnel	Maintenance / utility	Child	Adult	Child	Adult
Body Weight (BW) ⁽¹⁾	kg	78 (70)	78 (70)	15	78 (70)	15	78 (70)
Exposure Duration (ED) ^(2,3,4)	years	30	30	3	30	6	29
Exposure Frequency (EF) ⁽⁵⁾	days/year	240	20 (40)	240	240	365	365
Exposure Time (ET _i) – indoors ^(6,)	hours/day	7	NA	3	3	20	20
Exposure Time (ET _o) – outdoors ⁽⁶⁾	hours/day	1 (7)	8 (10)	3	3	4	4
Soil/Sediment Ingestion Rate (IR _s) ^(7,8)	mg/day	25 (30)	330	NA ⁽²²⁾	NA	100	50
Bioavailability – oral ingestion (Bi _o) ⁽⁹⁾	unitless	1	1	NA	NA	1	1
Fraction ingested from contaminated source (F _{cs}) ⁽¹⁰⁾	unitless	1	1	1	1	1	1
Event Frequency (EV) – dermal exposure ⁽¹¹⁾	events/day	1	1	NA	NA	1	1
Area of Exposed Skin (SA) ⁽¹²⁾	cm ²	6,300 (7,900)	6,300 (7,900)	NA	NA	6,100 (7,000)	20,000 (24,000)
Soil Adherence Factor (SAF) ^(13,14)	mg/cm ² /day	0.5 (1.7)	0.5 (1.7)	NA	NA	0.5	0.5
Dermal absorption Factor (DAB) ⁽¹⁵⁾	unitless	0.0005	0.0005	NA	NA	0.0005	0.0005
Particulate Retention (PR) ⁽¹⁶⁾	unitless	0.375	0.375	0.375	0.375	0.375	0.375
Particle Emission Factor outdoors (PEF _o) ^(17,18)	m ³ /kg	3.7 x 10 ¹⁰	4.4 x 10 ⁸	3.7 x 10 ¹⁰	3.7 x 10 ¹⁰	3.7 x 10 ¹⁰	3.7 x 10 ¹⁰
Particle Emission Factor indoors (PEF _i) ⁽¹⁹⁾	m ³ /kg	2.6 x 10 ⁷	NA	2.6 x 10 ⁷	2.6 x 10 ⁷	2.6 x 10 ⁷	2.6 x 10 ⁷
Fraction of indoor dust comprised of outdoor soil (TF) ⁽²⁰⁾	unitless	0.5	NA	0.5	0.5	0.5	0.5
Averaging Time (AT) = ED ⁽²¹⁾	years	30	30	3	30	6	29

Notes for Table 9.4 above:

Value in parenthesis () generally represents the 95th percentile, unless otherwise specified.

- (1) Ref: enHealth (2012b). Average and 95th percentile for adult male and female combined.
- (2) Ref: NEPC (2013). Exposure duration for commercial/industrial scenario adopted.
- (3) Ref: Friebe and Nadebaum (2011). 20 days = 4 weeks/year (typical setting); 40 days = 8 weeks/year (assumed upper limit exposure).
- (4) The exposure duration for a child attending the On-Base kindergarten was assumed to be 3 years (i.e. length of time at kindergarten).
- (5) Ref: NEPC (2013) and Friebe and Nadebaum (2011) for a maintenance/utility worker. The value in parenthesis () represents an upper limit exposure frequency for a maintenance/utility worker.
- (6) Typical setting based on NEPC (2013) time spent indoors/outdoors. Upper limit setting assumes that an 8-hour work day may be spent outdoors for Defence personnel. Exposure time for the kindergarten is site-specific and based on a 6 hour day (8.30 am – 2.30 pm)
- (7) Ref: enHealth (2012b). Daily intake as recommended by enHealth multiplied by 0.5 to account for half of waking hours spent at work, this is consistent with approach adopted in NEPC (2013).
- (8) Ref: Friebe and Nadebaum (2011) soil ingestion rate.
- (9) Assumed to be 100% bioavailable for PFAS.
- (10) Intake from contaminated source assumed to be 100%.
- (11) Assumed 1 event/day for dermal exposure.
- (12) Ref: NEPC (2013) and enHealth (2012b). Based on male and female combined and represents the sum of forearms, hands, lower legs and feet.
- (13) Ref: enHealth (2012b). Value is the average of mean values from several studies as per enHealth recommendation.
- (14) Ref: enHealth (2012b). For a maintenance/utility worker both the average (i.e. 0.5 mg/cm²/day) and the 95th percentile values (as per enHealth) were adopted.
- (15) Ref: ToxConsult (2016). Recommended value to adopt is 0.05%.
- (16) Ref: NEPC (2013) default value adopted.
- (17) Ref: NEPC (2013). As the kindergarten is located within the Base grounds, the same surface coverage as per On-Base workers (i.e. 80%) has been assumed for this scenario. Hence, the default PEF for a commercial/industrial setting was adopted.
- (18) Ref: Friebe and Nadebaum (2011). PEF value adopted for an intrusive maintenance worker.
- (19) Ref: NEPC (2013). Adopted PEF indoors represents the indoor dust level attributed from outdoor soils. Only relevant for Defence personnel and children/adults attending and working at the kindergarten; and who will spend a proportion of their day inside.
- (20) Ref: NEPC (2013). Adopted TF assumes 50% of soil concentration is present in dust indoors.
- (21) The averaging time is equal to the exposure duration for the evaluation of chemicals via a threshold approach.
- (22) NA – denotes pathway not applicable for receptor.

Table 9.5 Water exposure parameters (surface water and groundwater)

PARAMETERS	UNITS	EXPOSURE SETTING		
		WORKERS (ON AND OFF-BASE)		RESIDENTS (OFF-BASE)
		Defence personnel	Maintenance/utility ⁽¹⁴⁾	Domestic uses – garden watering
		ADULT	ADULT	ADULT
Body Weight (BW) ⁽¹⁾	kg	78 (70)	78 (70)	78 (70)
Exposure Duration (ED) ^(2,3)	years	30	30	35
Exposure Frequency (EF) ^(3,4,5)	days/year	240	20 (40)	365
Exposure Time (ET) ^(6,7)	hours/day	1 (8)	8 (10)	2.25
Water Ingestion Rate (IR _w) ⁽⁸⁾	L/hr	0.0025 (0.0125)	0.0025 (0.0125)	0.00125 (0.00625)
Bioavailability – oral ingestion (Bi _o) ⁽⁹⁾	unitless	1	1	1
Fraction ingested from contaminated source (F _{wcs}) ⁽¹⁰⁾	unitless	1	1	1
Area of Exposed Skin (SA) ⁽¹¹⁾	cm ²	6,300 (7,900)	6,300 (7,900)	6,300 (7,900)
Dermal Permeability (DP) ⁽¹²⁾	cm/hr	1 x 10 ⁻⁶	1 x 10 ⁻⁶	1 x 10 ⁻⁶
Averaging Time (AT) = ED ⁽¹³⁾	years	30	30	35

Notes for Table 9.5 above:

Value in parenthesis () generally represents the 95th percentile, unless otherwise specified.

- (1) Ref: enHealth (2012b). Average and 95th percentile for adult male and female combined.
- (2) Ref: NEPC (2013).
- (3) Ref: Friebel and Nadebaum (2011).
- (4) Ref: NEPC (2013) value adopted for Defence personnel/residents.
- (5) Ref: Friebel and Nadebaum (2011). 20 days = 4 weeks/year (typical setting); 40 days = 8 weeks/year (assumed upper limit exposure).
- (6) Typical setting based on NEPC (2013) time spent outdoors. Upper limit setting assumes that an 8-hour work day may be spent outdoors.
- (7) Ref: enHealth (2012b). The exposure time for domestic uses (garden watering) is conservatively based on the total for domestic activities.
- (8) Limited information available. Assumed to be an order of magnitude lower than the adult exposure value detailed for swimming as per enHealth (2012b).
- (9) Assumed to be 100% bioavailable for PFAS.
- (10) Intake from contaminated source assumed to be 100%.
- (11) Ref: enHealth (2012b).
- (12) Ref: ToxConsult (2016a, 2016b). Limited information available regarding the dermal permeability of PFAS. Value adopted is based on PFOA and was also adopted for PFOS + PFHxS.
- (13) The averaging time is equal to the exposure duration for the evaluation of chemicals via a threshold approach.
- (14) The exposure parameters for on-Base maintenance/utility worker were also adopted to evaluate an off-Base maintenance/utility worker.

Table 9.6 Dietary exposure input parameters

PARAMETERS	UNITS	EXPOSURE SETTING			
		RESIDENTS		CONSUMERS OF AQUATIC BIOTA	
		CHILD	ADULT	CHILD	ADULT
Body Weight (BW) ⁽¹⁾	kg	15	78 (70)	15	78 (70)
Exposure Duration (ED) ⁽²⁾	years	6	35	6	29
Exposure Frequency (EF) ⁽³⁾	days/year	365	365	365	365
Food Ingestion Rate (IR _F) ⁽⁴⁾	kg/day	<u>Terrestrial Biota:</u> Fruit – 0.314 (0.592) Vegetables – 0.188 (0.346)	<u>Terrestrial Biota:</u> Fruit – 0.381 (0.861) Vegetables – 0.314 (0.57)	<u>Aquatic Biota:</u> Freshwater Fish – 0.028 (0.072)	<u>Aquatic Biota:</u> Freshwater Fish – 0.056 (0.143) Offal mammalian – 0.032 (0.084) – adopted for fish liver
Fraction ingested from contaminated source (F _{cs}) ^(5,6)	unitless	<u>Terrestrial Biota:</u> Fruit – 0.1 (0.5) Vegetables – 0.1 (0.5)	<u>Terrestrial Biota:</u> Fruit – 0.1 (0.5) Vegetables – 0.1 (0.5)	0.5 (1)	0.5 (1)
Averaging Time (AT) = ED ⁽⁷⁾	years	6	35	6	29

Notes:

- (1) Ref: enHealth (2012b). Average and 95th percentile for adult male and female combined.
- (2) Ref: enHealth (2012b) and NEPC (2013). For consumers of aquatic biota, reasonable assumption of 6 years and 29 years adopted.
- (3) Maximum exposure frequency adopted.
- (4) Ref: FSANZ (2017c).
- (5) Assumed that 10% (typical limit) and 50% (upper limit) of fruit and vegetable intake may come from home-grown produce.
- (6) This assumes that 50% and 100% of fish consumed will be locally caught and from a contaminated source.
- (7) The averaging time is equal to the exposure duration for the evaluation of chemicals via a threshold approach.

9.5 INTAKE ESTIMATION

For the populations of concern, intakes of PFAS accumulated in food sources/adhered to soil/sediment or dissolved in water have been estimated using numerical equations in accordance with the approach adopted in NEPC (2013). The equations used to estimate the intake concentrations for the various media (including food sources) and exposure pathways are presented below. Calculated exposure intakes are presented in Appendix F.

9.5.1 SOIL AND SEDIMENT INTAKE EQUATIONS

Potential exposures to PFAS in soil and sediment have been calculated for incidental ingestion, dermal contact and dust inhalation (soil only) using the following equations, as adapted from the US EPA Risk Assessment Guidance for Superfund Sites (RAGS) (US EPA 1989) (US EPA 2004) and NEPC (2013):

$$\text{Intake}_{\text{oral}} = \frac{C_s \times \text{IR} \times \text{BA}_o \times \text{ED} \times \text{EF} \times \text{CF}}{\text{BW} \times \text{AT} \times 365 \text{ days/year}}$$

$$\text{Intake}_{\text{dermal}} = \frac{C_s \times \text{ED} \times \text{EF} \times \text{EV} \times \text{SA} \times \text{SAF} \times \text{DAB} \times \text{CF}}{\text{BW} \times \text{AT} \times 365 \text{ days/year}}$$

$$\text{Intake}_{\text{dust}} = \frac{C_s \times (1/\text{PEF}_o \times \text{ET}_o) + (1/\text{PEF}_i \times \text{TF} \times \text{ET}_i) \times \text{PR} \times \text{EF} \times \text{ED}}{\text{AT} \times 365 \times 24}$$

where:

Intake_{oral} = calculated daily intake of PFAS from soil ingestion (mg/kg/day)

Intake_{dermal} = calculated daily intake of PFAS from dermal contact with soil (mg/kg/day)

Intake_{dust} = calculated daily intake of PFAS from dust inhalation (mg/kg/day)

C_s = adopted soil/sediment EPC (mg/kg)

IR = ingestion rate of soil by each receptor group (mg/day)

BA_o = oral bioavailability (unitless) – assumed to be 100% (expressed as a fraction of 1)

ED = exposure duration relevant to exposures by each receptor group (years)

EF = exposure frequency relevant to exposures by each receptor group (days/year)

ET_o = exposure time outdoors (hours/day)

ET_i = exposure time indoors (hours/day) – only included for assessing Defence personnel and kindergarten settings

EV = event frequency (events/day)

SA = area of exposed skin (cm²)

SAF = soil adherence factor (mg/cm²/day)

DAB = dermal absorption factor (unitless)

PEF_o = particle emission factor outdoors (m³/kg)

PEF_i = particle emission factor indoors (m³/kg)

TF = indoor dust transport factor (unitless)

PR = particulate retention (unitless)

CF = conversion factor of 1 x 10⁻⁶ to convert mg to kg (kg/mg)

BW = body weight relevant to each receptor group (kg)

AT = averaging time (AT) = exposure duration (ED) (years) x 365 days/year. For the dust inhalation pathway AT is multiplied x 24 hours.

9.5.2 WATER INTAKE EQUATIONS

Potential exposures to PFAS in groundwater and surface water have been calculated for ingestion and dermal absorption using the following equations as adapted from US EPA (1989 and 2004):

$$\text{Intake}_{\text{oral}} = \frac{C_w \times IR_w \times BA_o \times ED \times EF \times Fwcs}{BW \times AT \times 365 \text{ days/year}}$$
$$\text{Intake}_{\text{dermal}} = \frac{C_w \times SA \times ED \times EF \times ET \times DP \times CF}{BW \times AT \times 365 \text{ days/year}}$$

where:

Intake_{oral} = calculated daily intake of PFAS from the ingestion of water (mg/kg/day)

Intake_{dermal} = calculated daily intake of PFAS from dermal contact with water (mg/kg/day)

C_w = adopted water EPC (mg/L)

IR_w = ingestion rate of water by each receptor group (L/hr) - L/day adopted for drinking water calculation

BA_o = oral bioavailability (unitless) – assumed to be 100% (expressed as a fraction of 1)

ED = exposure duration relevant to exposures by each receptor group (years)

EF = exposure frequency relevant to exposures by each receptor group (days/year)

ET = exposure time to PFAS in water (hours/day)

Fwcs = fraction of daily ingestion that is derived from a contaminated source (unitless) – assumed to be 100% for PFAS

SA = surface area of body exposed to water per day (cm²)

DP = dermal permeability constant (cm/hr)

CF = conversion factor of 1x10⁻³ (L/cm³)

BW = body weight relevant to each receptor group (kg)

AT = averaging time (AT) = exposure duration (ED) (years) x 365 days/year.

9.5.3 FOOD INTAKE EQUATIONS

Estimation of the PFAS uptake via indirect exposure pathways such as i) soil to plant to human or ii) soil to animal to human was undertaken to estimate exposure intakes associated with the consumption of home-grown produce or aquatic biota (including fish and crustaceans).

9.5.3.1 ESTIMATION OF FRUIT AND VEGETABLE UPTAKE

Plants can accumulate contaminants via several pathways, the most critical of which is the absorption from the soil solution by roots, whereby depending on the nature of the contaminant, translocation to other portions of the plant may occur (NEPC 2013) including the vegetative and edible components of the plant.

The approach used to estimate the PFAS concentrations in fruit and vegetables is based on that adopted by AECOM (2017) and NEPC (2013) and involves the use of applying concentration factors (CF), sourced from literature to estimate the PFAS concentration in the respective plant tissue (i.e. fruit or vegetable). PFAS concentrations in plant tissue (i.e. fruit and vegetables) were estimated using the reported off-Base soil and groundwater concentrations and the application of published CFs to evaluate the uptake by fruit and vegetables.

A variety of fruits and vegetables have been observed within private properties including lemons, limes, cherries, tomatoes, cucumber, parsley and silver beet. Hence, the evaluation of uptake by plants has considered the edible components of different types of vegetables and fruits including the roots, leaf, stem and tuber.

PLANT UPTAKE FROM SOIL

The plant uptake of PFAS from soil was estimated using the following equation:

$$C_p = C_s \times CF_s$$

where:

C_p = concentration in plant tissue (mg/kg) – edible portion

C_s = concentration in soil (mg/kg)

CF_s = Plant concentration factor (mg-chem/kg-plant per mg-chem/kg-soil). Based on studies conducted using hydroponic media relevant to the edible portion of the plant (i.e. root, tuber, fruit, leaf, stem). Adopted plant concentration factors are summarised in Table 9.7 below.

PLANT UPTAKE FROM WATER

Where the primary source of contaminants is irrigation water, it may also be valid to compare the plant uptake based on concentrations in the water as opposed to soil. Hence, the following equation was adopted to estimate the uptake of PFAS by plants from water:

$$C_p = C_w \times CF_w$$

where:

C_p = concentration in plant tissue (mg/kg) – edible portion

C_w = concentration in water (mg/L)

CF_w = Plant concentration factor (mg-chem/kg-plant per mg-chem/L-water). Based on studies conducted using hydroponic media relevant to the edible portion of the plant (i.e. root, tuber, fruit, leaf, stem). Adopted plant concentration factors are summarised in Table 9.7 below.

Table 9.7 Plant transfer factors adopted to estimate plant tissue uptake

PFAS COMPOUND	SOIL-TO-PLANT (mg/kg fresh weight to mg/kg soil dry weight) ⁽¹⁾				WATER-TO-PLANT (mg chemical/kg-plant per mg-chemical/L-water) ⁽²⁾		
	GREEN VEGETABLES	ROOT VEGETABLE	TUBER VEGETABLE	TREE FRUIT	CABBAGE VEGETABLE	ZUCCHINI - FRUIT	TOMATO - FRUIT
	CF_{GREEN}	CF_{ROOT}	CF_{TUBER}	CF_{FRUIT}	$CF_{VEGETABLE}$	CF_{FRUIT}	CF_{FRUIT}
PFOS + PFHxS	2.2	0.05	0.04	0.07	0.1	0.2	0.03
PFOA	1.5	0.05	0.1	0.03	0.3	0.3	0.1

Notes:

(1) Ref: as adopted in NSW EPA/OEH Science (2017) and referenced in ToxConsult (2016a and 2016b).

(2) Ref: ToxConsult (2016a and 2016b).

The calculated uptake of PFAS in plants is presented in Appendix F.

INGESTION OF PLANT (FRUIT OR VEGETABLE)

Potential exposures to PFAS via the ingestion of home-grown produce (i.e. fruit or vegetable) have been calculated using the following equation, as adapted from US EPA (1989):

$$\text{Intake}_{\text{plant}} = \frac{C_{\text{plant}} \times \text{IR}_{\text{plant}} \times \text{FI} \times \text{BA}_o \times \text{ED} \times \text{EF}}{\text{BW} \times \text{AT} \times 365 \text{ days/year}}$$

Where:

$\text{Intake}_{\text{plant}}$ = calculated daily intake of PFAS from the ingestion of the edible components of plants – fruit or vegetables (mg/kg/day)

C_{plant} = PFAS concentration in the edible portions of the plant (fruit or vegetable) (mg/kg) – calculated from above equation, refer Appendix E

IR_{plant} = ingestion rate of plants – fruit or vegetables (kg/day)

FI = fraction ingested from contaminated source (unitless)

BA_o = oral bioavailability (unitless) – assumed to be 100% (expressed as a fraction of 1)

ED = exposure duration (years)

EF = exposure frequency (days/year)

BW = body weight relevant to each receptor group (kg)

AT = averaging time (AT) = exposure duration (ED) (years) x 365 days/year.

The calculated exposure intake equations are presented in Appendix F.

9.5.3.2 INGESTION OF FINFISH AND CRUSTACEANS

Potential exposures to PFAS via the ingestion of finfish and crustaceans have been calculated using the following equation, as adapted from US EPA (1989):

$$\text{Intake}_{\text{seafood}} = \frac{C_{\text{seafood}} \times \text{IR}_{\text{seafood}} \times \text{FI} \times \text{BA}_o \times \text{ED} \times \text{EF}}{\text{BW} \times \text{AT} \times 365 \text{ days/year}}$$

Where:

$\text{Intake}_{\text{seafood}}$ = calculated daily intake of PFAS from the ingestion of finfish or crustaceans (mg/kg/day)

C_{seafood} = PFAS concentration in finfish or crustaceans (mg/kg) – adopted biota EPC

$\text{IR}_{\text{seafood}}$ = ingestion rate of plants – finfish or crustaceans (kg/day)

FI = fraction ingested from contaminated source (unitless) – assumed 50% (typical limit) and 100% (upper limit)

BA_o = oral bioavailability (unitless) – assumed to be 100% (expressed as a fraction of 1)

ED = exposure duration (years)

EF = exposure frequency (days/year)

BW = body weight relevant to each receptor group (kg)

AT = averaging time (AT) = exposure duration (ED) (years) x 365 days/year.

The calculated exposure intake equations from the consumption of finfish and crustaceans are presented in Appendix F.

10 RISK CHARACTERISATION

10.1 INTRODUCTION

The risk characterisation step of the HHRA quantifies the potential risk to human health from exposure to a selected chemical of concern. The process combines the exposure/intake and toxicity information to calculate a risk level. For the evaluation of PFAS this has been undertaken based on a threshold approach (i.e. threshold TDI).

The characterisation of risk has been undertaken via the calculation of a hazard quotient (HQ) and is discussed further in Section 10.2 below.

10.2 HAZARD QUOTIENT (HQ)

The hazard quotient (*HQ*) is the ratio of the estimated daily intake (EDI, or exposure concentration) to the TDI with consideration for background intakes (refer Section 8.3.2). The *HQ* is calculated as follows.

$$HQ = (EDI / TDI)$$

Where:

- HQ = Hazard Quotient
- EDI = estimated total exposure for PFAS from assessed exposure pathways
- TDI = Toxicity reference value adopted.

To estimate the additive effect of exposure to multiple COPCs, the HQs for each PFAS in each exposure scenario are then summed to produce a total hazard index (HI). This assumes additivity in the toxicological outcomes following concurrent exposures. This assumes that each PFAS compound will behave in the same way once it enters the body and affect the same target organ. It is considered reasonable to assume that additive effects may occur from exposure to PFAS compounds. The HI represents the potential risks associated with cumulative exposures from multiple exposure pathways (where identified to be of potential significance) and hence is conservative. The HI is calculated as follows:

$$HI = \sum HQ$$

In interpreting whether a HI is acceptable or unacceptable with respect to the total intake or exposure to PFAS the following is noted:

- Where a HI is less than or equal to 1 (and the total exposure/intake is less than or equal to the adopted TDI) indicates that adverse health effects (or harm) is unlikely to occur.
- Where a HI is greater than 1 then further consideration is necessary. A HI greater than 1 does not automatically imply that an unacceptable risk is present but it does indicate that further investigation (or potentially risk management) is warranted.

Of note, where a HI is calculated to be greater than 1 it infers that there is a potential for the total PFAS intake to be higher than the recommended FSANZ TDI. This does not necessarily equate to a risk or that toxicity will occur to the relevant population group, as the intake/exposure estimations and the TDIs for PFAS have incorporated inherent safety factors in their determination. However, it is noted that the likelihood of toxicity occurring or risk being realised increases with the extent to which estimated intakes/exposures exceed the TDI. Meaning that the higher the calculated HI, the greater the level of concern.

The calculated HQs for each exposure pathway and receptor population are presented in Appendix F. The calculated HI (i.e. the sum of HQs) for each exposure pathway and PFAS compound are summarised in Table 10.1 to Table 10.4.

Table 10.1 Summary of estimated HI – on-Base exposure – dry season

EXPOSURE SCENARIO	DEFENCE PERSONNEL		KINDERGARTEN ATTENDEES				MAINTENANCE/UTILITY WORKERS	
			CHILD		ADULT			
	Typical Exposure	Upper Limit Exposure	Typical Exposure	Upper Limit Exposure	Typical Exposure	Upper Limit Exposure	Typical Exposure	Upper Limit Exposure
Direct contact with soil ⁽¹⁾	0.04	0.21	0.000013	0.00002	0.000013	0.00002	0.03	0.12
Direct contact with groundwater	NA ⁽²⁾	NA	NA	NA	NA	NA	0.04	0.82
Direct contact with PFAS in surface water/stormwater and irrigation water	0.02	0.30	NA	NA	NA	NA	0.0014	0.05
Direct contact with sediments	NA	NA	NA	NA	NA	NA	0.0075	0.045
Total HI	0.06	0.51	0.000013	0.00002	0.000013	0.00002	0.08	1.0

Notes:

Shading indicates an exposure pathway and resulting total HI is at the acceptable risk threshold and TDI. Bold indicates where an exposure scenario is approaching the acceptable risk threshold.

- (1) Includes incidental ingestion, dermal contact and dust inhalation. For child and adults attending and working at the On-Base kindergarten, the HI is based on the dust inhalation exposure pathway only.
- (2) NA – denotes not applicable or assessed for receptor group.

A summary of the calculated HI's for on-Base exposure (as presented in Table 10.1 indicate the following:

- For on-Base Defence personnel based on average intakes (i.e. typical) potential health risks are low and acceptable (i.e. HI <1). For upper limit intakes, potential health risks are also low and acceptable (i.e. HI <1).
- For children attending and adults working at the on-Base kindergarten, both average and upper limit intakes are indicated to be low and acceptable (i.e. HI <1).
- For maintenance/utility workers, potential health risks are low and acceptable for average intakes (i.e. HI <1). However, for upper limit intakes, the calculated total HI was 1.0. The highest contributing exposure pathway was the incidental ingestion of contaminated groundwater.

Table 10.2 Summary of estimated HI – on-Base exposure – wet season

EXPOSURE SCENARIO	DEFENCE PERSONNEL		KINDERGARTEN ATTENDEES				MAINTENANCE/UTILITY WORKERS	
			CHILD		ADULT			
	Typical Exposure	Upper Limit Exposure	Typical Exposure	Upper Limit Exposure	Typical Exposure	Upper Limit Exposure	Typical Exposure	Upper Limit Exposure
Direct contact with soil ⁽¹⁾	0.04	0.21	0.000013	0.00002	0.000013	0.00002	0.03	0.12
Direct contact with groundwater	NA ⁽²⁾	NA	NA	NA	NA	NA	0.03	0.98
Direct contact with PFAS in surface water/stormwater and irrigation water	0.03	0.30	NA	NA	NA	NA	0.002	0.05
Direct contact with sediments	NA	NA	NA	NA	NA	NA	0.054	0.28
Total HI	0.07	0.51	0.000013	0.00002	0.000013	0.00002	0.12	1.4

Notes:

Shading indicates an exposure pathway and resulting total HI is above the acceptable risk threshold and TDI. Bold indicates where an exposure scenario is approaching the acceptable risk threshold.

- (1) Includes incidental ingestion, dermal contact and dust inhalation. For child and adults attending and working at the On-Base kindergarten, the HI is based on the dust inhalation exposure pathway only. This exposure setting is based on the dry season EPC as no soil sampling conducted during the wet season.
- (2) NA – denotes not applicable or assessed for receptor group.

A summary of the calculated HI's for on-Base exposure (as presented in Table 10.2) indicate the following:

- For on-Base Defence personnel based on average intakes (i.e. typical) potential health risks are low and acceptable (i.e. HI <1). For upper limit intakes, potential health risks are also low and acceptable (i.e. HI <1).
- For children attending and adults working at the on-Base kindergarten, both average and upper limit intakes are indicated to be low and acceptable (i.e. HI <1).
- For maintenance/utility workers, potential health risks are low and acceptable for average intakes (i.e. HI <1). However, for upper limit intakes, the calculated total HI was 1.4. The highest contributing exposure pathway was the incidental ingestion of contaminated groundwater.

Table 10.3 Summary of estimated HI – off-Base exposure – dry season

EXPOSURE SCENARIO	RESIDENTS				CONSUMERS OF AQUATIC BIOTA				MAINTENANCE/UTILITY	
	CHILD	ADULT	CHILD	ADULT	CHILD	ADULT	CHILD	ADULT	ADULT	
	Typical Exposure		Upper Limit Exposure		Typical Exposure		Upper Limit Exposure		Typical Exposure	Upper Limit Exposure
Consumption of home-grown vegetables	0.06	0.02	0.5	0.2	NA	NA	NA	NA	NA	NA
Consumption of home-grown fruit	0.007	0.0016	0.12	0.04	NA	NA	NA	NA	NA	NA
Consumption of finfish (flesh)	NA	NA	NA	NA	0.15	0.06	0.9	0.4	NA	NA
Consumption of finfish (liver)	NA	NA	NA	NA	NA	0.7	NA	9.6	NA	NA
Direct contact with groundwater – domestic use (garden watering)	NA	0.0005	NA	0.005	NA	NA	NA	NA	NA	NA
Direct contact with soil in gardens	0.0015	0.0002	0.0006	0.0001	NA	NA	NA	NA	NA	NA
Direct contact with soil ⁽¹⁾ – during maintenance/utility works	NA	NA	NA	NA	NA	NA	NA	NA	0.000004	0.000012
Direct contact with groundwater – during maintenance/utility works	NA	NA	NA	NA	NA	NA	NA	NA	0.00006	0.001
Direct contact with PFAS in surface water/stormwater and irrigation water – during maintenance works	NA	NA	NA	NA	NA	NA	NA	NA	0.00025	0.007
Direct contact with sediments during maintenance/utility works	NA	NA	NA	NA	NA	NA	NA	NA	0.0003	0.002
Total HI	0.07	0.02	0.6	0.25	0.15	0.8	0.9	10	0.003	0.01

Notes:

Shading indicates an exposure pathway and resulting total HI are **above** the acceptable risk threshold and TDI. Bold indicates where an exposure scenario is approaching the acceptable risk threshold.

- (1) Includes incidental ingestion, dermal contact and dust inhalation. This exposure setting is based on the dry season EPC as no soil sampling conducted during the wet season.
- (2) NA – denotes not applicable or assessed for receptor group.

A summary of the calculated HI's for off-Base exposure (as presented in Table 10.3) indicate the following:

- The calculated HI for residents (child and adult) based on average and upper limit intakes are low and acceptable (i.e. HI <1).
- The calculated HI for the consumption of fish flesh for average intakes was 0.15 for a child and 0.06 for an adult. Indicating that risks are low and acceptable.
- The calculated HI for the consumption of fish flesh (upper limit) is approaching the acceptable risk limit for a child receptor. For an adult receptor, upper limit intake are low and acceptable (i.e. HI < 1).
- For consumers of finfish (liver), the total HI based on upper limit intakes indicated a potential health risk for adult receptors (i.e. HI >1).
- For maintenance/utility workers, potential health risks are low and acceptable for average and upper limit intakes (i.e. HI <1).

It is understood that some recreational fishing activities maybe occurring in areas where biota samples were collected and reported above the screening criteria. Whilst it is expected that recreational fishers would abide and be aware of the recreational fishing rules and regulations as detailed by the Queensland Government Department of Agriculture and Fisheries, regarding size and possession limit of various fish species, little is currently known regarding the number of serves (per week) that maybe consumed subsequent to the recreational fishing event. However, the assumptions built into the risk assessment assumes that an individual eats fish daily (i.e. 365 days/year), with each daily fish serve equating to either 28 g (typical limit) or 72 g (upper limit) for a child; and 56 g (typical) or 143 g (upper limit) for an adult. Together, the assumptions adopted for a child and adult consuming fish are conservative, as it assumes their diet comprises fish (with PFAS impacts above the FSANZ screening criteria) every day.

Table 10.4 Summary of estimated HI – off-Base exposure – wet season

EXPOSURE SCENARIO	MAINTENANCE/UTILITY	
	ADULT	
	Typical Exposure	Upper Limit Exposure
Direct contact with soil ⁽¹⁾ – during maintenance/utility works	0.000004	0.000012
Direct contact with groundwater – during maintenance/utility works	0.0001	0.0043
Direct contact with PFAS in surface water/stormwater and irrigation water – during maintenance works	0.0003	0.009
Direct contact with sediments during maintenance/utility works	0.0003	0.0017
Total HI	0.0007	0.02

Notes:

Shading indicates an exposure pathway and resulting total HI are **above** or are approaching the acceptable risk threshold and TDI.

(1) Includes incidental ingestion, dermal contact and dust inhalation.

A summary of the calculated HI's for off-Base exposure (as presented in Table 10.4) indicate the following:

- For maintenance/utility workers, potential health risks are low and acceptable for average and upper limit intakes (i.e. HI <1).

10.3 POTENTIAL FOR CUMULATIVE HEALTH RISK

Where multiple pathways are identified to be complete for the same receptor, consideration of potential health risks from cumulative exposure to multiple pathways is required.

Potential health risks have been quantified for the following exposure pathways in this HHRA:

- Direct contact (oral ingestion, dermal contact and dust inhalation) with soil/sediment
- Direct contact (oral ingestion and dermal contact) with groundwater and surface water, including on-Base and/or off-Base exposures
- Consumption of locally caught fish; and
- Consumption of home-grown fruit and vegetables, either grown in impacted soil, or irrigated with impacted groundwater.

Based on the results of the risk quantification (refer Section 10.2 above), most of the above exposure pathways were identified to have a low and acceptable risk **except** for:

- The consumption of finfish (liver) – based on upper limit intakes for an adult
- The incidental ingestion of groundwater on-Base during maintenance activities during the wet season only.

Whilst the potential exists for the identified receptors to be exposed by via multiple pathways at some point in the future, the following is noted with respect to the identified health risks:

- The consumption of fish (flesh) upper limit intakes (i.e. 72 g) for child receptors was approaching the acceptable risk limit of 1. The estimate is considered to be overly conservative for young children as it assumes that their diet will comprise the upper limit intake (i.e. 72 g) of fish, every day for 6 years. This exposure scenario also assumed that a fish was continually impacted with the 90th percentile concentration. When combined, the assumptions overestimate the most likely exposure that will occur.
- Potential health risks associated with the average (i.e. 32 g) and upper limit (i.e. 84 g) intakes for finfish (liver) assumes that the same individual (adult) may consume fish liver every day of their lives (i.e. 365 days/year) for 35 years respectively. A fish was also assumed to (continually) be impacted with either the mean or the 90th percentile PFOS + PFHxS concentration. When combined, the assumptions overestimate the most likely exposure that will occur.

11 UNCERTAINTY ANALYSIS

Risk assessments require several assumptions regarding site conditions, human exposure and chemical toxicity. Even though site-specific parameters were included (i.e. soil, groundwater and aquatic biota data), it is not possible to fully describe site conditions and human activities at the site for the entire exposure duration considered in the risk assessment. The assumptions considered for this risk assessment were reasonably conservative in nature, to account for uncertainty in the parameter estimates and to protect public health by providing a deliberate margin of safety. The risk assessment approach presented does not consider a fully probabilistic estimate of risk, but presents conditional estimates based on several assumptions regarding exposure and toxicity. Thus, it is necessary to specify the assumptions and uncertainties inherent in the risk assessment to place the risk estimates into perspective.

The aim of this section is to provide a qualitative evaluation of the following uncertainties associated with this risk assessment. The key uncertainties of this risk assessment are presented below.

- Fish dataset – application of location specific data:
 - Many of the finfish species surveyed will actively move in and out of the various estuaries present within the Investigation Area, depending on the life history stage (i.e. fish size and stage of life). Actual fish movement is not well studied for many marine species. However, an example of one species that does move is Mullet. This species will move between estuaries particularly to spawn as adults, with smaller juveniles staying within the estuary, or even moving into freshwater areas. At the completion of the HHRA report, little other information was known about which fish species have relatively wide home-ranges (i.e. general movement of fish whilst gathering/sourcing food) versus species that do not move between estuaries, and are more stationary or territorial. To account for species that have a relatively small home-range, the data obtained at the comparative site locations were separated out from the impact site locations, prior to calculating exposure point concentrations for use in the risk assessment.
 - The aquatic plants, macro-algae and the oysters/barnacles that were surveyed are considered to provide useful information as potential point sources for contamination as they are stationary.
- Small aquatic biota dataset for finfish:
 - Although four separate fish sample events were undertaken to increase sample sizes for certain fish species, the resulting datasets for most fish species was generally considered too small to quantify potential health risks at each sampled location. Hence, the approach for assessing the exposure pathway for fish consumption has utilised all available fish flesh data, across all sampled locations. This approach has the potential to underestimate the health risk quantified for this pathway, at locations where fish samples reported elevated PFAS concentrations. Conversely it may overestimate health risks at locations where detected PFAS concentrations were low or negligible. For example, at the Bohle River and Town Common (both estuarine systems) measured PFAS results were at their highest. The inclusion of the higher results obtained at the Bohle River and Town Common with the lower results obtained at remaining impact sites (i.e. Mundy Creek, Rows Bay and Three Mile Creek) to estimate average and upper limit intake exposure concentrations, may have resulted in underestimating the predicted health risk outcome for fish species present within the Bohle River (estuarine) and Town Common (estuarine).
- Soil assessment program:

The contamination status of non-irrigated shallow soils off-Base was not known at the time of preparing the HHRA. No (non-irrigated) soil samples were collected in residential areas between the eastern Base boundary and delineation locations off-site to the east in Garbutt, during the DSI investigation. Hence, no assessment of shallow soils that may have been impacted from rising (impacted) groundwater conditions during wet season events and the subsequent transport of PFAS off-Base; and/or the transport of PFAS off-Base from other historical transport mechanisms could not be assessed, or quantified as part of the HHRA. The contribution (whilst considered to be low) to the overall health risk profile (in comparison to other quantified pathways), via this exposure pathway could not be confirmed upon issue of this report.

- Exposure point concentration data:
 - Calculated mean and 90th percentile concentrations of PFOS + PFHxS and PFOA (where evaluated) were utilised in the assessment of typical and upper limit exposure intakes by the identified receptors and are considered to be protective of both typical and upper limit exposures to PFAS, with the upper limit representing a worst-case scenario. For datasets where a large number of non-detects were reported (primarily off-Base soil data) this resulted in a higher (biased) average concentration being adopted to represent the typical exposure settings.
 - A qualitative assessment of the wet season data (groundwater, surface water and sediment) on the predicted risk outcomes was undertaken. Whilst the groundwater, surface water and sediment concentrations increased during the wet season, the increase in concentrations does not change the predicted risk outcomes.
 - Small datasets: the estimated exposure point concentrations for all media were based on relatively small datasets in most cases (i.e. sample size <25 samples). This may contribute to an increased margin of error, resulting in over or under-estimation of potential risks to human health. However, the data that was available to predict the risk outcomes and calculate a mean and 90th percentile exposure point concentrations is considered to represent the current status and impacts present within the Investigation Area.
- Toxicity criteria:
 - The toxicity values used in this risk assessment are generally considered to be conservative. They have been derived from exposure levels shown to cause ‘no adverse effect’ following studies of chronic exposure in animals. Safety factors, adopted by FSANZ, extending several orders of magnitude have been applied to take into account for issues related to data extrapolation relating to species variability and human variability. Toxicity reference values have been recently developed by the Food Standard Australia and New Zealand (FSANZ 2017b). The selection of toxicological source information and the derivation of screening criteria is in accordance with international agencies including WHO, USEPA and NEPM.
- Exposure assumptions:
 - Exposure assumptions were based on site specific information provided by Defence during the DSI, and where site specific information was not available, conservative exposure assumptions based on enHealth (2012b) and professional judgement were included in this risk assessment, which has resulted in several conservative exposure assumptions being included. For example, it was assumed that in a residential setting the same individual would be exposed to the same concentration for 365 days/year for 35 years for the evaluation of potable and non-potable domestic uses of groundwater. When combined, the assumptions deliberately overestimate the most likely exposure. The estimated exposures using upper estimates are considered to reflect plausible maximum exposures as the 90th percentile contaminant concentrations are multiplied by the 95th percentile or maximum exposure parameters.
 - This HHRA has been based on a ‘point estimates’ approach using adopted average and upper bound exposure assumptions. Actual exposure is likely to be variable and may be lower (or potentially higher) than that assumed.

12 CONCLUSIONS

WSP has undertaken a human health risk assessment (HHRA) to evaluate potential exposure risks from the presence of per - and poly-fluoroalkyl (PFAS) compounds at and in the vicinity of RAAF Base Townsville, QLD (the Base). The HHRA has incorporated both on-Base and off-Base areas and is defined as the Investigation Area shown on Figure 1, Appendix A.

DSI works undertaken by WSP (2018) have identified concentrations of PFAS compounds in soil, groundwater, surface water, sediments and aquatic biota from off-Base areas. This data has been used to assist in the characterisation of potential human health risks in both on-Base and off-Base areas.

The findings of the risk assessment with respect to Defence personnel, maintenance/utility workers, contractors and visitors during dry and wet season conditions are summarised in Table 12.1.

With respect to off-Base receptors, concentrations of PFAS have been identified in soil, groundwater, surface water and sediments; and within aquatic biota collected from waterways in off-Base areas. In addition, PFOS is known to bioaccumulate within the environment and have the potential to be present within edible produce (including home-grown fruit and vegetables) at properties where PFAS is present in irrigation water (used on gardens). In evaluating potential health risks to off-Base receptors, exposure to PFAS that may occur through direct contact; and/or from bioaccumulation in produce that is subsequently consumed has been quantified. A summary of the potential risks (during dry and wet season conditions) to off-Base receptors is summarised in Table 12.1.

The information provided in Table 12.1 should be used as a guide for relevant stakeholders which includes landowners.

Several exposure pathways for off-Base receptors including the consumption of home-raised/slaughtered meat, poultry and poultry-eggs; dairy products and/or honey (from home-kept bee hives) were not evaluated as part of the HHRA, as they were found to be incomplete, based on current information available for the Investigation Area. Likewise, the extractive use(s) of private bore water for drinking and/or other non-potable and domestic uses, including the filling of swimming pools were also identified to be incomplete, based on the information obtained from the WUS (as at 27 April 2018); and the supply of municipal (town) water for primary drinking and domestic use(s). However, should any of the above exposure pathways for home-grown produce and/or extractive uses of groundwater be realised (currently or in the future), then further assessment including a risk evaluation is warranted.

Table 12.1 Summary of exposure scenarios and Human Health Risks

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
ON-BASE						
Defence personnel	Soil	Sorption of PFAS onto soil during various activities (training, emergency response incidents, equipment testing and historical fire training/discharging etc)	Direct contact pathways (oral ingestion, dermal contact and dust)	Exceeded adopted screening criteria	Yes	Low and acceptable
	Groundwater	Extraction	Direct contact pathways (oral ingestion and dermal contact)	Incomplete – groundwater is not being extracted by Defence personnel to carry out Base activities	No	No exposure risk identified as pathway incomplete
	Surface water	Runoff to on-Base drains, open pits and waterways	Direct contact pathways (oral ingestion and dermal contact)	Exceeded adopted screening criteria	Yes	Low and acceptable
	Sediment	Sorption of PFAS onto sediments within surface water drains and open pits	Direct contact pathways (oral ingestion and dermal contact)	Below screening assessment criteria	No	No exposure risk identified as below adopted screening criteria
Kindergarten – children and adult workers	Soil	Outdoors – surface and shallow soils (<0.5 mBGL)	Direct contact pathways (oral ingestion, dermal contact and dust)	Below screening assessment criteria	No	No exposure risk identified as below adopted screening criteria

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
		Outdoors – soil at depth (>0.5 mBGL)	Direct contact pathways (oral ingestion, dermal contact and dust)	Above screening criteria	Yes – dust inhalation pathway	Low and acceptable for dust inhalation pathway <i>NB: Potential for elevated health risk if deeper soils are brought to the surface and exposed – management required for deeper soils. Refer to Note (1) underneath table.</i>
	Groundwater	Extraction	Direct contact pathways (oral ingestion and dermal contact)	Incomplete – groundwater is not being extracted by attendees at the kindergarten	No	No exposure risk identified as pathway incomplete
	Surface water	Runoff to on-Base drains, open pits and waterways	Direct contact pathways (oral ingestion and dermal contact)	Incomplete (no accessible on-Base drains, open pits or waterways in the kindergarten)	No	No exposure risk identified as pathway incomplete
	Sediment	Sorption of PFAS onto sediments within surface water drains and open pits	Direct contact pathways (oral ingestion and dermal contact)	Incomplete (no accessible on-Base drains, open pits or waterways in the kindergarten)	No	No exposure risk identified as pathway incomplete

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
Maintenance/utility workers	Soil	Sorption of soil onto PFAS	Direct contact pathways (oral ingestion, dermal contact and dust)	No available soil screening criteria for intrusive maintenance works. Therefore, scenario quantified in HHRA	Yes	Low and acceptable
	Groundwater	Extraction and seepage into open excavation	Direct contact pathways (oral ingestion and dermal contact)	Above screening criteria	Yes	Marginal <i>In the event that impacted groundwater is not intersected during subgrade activities at the Base, the human health risk is considered to be low and acceptable.</i>
	Surface Water	Runoff to on-Base drains, open pits and waterways	Direct contact pathways (oral ingestion and dermal contact)	Above screening criteria	Yes	Low and acceptable
	Sediment	Sorption of PFAS onto sediments within surface water drains and open pits	Direct contact pathways (oral ingestion and dermal contact)	No available sediment screening criteria for intrusive maintenance works. Therefore, scenario quantified in HHRA	Yes	Low and acceptable <i>NB: The total health risk from exposure to combined media (i.e. soil, groundwater, surface water and sediment) was elevated during the wet season only.</i>

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
OFF-BASE						
Residents (child and adult)	Soil	Sorption of PFAS onto soil from irrigating with private bore water	Direct contact pathways (oral ingestion, dermal contact and dust)	Above screening criteria in x1 sample collected from Garbutt	Yes	Low and acceptable
	Groundwater	Extraction	Direct contact pathways (oral ingestion and dermal contact)	Incomplete for drinking water, filling of swimming pools and other non-potable uses	No	No exposure risk currently identified as pathway incomplete
	Groundwater	Extraction	Direct contact pathways (oral ingestion and dermal contact)	Above screening for domestic garden watering	Yes	Low and acceptable
	Surface Water	Surface water drainage off-Base into nearby surrounding surface water bodies	Direct contact (oral ingestion and dermal contact) during swimming	Incomplete	No	No exposure risk currently identified as pathway incomplete
	Sediment	Sorption of PFAS onto sediments within surface water bodies	Direct contact pathways (oral ingestion and dermal contact)	Incomplete	No	No exposure risk currently identified as pathway incomplete
	Home-grown fruit and vegetables	Uptake of PFAS by fruit and vegetables irrigated with PFAS impacted bore water	Consumption of home-grown produce	Complete	Yes	Low and acceptable
	Home-raised poultry and poultry eggs	Uptake of PFAS by poultry watered with impacted bore water	Consumption of home-raised poultry meat and/or poultry eggs	Incomplete	No	No exposure risk currently identified as pathway incomplete

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
Consumers of locally caught aquatic biota (child and adult). Includes local residents and/or recreational fishers holidaying in the area	Aquatic biota (finfish, prawns, crabs, molluscs, samphire etc)	Uptake of PFAS by aquatic biota	Consumption of locally caught finfish, prawns, crabs and edible aquatic plants	Above screening criteria for finfish caught within estuarine waterways only. Exposure scenario evaluated in two parts (i) the flesh (edible) component of the fish and (ii) the fish liver (see below)	Yes – finfish (flesh component)	Child – low and acceptable for average daily intakes (i.e. 28 g per day) Child – marginal for upper limit intakes (i.e. 72 g per day) Adult – low and acceptable for average and upper limit intakes (i.e. 56 g and 143 g per day respectively)
Consumers of locally caught aquatic biota (child and adult). Includes local residents and/or recreational fishers holidaying in the area	Aquatic biota (finfish, prawns, crabs, molluscs, samphire etc)	Uptake of PFAS by aquatic biota	Consumption of locally caught finfish, prawns, crabs and edible aquatic plants	Above screening criteria for finfish (liver) from estuarine waterways only	Yes – finfish (liver component). Only evaluated for adults as young children assumed not to eat liver in accordance with FSANZ (2017c)	Adult – marginal for average intakes (i.e. 32 g per day) Adult – elevated health risk identified for upper limit intakes (i.e. 84 g per day)
Recreational users of Ingham Road Sports Field (child and adult)	Soil	Sorption of PFAS onto soil	Direct contact pathways (oral ingestion, dermal contact and dust)	Below screening criteria	No	No exposure risk identified as below adopted screening criteria. <i>Refer to Note (2) underneath table.</i>

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
Recreational users of nearby surface waters (child and adult)	Surface water	Surface water drainage off-Base into nearby surrounding surface water bodies	Direct contact pathways during swimming (oral ingestion and dermal)	Incomplete – not safe for swimming due to the presence of crocodiles and other wildlife	No	No exposure risk identified as pathway incomplete
	Sediment	Sorption of PFAS onto sediment within water ways	Direct contact pathways (oral ingestion and dermal contact)	Incomplete – waterways not deemed safe for swimming due to the presence of crocodiles and other wildlife	No	No exposure risk identified as pathway incomplete
Recreational users of nearby public swimming pools (child and adult)	Groundwater	Extraction	Direct contact pathways during swimming (oral ingestion and dermal)	Incomplete	No	No exposure risk identified as pathway incomplete
Maintenance/utility workers	Soil	Sorption of PFAS onto soil	Direct contact pathways (oral ingestion, dermal contact and dust)	No available soil screening criteria for intrusive maintenance works. Therefore, scenario quantified in HHRA	Yes	Low and acceptable
	Groundwater	Extraction and seepage into open excavation	Direct contact pathways (oral ingestion and dermal contact)	Above screening criteria	Yes	Low and acceptable
	Surface water	Surface water drainage off-Base to nearby stormwater drains or irrigation systems	Direct contact pathways (oral ingestion and dermal contact)	Above screening criteria	Yes	Low and acceptable

RECEPTOR AND SETTING	MEDIA	TRANSPORT PATHWAY	EXPOSURE PATHWAY	SCREENING ASSESSMENT OUTCOME	EXPOSURE SCENARIO QUANTIFIED FOR HHRA (YES/NO)	PREDICTED HEALTH RISK OUTCOME
	Sediment	Sorption of PFAS onto sediment in drains/irrigation systems	Direct contact pathways (oral ingestion and dermal contact)	No available sediment screening criteria for intrusive maintenance works. Therefore, scenario quantified in HHRA	Yes	Low and acceptable

Notes.

- (1) Whilst soil impact at depth is present within the kindergarten (i.e. ≥ 0.5 mBGL), exposure to deeper soils beneath the kindergarten is considered unlikely as any digging activities by children are only considered to occur within the designated play areas (i.e. sandpit and/or raised playground area surfaced with tanbark). All surface soil samples collected from the kindergarten (including play areas or exposed surface areas) were below the adopted screening criteria. One approach to manage potential exposures from soil at depth (i.e. > 0.5 mBGL) could be the implementation of a management plan. It is understood that during construction and maintenance activities on the Base, Defence will implement control measures documented in PFAS-specific guidance publications to facilitate effective management of PFAS on the Defence estate.
- (2) In regards to surface soils at the Ingham Road Sports Field, concentrations of PFAS were identified to be below the public open space screening criteria and hence; this pathway was screened out from the risk quantification step. Additional surface soil samples were also collected on 26 June 2018 and did not identify concentrations to be above the open space screening criteria. Whilst only a small soil dataset exists for soils at a depth where there is the most potential for direct contact to occur (i.e. shallow soils), it is considered that the sports field would be used infrequently by Defence personnel and off-Base recreational users. Hence, it is unlikely to be driving the exposure risk in comparison to other on and off-Base scenarios quantified as part of this HHRA.

Based on the information provided in Table 12.1 overall health risks were predicted to be low and acceptable for the identified receptors and exposure pathways, based on the available data utilised in the HHRA, except for the following:

- The unacceptable human health risk for consumption of fish liver is driven by the assumption that an adult consumes whole fish daily (i.e. 365 day/year) for 29 years with the daily consumption being 227 g of fish per person (with over a third of the fish weight being the liver) from fish sourced within estuarine waterway located within the Investigation Area. The typical intake, which still assumes daily consumption of whole fish, assumes 88 g of fish and the predicted human health risk was predicted to be acceptable. Thus, *ad hoc* consumption of whole fish sourced from the Investigation Area is unlikely to result in a risk to human health.
- The marginal human health risk predicted for children consuming fish flesh is driven by the assumption that a young child will consume upper limit intakes daily (i.e. 72 g per day) for 6 years. This exposure scenario also assumes that a fish is sourced within an estuarine waterway located within the Investigation Area and is continually impacted with an upper limit exposure concentration (i.e. 4 µg/kg). The typical intake, which also assumes the daily consumption of fish at 28 g per day for 6 years was predicted to be low and acceptable.
- The unacceptable human health risk for maintenance workers at the Base is only just above the trigger level of a hazard index of 1 (during the wet season). The worst-case health risk is being driven by the assumptions that the same worker attends the Base 40 days/year for 30 years, is exposed to groundwater for the whole of a 10-hour shift and that over this period, that 125 mL of impacted groundwater is ingested every day whilst on-Base. Even at this extreme exposure, the hazard index was only just triggered suggesting that an adverse health outcome to maintenance/utility workers attending the Base is unlikely.
- Whilst the health risks to maintenance/utility workers on-Base, associated with exposure to sediments was identified to be low and acceptable, no sampling of sediments from equipment used within source areas and/or wastewater drainage systems was completed to assess if exposure was acceptable. Hence, one approach to manage potential exposures from handling equipment; and/or any maintenance works of wastewater drainage systems by workers, could be the implementation of a management plan.

Generic advice from the Queensland Department of Health, the federal Department of Health and FSANZ have been provided in Appendix G for reference. The guidance documents describe approaches for limiting the severity of some exposure pathways assessed in the HHRA (e.g. consumption of seafood) whilst explaining why some exposure pathways that are currently incomplete should not be completed (e.g. chronic ingestion of groundwater). Whilst the publications were current as at the issue of this report, care should be taken to ensure the advice is current through referring to the authoring government agency.

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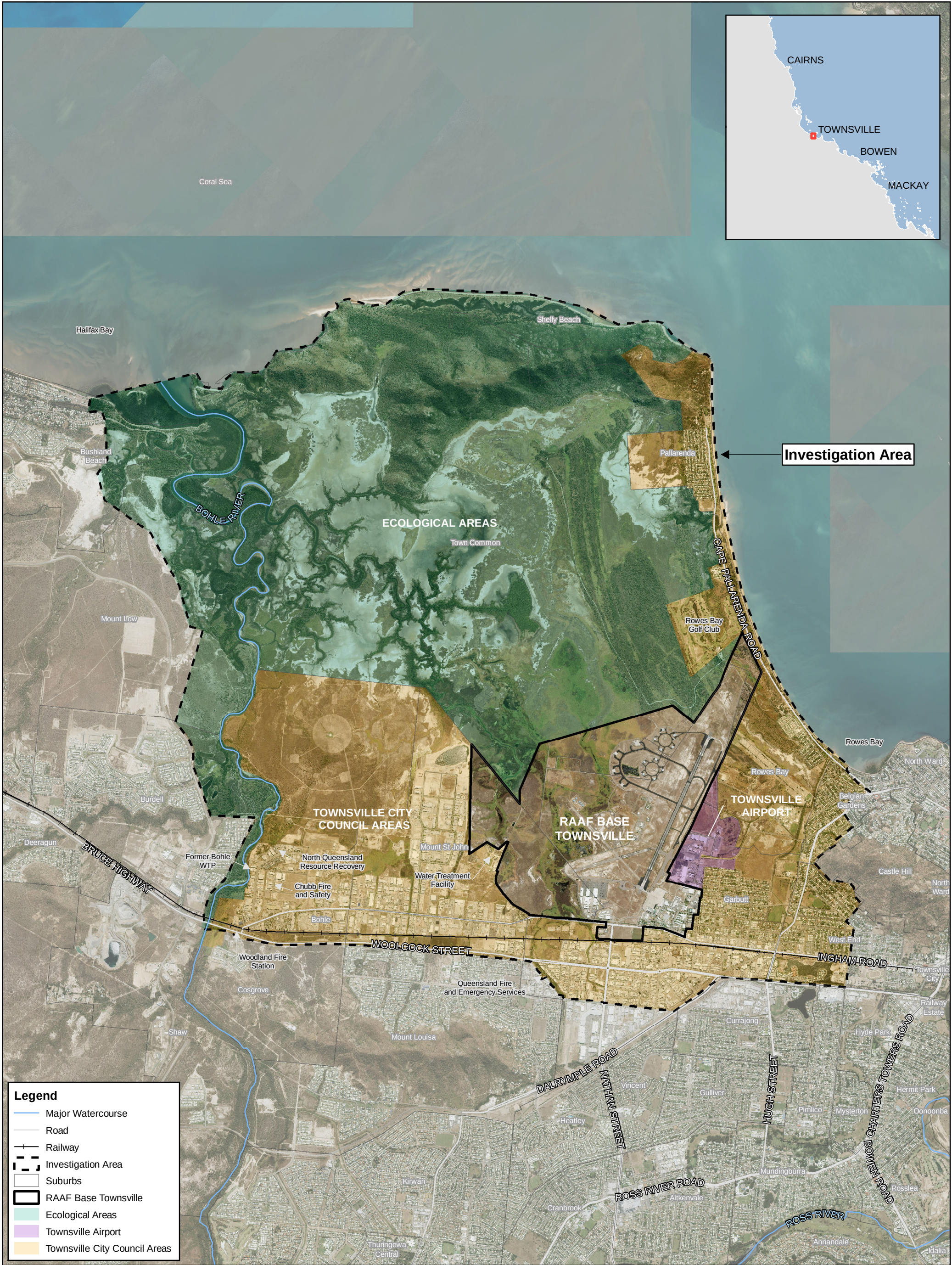
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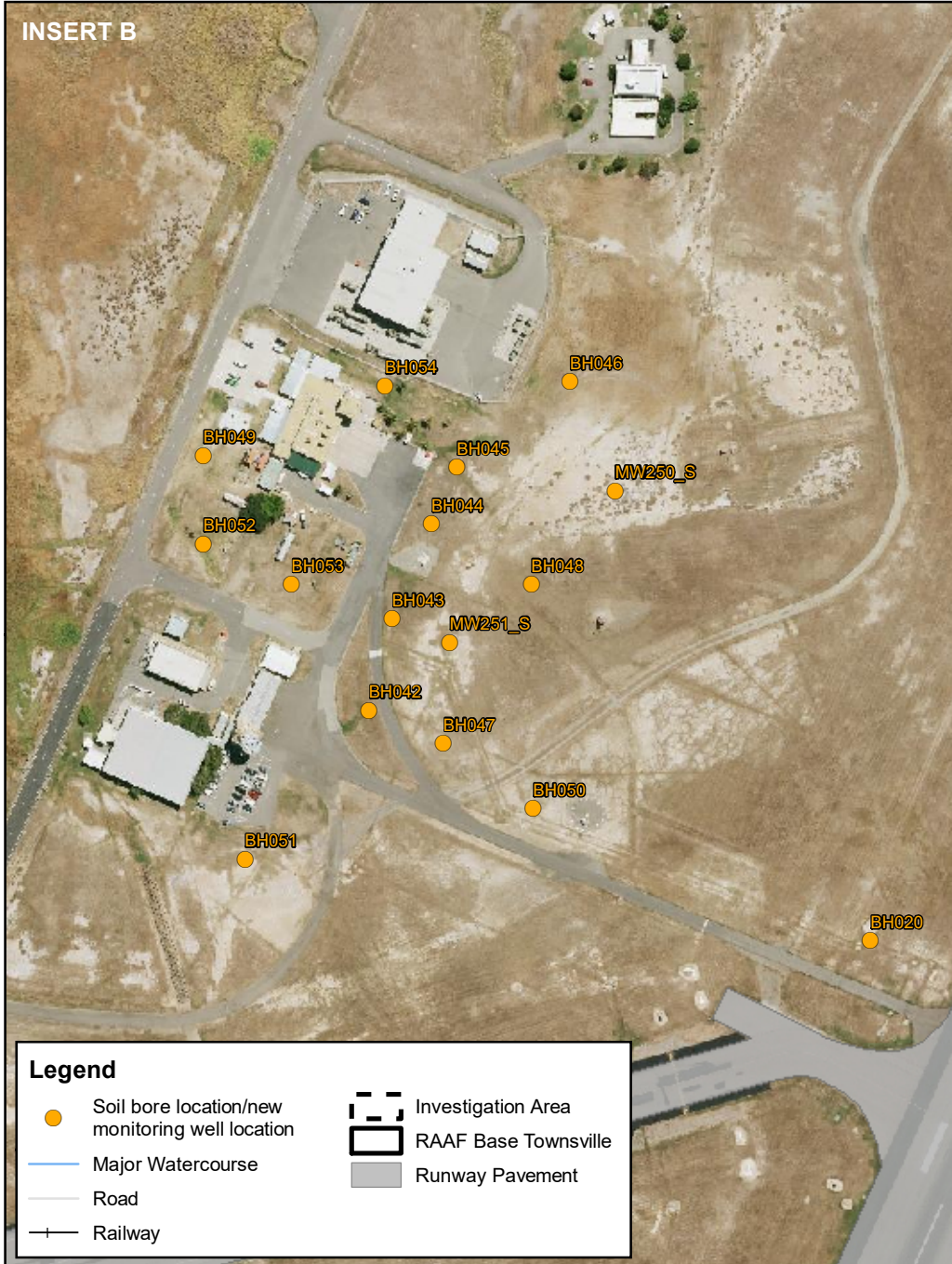
APPENDIX A

FIGURES





Investigation Area



Legend

- Soil bore location/new monitoring well location
- Major Watercourse
- Road
- Railway
- Investigation Area
- RAAF Base Townsville
- Runway Pavement

Map: 2270642A_F002b_SoilSites_r3v2

Date: 3/08/2018

Data source: Esri Digital Globe, Pitney Bowes Software Australia Pty Ltd, © The State of Queensland (Department of Natural Resources and Mines) (2016)

Author: NK

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Coordinate system: GDA 1994 MGA Zone 55

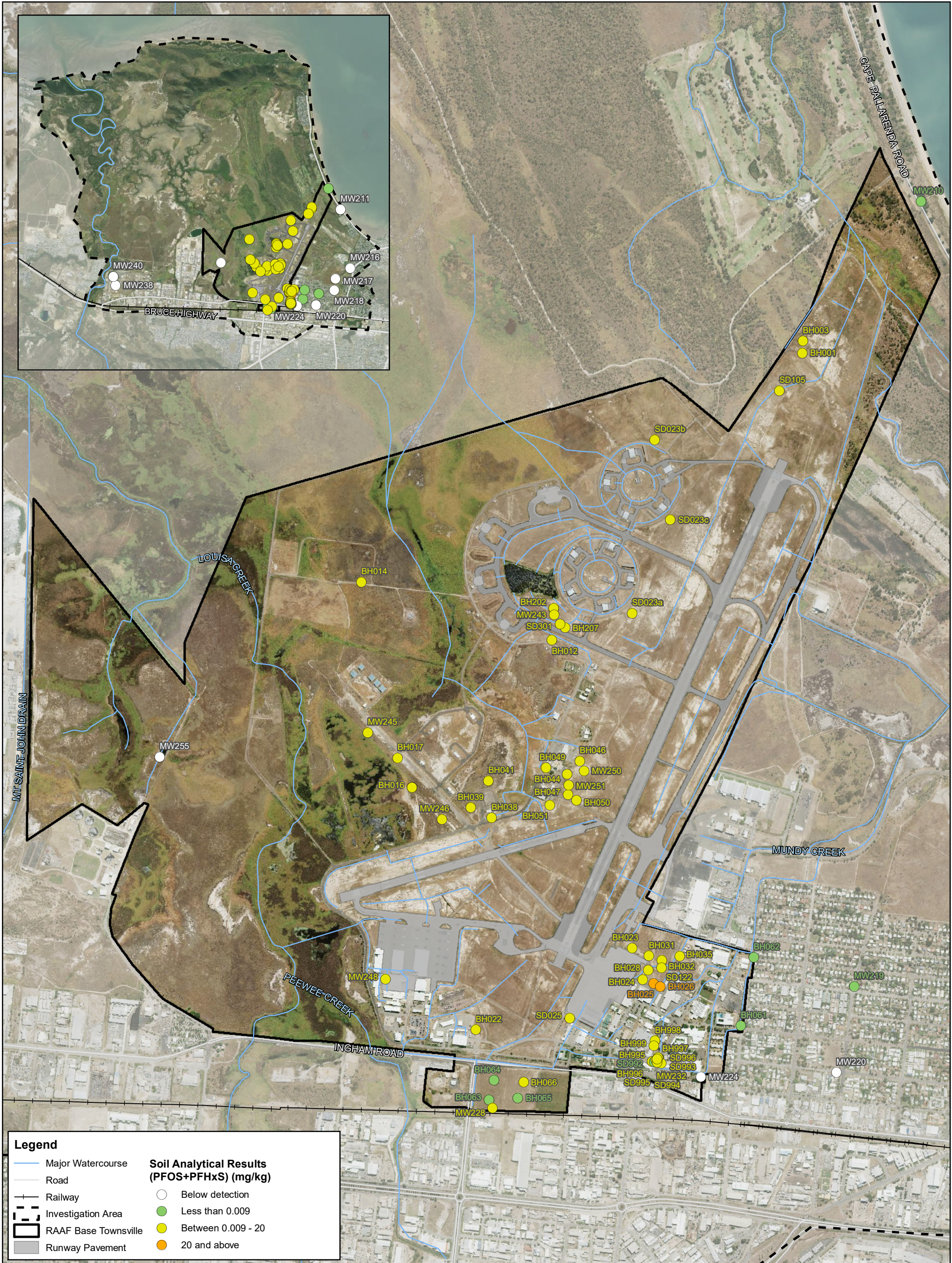
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RAAF TVL Detailed Site Investigation
Townsville, Queensland, 4810
Figure 2b
Soil Investigation Locations

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Legend

- Major Watercourse
- Road
- Railway
- Investigation Area
- RAAF Base Townsville
- Runway Pavement

Soil Analytical Results (PFOS+PFHxS) (mg/kg)

- Below detection
- Less than 0.009
- Between 0.009 - 20
- 20 and above

Map: 2270642A_F003a_SoilPFOSPFH_r3v4

Author: NK

Date: 13/08/2018

Approved by: DH

Coordinate system: GDA 1994 MGA Zone 55

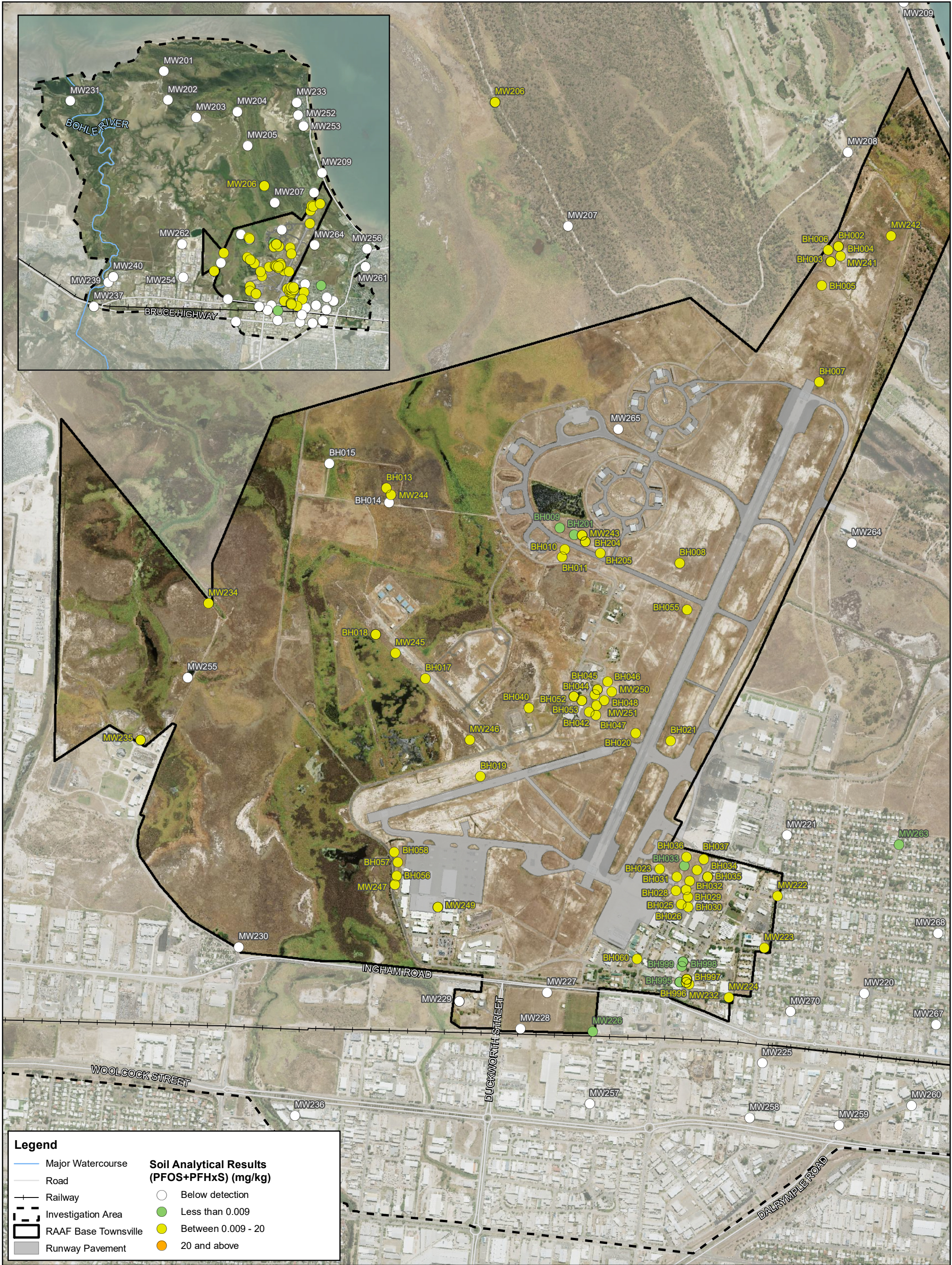
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RAAF TVL Detailed Site Investigation
Townsville, Queensland, 4810
Figure 3a
Soil analytical results PFOS+PFHxS
Human Health Screening 0 - 0.5m



**RAAF TVL Detailed Site Investigation
Townsville, Queensland, 4810**

Figure 3c

Soil analytical results PFOS+PFHxS
Human Health Screening >1 m



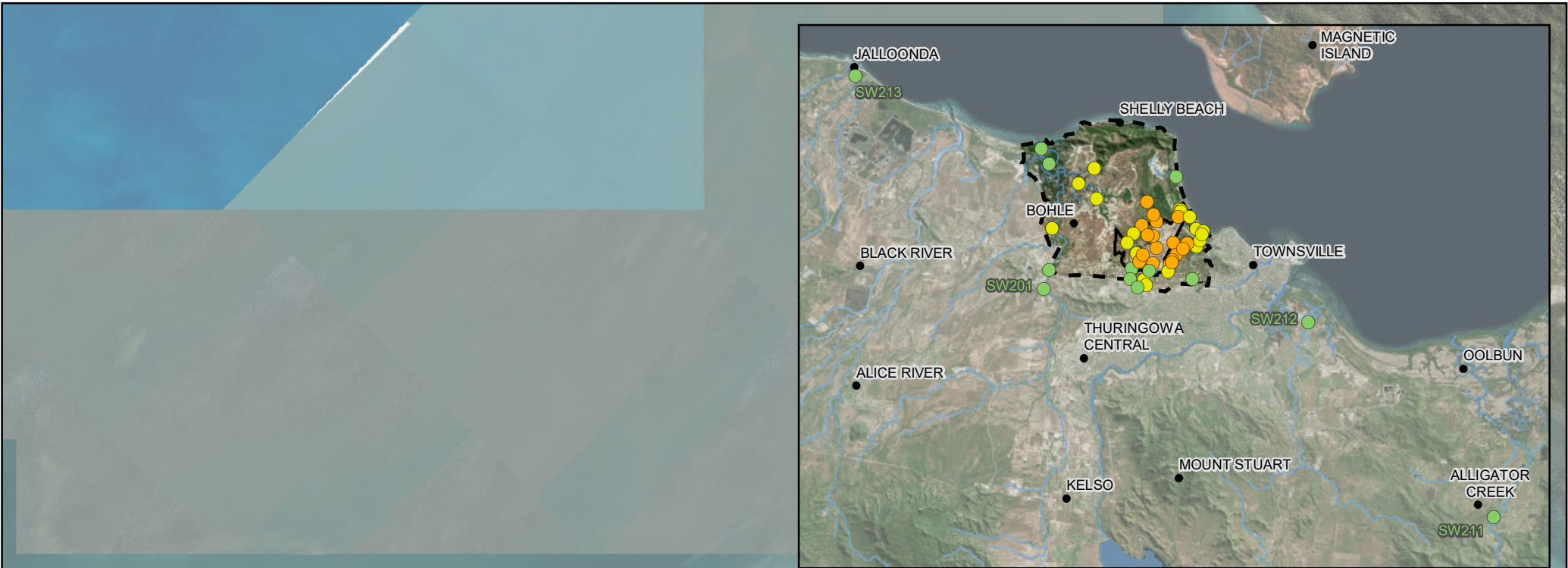


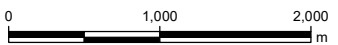


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RAAF TVL Detailed Site Investigation
Townsville, Queensland, 4810
Figure 6a
Groundwater analytical results PFOS+PFHxS
Human Health screening
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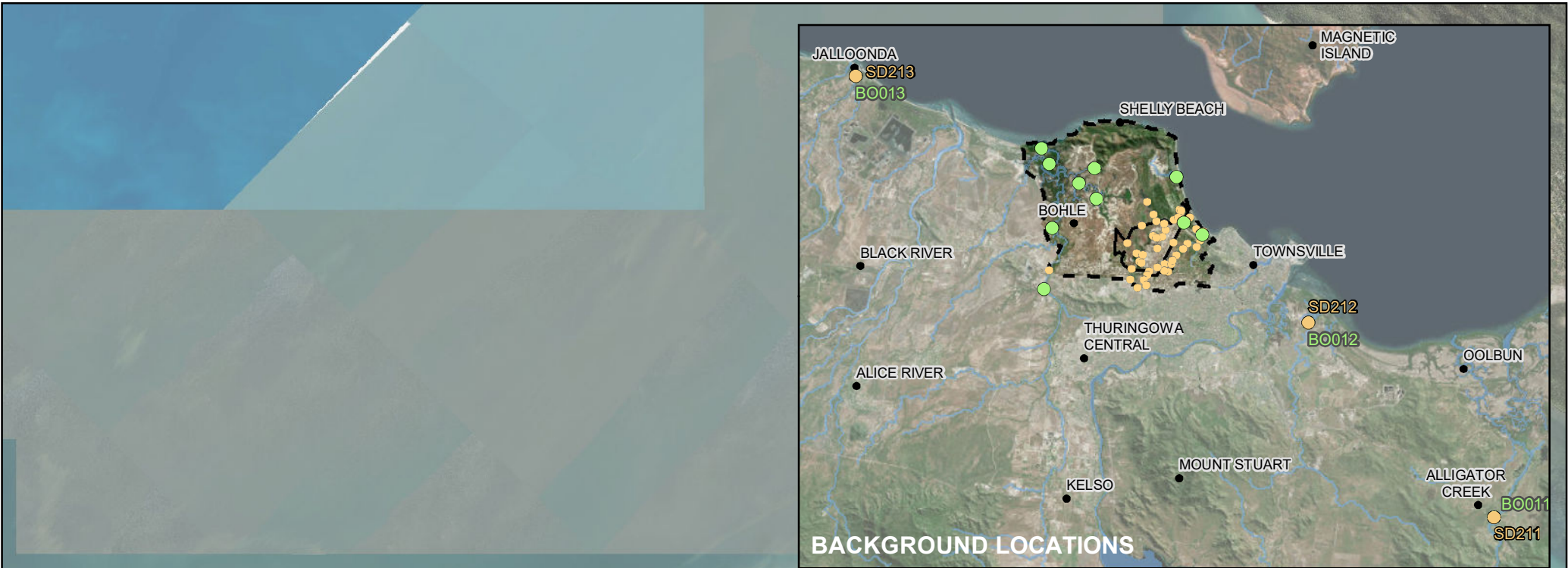


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Townsville, Queensland, 4810
Figure 7
Surface Water Analytical Results PFOS+PFHxS
Human health screening



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APPENDIX B

TABULATED ANALYTICAL RESULTS



Table 1 - on-Base Soil Analytical Results - PFAS

							Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids											
							Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorobutanoic acid (PFBA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTriDA)	
							mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL							0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
NEMP – Human health – Industrial/commercial													20								50				
NEMP – Human health – Public open space													1								10				
NEMP – Human health – Residential with minimal opportunities for soil access													2								20				
NEMP – Human health – Residential with garden/accessible soil													0.009								0.1				
Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	Depth																				
ES1714865	NQ0105	0874_BH001_0.5_170612	Soil	12/06/2017	0.5	0.113	0.0511	-	1.31	0.0656	1.31	2.62	0.0062	0.0003	<0.0002	<0.0002	0.003	<0.0005	0.0769	0.0144	0.0516	<0.0002	<0.0002		
ES1714865	NQ0105	0874_BH002_1.0_170612	Soil	12/06/2017	1	0.0008	0.0016	-	0.0093	0.0003	0.0019	0.0112	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0021	0.0003	0.0004	<0.0002	<0.0002		
ES1714865	NQ0105	0874_BH003_0.2_170612	Soil	12/06/2017	0.2	0.0004	<0.0002	-	0.0028	<0.0002	0.0257	0.0285	<0.0002	0.0003	<0.0002	<0.0002	<0.001	<0.0005	0.0009	<0.0002	0.0006	0.0031	<0.0002		
ES1714865	NQ0105	0874_BH003_1.0_170612	Soil	12/06/2017	1	0.0008	0.0024	-	0.0026	<0.0002	0.0008	0.0034	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0028	0.0003	<0.0002	<0.0002	<0.0002		
ES1714865	NQ0105	0874_BH003_1.7_170612	Soil	12/06/2017	1.7	0.0012	0.0041	-	0.0067	<0.0002	0.0026	0.0093	0.0005	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0046	0.0004	<0.0002	<0.0002	<0.0002		
ES1714865	NQ0105	0874_BH004_1.0_170612	Soil	12/06/2017	1	0.0006	0.0013	-	0.0102	0.0003	0.005	0.0152	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0015	0.0003	0.0004	<0.0002	<0.0002		
ES1714865	NQ0105	0874_BH005_1.0_170612	Soil	12/06/2017	1	0.0217	0.0364	-	0.268	0.0121	0.232	0.5	0.0108	<0.0002	<0.0002	<0.0002	0.005	<0.0005	0.0559	0.0061	0.0084	<0.0002	<0.0002		
ES1714865	NQ0105	0874_BH006_1.0_170612	Soil	12/06/2017	1	0.0014	0.0024	-	0.027	0.001	0.002	0.029	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0036	0.0005	0.0008	<0.0002	<0.0002		
ES1714865	NQ0105	0874_BH007_1.0_170612	Soil	12/06/2017	1	<0.0002	<0.0002	-	0.001	<0.0002	0.001	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714865	NQ0105	0874_MW241_S_1.0_170612	Soil	12/06/2017	1	<0.0002	0.0003	-	0.0022	<0.0002	0.0004	0.0026	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714865	NQ0105	0874_SD105_170612	Soil	12/06/2017	0.05	0.0005	0.0035	-	0.0035	0.0004	0.0629	0.0664	0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0014	<0.0002	0.0002	<0.0002	<0.0002		
ES1714280	NQ0106	0874_BH008_1.0_170606	Soil	6/06/2017	1	0.0095	0.007	-	0.0556	0.0005	0.0071	0.0627	0.006	<0.0002	<0.0002	<0.0002	0.002	<0.0005	0.0358	0.0024	0.003	<0.0002	<0.0002		
ES1714411	NQ0106	0874_BH009_3.6_170609	Soil	9/06/2017	3.6	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714411	NQ0106	0874_BH010_1.0_170609	Soil	9/06/2017	1	0.0084	0.0055	-	0.068	0.0019	0.0693	0.137	0.0042	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0157	0.002	0.0027	<0.0002	<0.0002		
ES1714411	NQ0106	0874_BH011_1.0_170609	Soil	9/06/2017	1	0.0164	0.0157	-	0.0696	0.0018	0.083	0.153	0.0143	<0.0002	<0.0002	<0.0002	0.006	<0.0005	0.0506	0.0045	0.0048	<0.0002	<0.0002		
ES1714411	NQ0106	0874_BH012_0.5_170609	Soil	9/06/2017	0.5	0.0019	0.0024	-	0.0081	<0.0002	0.0053	0.0134	0.0016	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0061	0.0003	0.0003	<0.0002	<0.0002		
ES1714411	NQ0106	0874_BH201_2.0_170609	Soil	9/06/2017	2	0.001	0.0014	-	0.0009	<0.0002	<0.0002	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0028	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714280	NQ0106	0874_BH202_0.3_170606	Soil	6/06/2017	0.3	0.0132	0.0247	-	0.07	0.0041	1.53	1.6	0.0192	0.0002	0.0003	0.0002	0.012	<0.0005	0.0433	0.0023	0.0086	0.0002	<0.0002		
ES1714280	NQ0106	0874_BH202_0.5_170606	Soil	6/06/2017	0.5	0.164	0.257	-	0.965	0.0801	1.74	2.7	0.119	0.0008	<0.0002	<0.0002	0.052	<0.0005	0.412	0.0362	0.125	<0.0002	<0.0002		
ES1714280	NQ0106	0874_MW243_S_0.5_170606	Soil	6/06/2017	0.5	0.289	0.256	-	2.94	0.078	13.7	16.6	0.0853	0.0013	0.0004	<0.0002	0.029	<0.0005	0.548	0.0704	0.392	<0.0002	<0.0002		
ES1714280	NQ0106	0874_MW243_S_5.0_170606	Soil	6/06/2017	5	0.0011	0.001	-	0.0064	0.0007	0.0349	0.0413	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0027	0.0002	0.0006	<0.0002	<0.0002		
ES1714280	NQ0106	0874_MW243_S_6.0_170606	Soil	6/06/2017	6	<0.0002	<0.0002	-	0.0004	<0.0002	0.0012	0.0016	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714411	NQ0106	0874_BH204_1.0_170609	Soil	9/06/2017	1	0.147	0.177	-	0.931	0.0888	2.3	3.23	0.0781	0.0003	<0.0002	<0.0002	0.04	<0.0005	0.255	0.0345	0.0713	<0.0002	<0.0002		
ES1714411	NQ0106	0874_BH204_3.0_170609	Soil	9/06/2017	3	0.0011	0.0011	-	0.0075	0.0003	0.0074	0.0149	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0011	<0.0002	0.0003	<0.0002	<0.0002		
ES1714411	NQ0106	0874_BH205_1.5_170609	Soil	9/06/2017	1.5	0.0657	0.0411	-	0.191	0.0117	0.241	0.432	0.0258	<0.0002	<0.0002	<0.0002	0.017	<0.0005	0.103	0.0183	0.019	<0.0002	<0.0002		
ES1714411	NQ0106	0874_BH207_0.5_170609	Soil	9/06/2017	0.5	0.451	0.516	-	2.52	0.258	11.5	14	0.218	0.0004	0.0004	0.0004	0.176	<0.0005	0.894	0.116	0.314	0.0002	0.0002		
ES1714411	OLAs – NQ0106	0874_SD301_170609	Soil	9/06/2017	0.05	0.285	0.0606	-	1.45	0.279	11.5	13	0.033</												

Table 1 - on-Base Soil Analytical Results - PFAS

						Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids												
						Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorobutanoic acid (PFBA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTriDA)		
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial												20								50					
NEMP – Human health – Public open space												1								10					
NEMP – Human health – Residential with minimal opportunities for soil access												2								20					
NEMP – Human health – Residential with garden/accessible soil												0.009								0.1					
Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	Depth																				
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH023_0.2_170607	Soil	7/06/2017	0.2	0.0116	0.0096	-	0.0366	0.0015	0.019	0.0556	0.0022	<0.0002	<0.0002	<0.0002	0.002	<0.0005	0.0208	0.0027	0.0033	<0.0002	<0.0002		
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH023_2.8_170607	Soil	7/06/2017	2.8	0.0013	0.0008	-	0.008	0.0006	0.0434	0.0514	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0042	0.0009	0.0019	<0.0002	<0.0002		
ES1714411	Fuel Farm 1 (NQ0052)	0874_BH024_0.2_170608	Soil	8/06/2017	0.2	0.0014	0.0011	-	0.0166	0.0023	2.7	2.72	0.0014	0.0002	0.0006	<0.0002	<0.001	<0.0005	0.0085	0.0016	0.013	0.0002	<0.0002		
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH025_1.0_170531	Soil	31/05/2017	1	0.874	1.19	-	2.12	0.0435	1.41	3.53	0.299	<0.0005	<0.0005	<0.0005	0.182	<0.0012	1.75	0.248	0.231	<0.0005	<0.0005		
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH026_1.0_170531	Soil	31/05/2017	1	0.635	1.06	-	2.29	0.107	3.18	5.47	0.307	<0.0005	<0.0005	<0.0005	0.179	<0.0012	1.72	0.212	0.362	<0.0005	<0.0005		
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH028_0.5_170531	Soil	31/05/2017	0.5	0.204	0.44	-	0.852	0.138	16.4	17.2	0.164	<0.0050	<0.0050	<0.0050	0.109	<0.0125	0.953	0.149	0.278	<0.0050	<0.0050		
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH028_1.5_170531	Soil	31/05/2017	1.5	0.0231	0.0346	-	0.166	0.0064	0.0673	0.233	0.01	<0.0002	<0.0002	<0.0002	0.005	<0.0005	0.0703	0.0117	0.021	<0.0002	<0.0002		
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH031_0.5_170607	Soil	7/06/2017	0.5	0.312	0.552	-	2.14	0.163	1.37	3.51	0.376	0.0022	<0.0002	<0.0002	0.093	<0.0005	0.848	0.241	0.723	<0.0002	<0.0002		
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH031_1.7_170607	Soil	7/06/2017	1.7	0.0095	0.0064	-	0.0492	0.0028	0.111	0.16	0.0072	0.0002	<0.0002	<0.0002	0.004	<0.0005	0.0242	0.0062	0.008	<0.0002	<0.0002		
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH032_0.2_170607	Soil	7/06/2017	0.2	0.0005	0.0005	-	0.0036	0.0009	0.962	0.966	0.0144	0.0118	0.0191	0.0027	0.004	<0.0005	0.0047	0.0029	0.0088	0.0037	0.0006		
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH032_1.0_170607	Soil	7/06/2017	1	0.0344	0.0237	-	0.102	0.0038	0.0291	0.131	0.237	0.0017	0.0002	<0.0002	0.034	<0.0005	0.282	0.0943	0.0486	<0.0002	<0.0002		
ES1715280	Fuel Farm 1 (NQ0052)	0874_BH035_0.5_170616	Soil	16/06/2017	0.5	0.0044	0.0017	-	0.0685	0.007	0.52	0.588	0.0026	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0179	0.0011	0.0043	<0.0002	<0.0002		
ES1715280	Fuel Farm 1 (NQ0052)	0874_BH035_1.5_170616	Soil	16/06/2017	1.5	0.025	0.0083	-	0.224	0.0099	0.167	0.391	0.0068	<0.0002	<0.0002	<0.0002	0.002	<0.0005	0.0956	0.0052	0.0068	<0.0002	<0.0002		
ES1715280	Fuel Farm 1 (NQ0052)	0874_BH035_3.5_170616	Soil	16/06/2017	3.5	0.0007	0.0004	-	0.0017	0.0005	0.0148	0.0165	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0018	0.0004	0.0007	<0.0002	<0.0002		
ES1714411	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH029_1.0_170608	Soil	8/06/2017	1	0.228	0.206	-	0.84	0.0481	0.35	1.19	0.0728	0.0002	<0.0002	<0.0002	0.034	<0.0005	0.522	0.101	0.145	<0.0002	<0.0002		
ES1714411	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH030_1.5_170608	Soil	8/06/2017	1.5	0.0274	0.0208	-	0.151	0.0094	0.132	0.283	0.0125	<0.0002	<0.0002	<0.0002	0.005	<0.0005	0.0576	0.0094	0.0212	<0.0002	<0.0002		
ES1714280	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH034_1.0_170607	Soil	7/06/2017	1	0.2	0.253	-	1.03	0.106	1.25	2.28	0.07	0.0006	<0.0002	<0.0002	0.026	<0.0005	0.372	0.0723	0.189	<0.0002	<0.0002		
ES1714280	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH036_1.0_170607	Soil	7/06/2017	1	0.0005	0.0005	-	0.0029	<0.0002	0.0009	0.0038	0.0012	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.002	0.0002	<0.0002	<0.0002	<0.0002		
ES1714280	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH037_2.0_170607	Soil	7/06/2017	2	0.0002	<0.0002	-	0.0019	<0.0002	0.0004	0.0023	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0004	<0.0002	<0.0002	<0.0002	<0.0002		
ES1713464	NQ0054 - Former Fire Training Area	0874_BH025_0.5_170531	Soil	31/05/2017	0.5	6.53	8.25	-	26.9	1.87	73.2	100	2.73	0.0056	<0.0050	<0.0050	1.61	<0.0125	15	2.06	4.61	<0.0050	<0.0050		
ES1713464	NQ0054 - Former Fire Training Area	0874_BH026_0.5_170531	Soil	31/05/2017	0.5	0.119	0.163	-	0.798	0.14	21	21.8	0.0644	0.0009	0.0009	<0.0005	0.045	<0.0012	0.364	0.0686	0.284	<0.0005	<0.0005		
ES1714280	NQ0054 - Former Fire Training Area	0874_SD122_170606	Soil	6/06/2017	0.05	0.0532	0.0397	-	0.14	0.0289	0.58	0.72	0.0284	0.0006	<0.0002	<0.0002	0.017	<0.0005	0.113	0.0261	0.0421	<0.0002	<0.0002		
ES1714280	NQ0054 - Former Fire Training Area	0874_BH033_3.0_170607	Soil	7/06/2017	3	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH038_0.5_170602	Soil	2/06/2017	0.5	0.0963	0.0753	-	1.18	0.259	7.36	8.54	0.0418	0.0004	<0.0002	<0.0002	0.016	<0.0005	0.174	0.018	0.076	<0.0002	<0.0002		
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH039_0.5_170602	Soil	2/06/2017	0.5	0.0411	0.0203	-	0.351	0.0154	0.0624	0.413	0.0092	<0.0002	<0.0002	<0.0002	0.003	<0.0005	0.0637	0.0057	0.0102	<0.0002	<0.0002		
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH040_1.0_170602	Soil	2/06/2017	1	0.0016	0.0017	-	0.0132	<0.0002	0.0028	0.016	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0053	0.0004	0.0003	<0.0002	<0.0002		
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH041_0.2_170602	Soil	2/06/2017	0.2	0.0043	0.0025	-	0.0476	0.0022	0.0685	0.116	0.0034	<0.0002	<0.0002	<0.0002	0.001	<0.0005	0.0122	0.0011	0.0037	<0.0002	<0.0002		
ES1715280	NQ0107	0874_BH044_0.5_170615	Soil	15/06/2017	0.5	0.189	0.0836	-	4.98	0.519	8.61	13.6	0.0892	0.0094	<0.0005	<0.0005	0.018	<0.0012	0.744	0.0724	0.3				

Table 1 - on-Base Soil Analytical Results - PFAS

						Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids												
						Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorobutanoic acid (PFBA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTriDA)		
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL						0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
NEMP – Human health – Industrial/commercial												20									50				
NEMP – Human health – Public open space												1									10				
NEMP – Human health – Residential with minimal opportunities for soil access												2									20				
NEMP – Human health – Residential with garden/accessible soil												0.009									0.1				
Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	Depth																				
ES1716954	Kindergarten	0874_BH995_0.2_170710	Soil	10/07/2017	0.2	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0016	0.0016	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	0.0004	<0.0002	<0.0002		
ES1716954	Kindergarten	0874_BH995_0.5_170710	Soil	10/07/2017	0.5	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1716954	Kindergarten	0874_BH995_1.0_170710	Soil	10/07/2017	1	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0005	0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1716954	Kindergarten	0874_BH995_1.5_170710	Soil	10/07/2017	1.5	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1716954	Kindergarten	0874_BH996_0.2_170710	Soil	10/07/2017	0.2	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0017	0.0017	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1716954	Kindergarten	0874_BH996_0.5_170710	Soil	10/07/2017	0.5	<0.0002	<0.0002	-	0.0003	<0.0002	0.0049	0.0052	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1716954	Kindergarten	0874_BH996_1.0_170710	Soil	10/07/2017	1	0.0002	0.0004	-	0.003	<0.0002	<0.0002	0.003	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1716954	Kindergarten	0874_BH996_1.5_170710	Soil	10/07/2017	1.5	<0.0002	<0.0002	-	0.0006	<0.0002	0.0006	0.0012	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1715280	Kindergarten	0874_BH997_0.2_170616	Soil	16/06/2017	0.2	<0.0002	<0.0002	-	0.0003	<0.0002	0.0059	0.0062	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1716573	Kindergarten	0874_BH997_0.5_170616	Soil	16/06/2017	0.5	<0.0002	<0.0002	-	0.001	<0.0002	0.0116	0.0126	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0017	0.0003	0.0006	<0.0002	<0.0002		
ES1716573	Kindergarten	0874_BH997_1.0_170616	Soil	16/06/2017	1	<0.0002	<0.0002	-	0.0004	<0.0002	0.0102	0.0106	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0016	0.0003	0.0004	<0.0002	<0.0002		
ES1715280	Kindergarten	0874_BH997_1.4_170616	Soil	16/06/2017	1.4	0.0002	<0.0002	-	0.0007	0.0002	0.0247	0.0254	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.001	<0.0002	0.0004	<0.0002	<0.0002		
ES1716573	Kindergarten	0874_BH997_1.4_170616	Soil	16/06/2017	1.4	<0.0002	<0.0002	-	0.001	<0.0002	0.0136	0.0146	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0018	<0.0002	0.0004	<0.0002	<0.0002		
ES1714411	Kindergarten	0874_BH998_0.5_170610	Soil	10/06/2017	0.5	<0.0002	<0.0002	-	0.0006	<0.0002	0.0007	0.0013	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714411	Kindergarten	0874_BH998_1.0_170610	Soil	10/06/2017	1	<0.0002	<0.0002	-	0.0004	<0.0002	0.0004	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714411	Kindergarten	0874_BH998_2.6_170610	Soil	10/06/2017	2.6	<0.0002	<0.0002	-	0.0002	<0.0002	0.0005	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714411	Kindergarten	0874_BH999_0.5_170610	Soil	10/06/2017	0.5	<0.0002	<0.0002	-	0.001	<0.0002	0.0048	0.0058	0.0006	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0009	0.0004	0.0008	<0.0002	<0.0002		
ES1714411	Kindergarten	0874_BH999_1.7_170610	Soil	10/06/2017	1.7	<0.0002	<0.0002	-	0.0009	<0.0002	<0.0002	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1714411	Kindergarten	0874_MW232_S_0.5_170610	Soil	10/06/2017	0.5	<0.0002	<0.0002	-	0.0021	0.0008	0.0164	0.0185	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0004	0.0002	0.0011	<0.0002	<0.0002		
ES1714411	Kindergarten	0874_MW232_S_4.2_170610	Soil	10/06/2017	4.2	0.0002	0.0003	-	0.0018	<0.0002	0.0043	0.0061	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	0.0003	<0.0002	<0.0002	<0.0002	<0.0002		
ES1713464	Kindergarten & domestic	0874_MW224_0.2_170530	Soil	30/05/2017	0.2	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1713464	Kindergarten & domestic	0874_MW224_1.0_170530	Soil	30/05/2017	1	0.0002	0.0003	-	0.0024	<0.0002	0.0086	0.011	<0.0002	<0.0002	<0.0002	<0.0002	0.02	<0.0005	0.0003	<0.0002	<0.0002	<0.0002	<0.0002		
ES1715280	Kindergarten & domestic	0874_BH060_1.9_170616	Soil	16/06/2017	1.9	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0013	0.0013	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1715280	Kindergarten & domestic	0874_SD996_170616	Soil	16/06/2017	0.05	<0.0002	<0.0002	-	0.0005	<0.0002	0.0073	0.0078	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1716954	Kindergarten & domestic	0874_SD992_170710	Soil	10/07/2017	0.05	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0006	0.0006	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
ES1716954	Kindergarten & domestic	0874_SD993_170710	Soil	10/07/2017	0.05	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0015	0.0015	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0		

Table 1 - on-Base Soil Analytical Results - PFAS

							(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
							4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSA)	N-EtFOSA	N-Ethyl perfluorooctane sulfonamidoethanol (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS	Sum of PFAS (WA DER List)
EQL							0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	
NEMP – Human health – Industrial/commercial																				
NEMP – Human health – Public open space																				
NEMP – Human health – Residential with minimal opportunities for soil access																				
NEMP – Human health – Residential with garden/accessible soil																				
Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	Depth															
ES1714865	NQ0105	0874_BH001_0.5_170612	Soil	12/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	3	2.82	
ES1714865	NQ0105	0874_BH002_1.0_170612	Soil	12/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0167	0.0156	
ES1714865	NQ0105	0874_BH003_0.2_170612	Soil	12/06/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0338	0.03	
ES1714865	NQ0105	0874_BH003_1.0_170612	Soil	12/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0097	0.0089	
ES1714865	NQ0105	0874_BH003_1.7_170612	Soil	12/06/2017	1.7	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0201	0.0189	
ES1714865	NQ0105	0874_BH004_1.0_170612	Soil	12/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0196	0.0187	
ES1714865	NQ0105	0874_BH005_1.0_170612	Soil	12/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.656	0.623	
ES1714865	NQ0105	0874_BH006_1.0_170612	Soil	12/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0387	0.0363	
ES1714865	NQ0105	0874_BH007_1.0_170612	Soil	12/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.002	0.002	
ES1714865	NQ0105	0874_MW241_S_1.0_170612	Soil	12/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0031	0.0031	
ES1714865	NQ0105	0874_SD105_170612	Soil	12/06/2017	0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0731	0.0717	
ES1714280	NQ0106	0874_BH008_1.0_170606	Soil	6/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.129	0.119	
ES1714411	NQ0106	0874_BH009_3.6_170609	Soil	9/06/2017	3.6	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0002	0.0002	
ES1714411	NQ0106	0874_BH010_1.0_170609	Soil	9/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.178	0.167	
ES1714411	NQ0106	0874_BH011_1.0_170609	Soil	9/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.267	0.248	
ES1714411	NQ0106	0874_BH012_0.5_170609	Soil	9/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.026	0.0241	
ES1714411	NQ0106	0874_BH201_2.0_170609	Soil	9/06/2017	2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0061	0.0051	
ES1714280	NQ0106	0874_BH202_0.3_170606	Soil	6/06/2017	0.3	<0.0005	<0.0005	<0.0005	<0.0005	0.0082	0.0007	<0.0002	<0.0005	<0.0005	0.0002	<0.0005	<0.0005	1.74	1.71	
ES1714280	NQ0106	0874_BH202_0.5_170606	Soil	6/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	3.95	3.71	
ES1714280	NQ0106	0874_MW243_S_0.5_170606	Soil	6/06/2017	0.5	<0.0005	0.0169	0.0007	<0.0005	0.0041	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	18.4	18	
ES1714280	NQ0106	0874_MW243_S_5.0_170606	Soil	6/06/2017	5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0476	0.0458	
ES1714280	NQ0106	0874_MW243_S_6.0_170606	Soil	6/06/2017	6	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0016	0.0016	
ES1714411	NQ0106	0874_BH204_1.0_170609	Soil	9/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	0.002	<0.0005	<0.0002	<0.0005	<0.0005	0.0009	<0.0005	<0.0005	4.13	3.89	
ES1714411	NQ0106	0874_BH204_3.0_170609	Soil	9/06/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0188	0.0174	
ES1714411	NQ0106	0874_BH205_1.5_170609	Soil	9/06/2017	1.5	<0.0005	0.0045	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.738	0.661	
ES1714411	NQ0106	0874_BH207_0.5_170609	Soil	9/06/2017	0.5	<0.0005	0.0788	0.0291	0.0011	0.0564	0.0021	0.0019	<0.0005	<0.0005	0.001	<0.0005	<0.0005	17.2	16.4	
ES1714411	OLAs – NQ0106	0874_SD301_170609	Soil	9/06/2017	0.05	<0.0005	0.0039	0.0009	<0.0005	0.0365	<0.0005	0.0003	<0.0005	<0.0005	0.0004	<0.0005	<0.0005	14.5	13.8	
ES1719419	Pad Brahman	0874_BH013_1.0_170802	Soil	2/08/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0155	0.0148	
ES1719419	Pad Brahman	0874_BH014_0.5_170802	Soil	2/08/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0521	0.0514	
ES1719419	Pad Brahman	0874_BH014_4.0_170802	Soil	2/08/2017	4	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	
ES1719419	Pad Brahman	0874_BH015_2.0_170802	Soil	2/08/2017	2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	
ES1719419	Pad Brahman	0874_MW244_S_3.0_170802	Soil	2/08/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.0212	0.0198	
ES1714149	Disused Runway 13/31	0874_BH016_0.05_170601	Soil	1/06/2017	0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.0013	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	0.219	0.21	
ES171																				

Table 1 - on-Base Soil Analytical Results - PFAS

						(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides						PFAS		
						4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-veryl perfluorooctane sulfonamidoacetic acid (NMeFOSA)	perfluorooctane sulfonamidoethanol (MeFOSN)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS	Sum of PFAS (WA DER List)
EQL						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
						0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002
NEMP – Human health – Industrial/commercial																		
NEMP – Human health – Public open space																		
NEMP – Human health – Residential with minimal opportunities for soil access																		
NEMP – Human health – Residential with garden/accessible soil																		
Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	Depth													
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH023_0.2_170607	Soil	7/06/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.109	0.0962
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH023_2.8_170607	Soil	7/06/2017	2.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0611	0.0592
ES1714411	Fuel Farm 1 (NQ0052)	0874_BH024_0.2_170608	Soil	8/06/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	0.0302	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	2.8	2.74
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH025_1.0_170531	Soil	31/05/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	0.0046	<0.0012	<0.0005	<0.0012	<0.0012	<0.0005	<0.0012	8.36	7.43
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH026_1.0_170531	Soil	31/05/2017	1	<0.0005	0.0097	<0.0005	<0.0005	0.0063	<0.0012	<0.0005	<0.0012	<0.0012	<0.0005	<0.0012	10.1	9.32
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH028_0.5_170531	Soil	31/05/2017	0.5	<0.0050	<0.0050	<0.0050	<0.0050	0.0196	<0.0125	<0.0050	<0.0125	<0.0125	<0.0050	<0.0125	19.7	19.3
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH028_1.5_170531	Soil	31/05/2017	1.5	<0.0005	0.0006	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.416	0.386
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH031_0.5_170607	Soil	7/06/2017	0.5	0.0241	2.57	0.0015	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	9.42	8.91
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH031_1.7_170607	Soil	7/06/2017	1.7	<0.0005	0.0393	0.0035	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.272	0.259
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH032_0.2_170607	Soil	7/06/2017	0.2	<0.0005	0.0694	0.368	0.0408	0.005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	1.53	1.44
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH032_1.0_170607	Soil	7/06/2017	1	0.0217	3.86	0.0173	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	4.79	4.73
ES1715280	Fuel Farm 1 (NQ0052)	0874_BH035_0.5_170616	Soil	16/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.628	0.616
ES1715280	Fuel Farm 1 (NQ0052)	0874_BH035_1.5_170616	Soil	16/06/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.551	0.516
ES1715280	Fuel Farm 1 (NQ0052)	0874_BH035_3.5_170616	Soil	16/06/2017	3.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.021	0.0198
ES1714411	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH029_1.0_170608	Soil	8/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	2.55	2.27
ES1714411	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH030_1.5_170608	Soil	8/06/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.446	0.41
ES1714280	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH034_1.0_170607	Soil	7/06/2017	1	<0.0005	0.001	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	3.57	3.26
ES1714280	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH036_1.0_170607	Soil	7/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0082	0.0077
ES1714280	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH037_2.0_170607	Soil	7/06/2017	2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0029	0.0027
ES1713464	NQ0054 - Former Fire Training Area	0874_BH025_0.5_170531	Soil	31/05/2017	0.5	<0.0050	<0.0050	<0.0050	<0.0050	0.119	<0.0125	0.0078	<0.0125	<0.0125	<0.0050	<0.0125	143	134
ES1713464	NQ0054 - Former Fire Training Area	0874_BH026_0.5_170531	Soil	31/05/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	0.0355	<0.0012	0.003	<0.0012	<0.0012	<0.0005	<0.0012	23.2	22.8
ES1714280	NQ0054 - Former Fire Training Area	0874_SD122_170606	Soil	6/06/2017	0.05	<0.0005	0.0018	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	1.07	0.988
ES1714280	NQ0054 - Former Fire Training Area	0874_BH033_3.0_170607	Soil	7/06/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH038_0.5_170602	Soil	2/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	0.005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	9.3	8.94
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH039_0.5_170602	Soil	2/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.582	0.526
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH040_1.0_170602	Soil	2/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0253	0.0237
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH041_0.2_170602	Soil	2/06/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.146	0.14
ES1715280	NQ0107	0874_BH044_0.5_170615	Soil	15/06/2017	0.5	<0.0005	0.008	<0.0005	<0.0005	0.0008	<0.0012	<0.0005	<0.0012	<0.0012	<0.0005	<0.0012	15.7	14.9
ES1715280	NQ0107	0874_BH044_3.8_170615	Soil	15/06/2017	3.8	<0.0005	0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.208	0.2
ES1714149	NQ0107	0874_BH046_0.5_170605	Soil	5/06/2017	0.5	<0.0005	0.0006	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.438	0.401
ES1714149	NQ0107	0874_BH046_1.4_170605	Soil	5/06/2017	1.4	<0.0005	0.0006	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.565	0.51
ES1714149	NQ0107	0874_BH047_0.2_170605	Soil	5/06/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.396	0.343
ES1714149	NQ0107	0874_BH047_1.0_170605	Soil	5/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0348	0.0305
ES1715280	NQ0107	0874_BH049_0.5_170615	Soil	15/06/2017	0.5	<0.0005	0.0043	<0.0005	<0.0005	0.0157	<0.0012	<0.0005	<0.0012	<0.0012	<0.0005	<0.0012	7.77	7.41
ES1714149	NQ0107	0874_BH050_0.5_170605	Soil	5/06/2017	0.5	<0.0005	<0.0005	<0.0.										

Table 1 - on-Base Soil Analytical Results - PFAS

							(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
							4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-veryl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	perfluorooctane sulfonamidoethanol (Me-FOSF)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS	Sum of PFAS (WA DER List)	
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg							
EQL	0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0002	0.0002		
NEMP – Human health – Industrial/commercial																				
NEMP – Human health – Public open space																				
NEMP – Human health – Residential with minimal opportunities for soil access																				
NEMP – Human health – Residential with garden/accessible soil																				
Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	Depth															
ES1716954	Kindergarten	0874_BH995_0.2_170710	Soil	10/07/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0023	0.002		
ES1716954	Kindergarten	0874_BH995_0.5_170710	Soil	10/07/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002		
ES1716954	Kindergarten	0874_BH995_1.0_170710	Soil	10/07/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0005		
ES1716954	Kindergarten	0874_BH995_1.5_170710	Soil	10/07/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002		
ES1716954	Kindergarten	0874_BH996_0.2_170710	Soil	10/07/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0017	0.0017		
ES1716954	Kindergarten	0874_BH996_0.5_170710	Soil	10/07/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0052	0.0052		
ES1716954	Kindergarten	0874_BH996_1.0_170710	Soil	10/07/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0036	0.0034		
ES1716954	Kindergarten	0874_BH996_1.5_170710	Soil	10/07/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0012	0.0012		
ES1715280	Kindergarten	0874_BH997_0.2_170616	Soil	16/06/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0066	0.0062		
ES1716573	Kindergarten	0874_BH997_0.5_170616	Soil	16/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0152	0.0152		
ES1716573	Kindergarten	0874_BH997_1.0_170616	Soil	16/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0129	0.0129		
ES1715280	Kindergarten	0874_BH997_1.4_170616	Soil	16/06/2017	1.4	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0272	0.0268		
ES1716573	Kindergarten	0874_BH997_1.4_170616	Soil	16/06/2017	1.4	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0168	0.0168		
ES1714411	Kindergarten	0874_BH998_0.5_170610	Soil	10/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0013	0.0013		
ES1714411	Kindergarten	0874_BH998_1.0_170610	Soil	10/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0008	0.0008		
ES1714411	Kindergarten	0874_BH998_2.6_170610	Soil	10/06/2017	2.6	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0007	0.0007		
ES1714411	Kindergarten	0874_BH999_0.5_170610	Soil	10/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0085	0.0085		
ES1714411	Kindergarten	0874_BH999_1.7_170610	Soil	10/06/2017	1.7	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0009	0.0009		
ES1714411	Kindergarten	0874_MW232_S_0.5_170610	Soil	10/06/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0214	0.0206		
ES1714411	Kindergarten	0874_MW232_S_4.2_170610	Soil	10/06/2017	4.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0069	0.0067		
ES1713464	Kindergarten & domestic	0874_MW224_0.2_170530	Soil	30/05/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002		
ES1713464	Kindergarten & domestic	0874_MW224_1.0_170530	Soil	30/05/2017	1	<0.0005	0.144	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.176	0.176		
ES1715280	Kindergarten & domestic	0874_BH060_1.9_170616	Soil	16/06/2017	1.9	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0013	0.0013		
ES1715280	Kindergarten & domestic	0874_SD996_170616	Soil	16/06/2017	0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0081	0.0078		
ES1716954	Kindergarten & domestic	0874_SD992_170710	Soil	10/07/2017	0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006		
ES1716954	Kindergarten & domestic	0874_SD993_170710	Soil	10/07/2017	0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	0.0008	<0.0005	0.0025	0.0015		
ES1716954	Kindergarten & domestic	0874_SD994_170710	Soil	10/07/2017	0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.002	0.002		
ES1716954	Kindergarten & domestic	0874_SD995_170710	Soil	10/07/2017	0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0011	0.0011		
ES1716156	Garbutt Community - soil sample collected from monitoring well MW222 installed just inside the base boundary	0874_MW222_S_1.0_170626	Soil	26/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0043	0.0038		
ES1715280	Belgian Gardens or Garbutt	0874_MW223_S_1.0_170616	Soil	16/06/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0064	0.0058		
ES1818611	East of Mundy Creek Drain	0874_BH061_180625	Soil	25/06/2018	0.01	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-		
ES1818611	East of Mundy Creek Drain	0874_BH062_180625	Soil	25/06/2018	0.01	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-		
ES1716027	Ingham Road sports Field	0874_MW226_S_5.0_170622	Soil	22/06/2017	5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0005		
ES1716027	Ingham Road sports fields	0874_MW227_S_6.0_170622	Soil	22/06/2017	6	<0.0005	<0.0005													

					NA	Perfluoroalkane Sulfonic Acids								Perfluoroalkane Carboxylic Acids											
					Moisture Content	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)		
						%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					1	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	
NEMP – Human health – Industrial/commercial												20					50								
NEMP – Human health – Public open space												1					10								
NEMP – Human health – Residential with minimal opportunities for soil access												2					20								
NEMP – Human health – Residential with garden/accessible soil												0.009					0.1								
Lab Report Number		Base Area	Field ID	Matrix Type	Date																				
ES1714280	5 AVN	0874_SD123_170607	Sediment	7/06/2017	44.6	0.0255	0.0153	0.183	0.0454	0.0054	2.75	2.93	0.006	0.0126	0.058	0.0066	0.0245	0.0009	0.0008	0.0006	0.0024	<0.0005	0.0005		
ES1714411	5 AVN	0874_SD019_170608	Sediment	8/06/2017	26.3	0.0014	0.0013	0.017	0.0024	0.0017	0.223	0.24	<0.001	<0.0002	0.004	0.0007	0.0024	0.0005	0.001	0.0006	0.0006	<0.0005	<0.0002		
ES1714411	5 AVN	0874_SD124_170610	Sediment	10/06/2017	12.8	0.0019	0.0066	0.0138	0.0011	<0.0002	0.0404	0.0542	0.002	0.0028	0.0044	0.0007	0.0013	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1713464	Domestic Area	0874_SD010S_170530	Sediment	30/05/2017	47.3	0.0007	0.0012	0.0144	0.0007	<0.0002	0.0358	0.0502	<0.001	<0.0002	0.0007	0.0004	0.0013	0.0002	0.0002	0.0005	0.0005	<0.0005	<0.0002		
ES1714865	Domestic Area	0874_SD121_170612	Sediment	12/06/2017	75.1	0.0003	0.0022	0.0042	0.0008	0.0006	0.103	0.107	<0.001	<0.0002	0.0007	0.0002	0.0008	0.0004	0.0008	0.0005	<0.0002	<0.0005	<0.0002		
ES1717838	Ingham Road Sports Field	0874_SD020_170717	Sediment	17/07/2017	49	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0021	0.0021	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1717838	Ingham Road Sports Field	0874_SD021_170718	Sediment	18/07/2017	35.5	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1717838	Mount St John (on-Base wetland area that extends from the The Common onto Base)	0874_SD112_170718	Sediment	18/07/2017	37.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	0.0011	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1714865	NQ0105	0874_SD101_170613	Sediment	13/06/2017	28.2	<0.0002	<0.0002	0.0006	<0.0002	<0.0002	0.0046	0.0052	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1714865	NQ0105	0874_SD102_170613	Sediment	13/06/2017	24.6	0.0016	0.0033	0.0378	0.0013	<0.0002	0.0333	0.0711	<0.001	<0.0002	0.0025	0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1714865	NQ0105	0874_SD103_170612	Sediment	12/06/2017	51.4	0.0003	0.0008	0.0082	0.0013	0.0012	0.0611	0.0693	<0.001	<0.0002	0.0006	<0.0002	0.0004	0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1714865	NQ0105	0874_SD104_170612	Sediment	12/06/2017	32.7	<0.0002	0.0007	0.0077	0.0008	0.0005	0.0379	0.0456	<0.001	<0.0002	0.0006	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1714280	NQ0106 & OLAs	0874_SD302_170606	Sediment	6/06/2017	21.3	0.0786	0.0391	0.737	0.0991	0.0226	5.12	5.86	0.012	0.021	0.0889	0.0176	0.0826	0.0008	0.0005	0.0005	0.0007	<0.0005	0.0003		
ES1714411	NW Base Boundary	0874_SD012_170609	Sediment	9/06/2017	37.9	0.0002	0.0005	0.0047	0.0004	<0.0002	0.0734	0.0781	<0.001	<0.0002	0.0008	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1714411	NW Base Boundary	0874_SD013_170609	Sediment	9/06/2017	29.4	0.0004	0.0005	0.0092	0.0006	<0.0002	0.0569	0.0661	<0.001	<0.0002	0.0007	<0.0002	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1714280	OLAs	0874_SD126_170606	Sediment	6/06/2017	5.6	0.0008	0.0004	0.0101	0.0009	0.0005	0.0699	0.08	<0.001	<0.0002	0.0013	<0.0002	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		
ES1714411	W Base Boundary	0874_SD015_170610	Sediment	10/06/2017	45.4	<0.0002	<0.0002	0.0008	0.0002	<0.0002	0.0095	0.0103	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002		

					(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS		
					4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS	Sum of PFAS (WA DER List)	
EQL					0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial																		
NEMP – Human health – Public open space																		
NEMP – Human health – Residential with minimal opportunities for soil access																		
NEMP – Human health – Residential with garden/accessible soil																		
Lab Report Number		Base Area	Field ID	Matrix Type	Date													
ES1714280	5 AVN	0874_SD123_170607	Sediment	7/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	0.0102	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	3.15	3.06	
ES1714411	5 AVN	0874_SD019_170608	Sediment	8/06/2017	<0.0005	<0.0005	0.0089	<0.0005	0.013	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.278	0.257	
ES1714411	5 AVN	0874_SD124_170610	Sediment	10/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.075	0.072	
ES1713464	Domestic Area	0874_SD010S_170530	Sediment	30/05/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0566	0.0538	
ES1714865	Domestic Area	0874_SD121_170612	Sediment	12/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.114	0.111	
ES1717838	Ingham Road Sports Field	0874_SD020_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0021	0.0021	
ES1717838	Ingham Road Sports Field	0874_SD021_170718	Sediment	18/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1717838	Mount St John (on-Base wetland area that extends from the The Common onto Base)	0874_SD112_170718	Sediment	18/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0011	0.0011	
ES1714865	NQ0105	0874_SD101_170613	Sediment	13/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0052	0.0052	
ES1714865	NQ0105	0874_SD102_170613	Sediment	13/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0803	0.0774	
ES1714865	NQ0105	0874_SD103_170612	Sediment	12/06/2017	<0.0005	<0.0005	<0.0005	0.0006	<0.0002	<0.0005	<0.0002	0.0017	<0.0005	0.0003	0.0032	0.0799	0.0711	
ES1714865	NQ0105	0874_SD104_170612	Sediment	12/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0486	0.0473	
ES1714280	NQ0106 & OLAs	0874_SD302_170606	Sediment	6/06/2017	<0.0005	0.0008	0.0005	<0.0005	0.0144	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	6.34	6.12	
ES1714411	NW Base Boundary	0874_SD012_170609	Sediment	9/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0804	0.0798	
ES1714411	NW Base Boundary	0874_SD013_170609	Sediment	9/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.069	0.068	
ES1714280	OLAs	0874_SD126_170606	Sediment	6/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0848	0.0826	
ES1714411	W Base Boundary	0874_SD015_170610	Sediment	10/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0105	0.0103	

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids										
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorobutanoic acid (PFBA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorohexanoic acid (PFHxA)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptanoic acid (PFHpA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTriDA)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial							20									50		
NEMP – Human health – Public open space							1									10		
NEMP – Human health – Residential with garden/accessible soil							0.009									0.1		
NEMP – Human health – Residential with minimal opportunities for soil access							2									20		

Lab Report Number	Location	Field ID	Matrix Type	Date	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	0.0052	0.006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1809440	38 Squadron SE corner of Base	0874_SD025_180412	Sediment	12/04/2018	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	0.0052	0.006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1810046	5AVN	0874_SD019_180419	Sediment	19/04/2018	0.0044	0.0053	0.0010	0.0342	0.0024	0.0906	0.125	0.003	0.001	0.0003	<0.0002	0.0113	0.0002	0.0014	<0.0005	0.0025	0.0002
EB1809799	5AVN	0874_SD123_180418	Sediment	18/04/2018	0.0027	0.0028	0.0061	0.0235	0.0018	0.127	0.150	0.0018	0.001	<0.0002	<0.0002	0.007	<0.0002	0.0008	<0.0005	0.0018	<0.0002
EB1810072	5AVN	0874_SD124_180420	Sediment	20/04/2018	0.0014	0.0018	<0.0002	0.018	0.0017	0.0706	0.0886	0.0005	<0.001	<0.0002	<0.0002	0.0034	<0.0002	0.0004	<0.0005	0.0011	<0.0002
EB1809798	Domestic area	0874_SD010S_180417	Sediment	17/04/2018	0.0003	0.0004	<0.0002	0.0022	<0.0002	0.0122	0.0144	0.0004	<0.001	<0.0002	<0.0002	0.0007	<0.0002	0.0003	<0.0005	0.0006	<0.0002
EB1809798	Fuel Farm 2 NQ0099	0874_SD024_180417	Sediment	17/04/2018	1.03	1.14	<0.246	13.4	1.79	80.2	93.6	0.517	<0.246	<0.246	<0.246	3.53	<0.246	0.326	<0.616	0.625	<0.246
EB1809230	Ingham Rd Sports Fields	0874_SD020_180411	Sediment	11/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1809230	Ingham Rd Sports Fields	0874_SD021_180411	Sediment	11/04/2018	<0.0002	0.0002	<0.0002	0.0004	<0.0002	0.0035	0.0039	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1809799	Mount St John	0874_SD112_180419	Sediment	19/04/2018	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	0.0037	0.0041	<0.0002	<0.001	<0.0002	0.0003	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1810072	NQ0055 & NQ0107	0874_SD039_180420	Sediment	20/04/2018	0.121	0.0431	0.0518	2	0.168	10.4	12.4	<0.0246	<0.025	<0.0246	<0.0246	0.16	<0.0246	0.0431	<0.0616	0.129	<0.0246
EB1809230	NQ0105	0874_SD101_180411	Sediment	11/04/2018	<0.0002	<0.0002	<0.0002	0.001	0.0008	0.0106	0.0116	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1809230	NQ0105	0874_SD102_180411	Sediment	11/04/2018	<0.0002	<0.0002	<0.0002	0.0017	<0.0002	0.0192	0.0209	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1809798	NQ0105	0874_SD102_180417	Sediment	17/04/2018	<0.0002	<0.0002	<0.0002	0.0013	<0.0002	0.0113	0.0126	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1809440	NQ0105	0874_SD103_180412	Sediment	12/04/2018	0.0010	0.0006	<0.0002	0.0128	0.0008	0.0667	0.0795	0.0002	<0.001	<0.0002	<0.0002	0.001	<0.0002	<0.0002	<0.0005	0.0004	<0.0002
EB1809440	NQ0105	0874_SD104_180412	Sediment	12/04/2018	0.0004	0.0004	<0.0002	0.0036	<0.0002	0.0255	0.0291	<0.0002	<0.001	<0.0002	<0.0002	0.0006	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809440	NQ0105	0874_SD105_180412	Sediment	12/04/2018	0.0010	0.0014	<0.0002	0.0067	0.0009	0.0987	0.105	0.0003	<0.001	<0.0002	<0.0002	0.0018	<0.0002	<0.0002	<0.0005	0.0009	<0.0002
EB1809798	NQ0106 & OLAs	0874_SD126_180417	Sediment	17/04/2018	0.0019	0.0034	0.0038	0.0341	0.0034	0.35	0.384	0.0016	<0.001	<0.0010	<0.0010	0.0064	<0.0010	<0.0010	<0.0025	0.0028	<0.0010
EB1809798	NQ0106 & OLAs	0874_SD301_180417	Sediment	17/04/2018	0.0603	0.0566	<0.0050	0.533	0.0582	2.11	2.64	0.0283	0.022	<0.0050	<0.0050	0.146	<0.0050	0.0232	<0.0124	0.0721	<0.0050
EB1809798	NQ0106 & OLAs	0874_SD302_180417	Sediment	17/04/2018	0.0400	0.0483	0.0022	0.243	0.0125	0.24	0.483	0.0173	0.013	<0.0005	<0.0005	0.0856	<0.0005	0.0107	<0.0012	0.0217	<0.0005
EB1809798	NW Base boundary	0874_SD012_180417	Sediment	17/04/2018	<0.0002	0.0002	<0.0002	0.0024	<0.0002	0.0123	0.0147	<0.0002	<0.001	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809798	NW Base boundary	0874_SD013_180417	Sediment	17/04/2018	0.0004	0.0003	<0.0002	0.006	0.0008	0.103	0.109	<0.0002	<0.001	<0.0002	<0.0002	0.001	<0.0002	<0.0002	<0.0005	0.0006	<0.0002
EB1809798	Pad Brahman	0874_SD016_180417	Sediment	17/04/2018	<0.0002	<0.0002	0.0003	0.0023	<0.0002	0.0234	0.0257	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1810046	Runoff from NQ0052 & NQ0054	0874_SD001A_180419	Sediment	19/04/2018	0.0021	0.0024	0.0008	0.0145	0.0011	0.0662	0.0807	0.0010	<0.001	0.0007	<0.0002	0.0055	<0.0002	0.0010	<0.0005	0.0033	<0.0002
EB1809799	The Common discharge	0874_SD131_180419	Sediment	19/04/2018	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	0.0054	0.0061	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1809799	W of Runway 13/31 & Emergency Resp Areas	0874_SD015_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0014	0.0017	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
EB1809798	W of Runway 13/31 & Emergency Resp Areas	0874_SD125_180417	Sediment	17/04/2018	0.0064	0.0061	<0.0010	0.124	0.0175	0.818	0.942	0.0022	<0.001	<0.0010	<0.0010	0.0185	<0.0010	0.0017	<0.0025	0.0056	<0.0010

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS			
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Ethyl perfluorooctane sulfonamide (N-EFOSA)	perfluorooctane sulfonamidoacetic acid (MeFOSAA) (N-Ethyl)	perfluorooctane sulfonamidoethanol (MeFOSE) (N-Ethyl)	N-Ethyl perfluorooctane sulfonamide (EFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EFOSAA) (N-Ethyl)	perfluorooctane sulfonamidoethanol (EFOSSE) (N-Ethyl)	Sum of TOP C4 - C14 as Fluorine	Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfo	Sum of PFAS (WA DER List)	Sum of PFAS	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002	
NEMP – Human health – Industrial/commercial																
NEMP – Human health – Public open space																
NEMP – Human health – Residential with garden/accessible soil																
NEMP – Human health – Residential with minimal opportunities for soil access																

Lab Report Number	Location	Field ID	Matrix Type	Date	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0060	0.0060
EB1809440	38 Squadron SE corner of Base	0874_SD025_180412	Sediment	12/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.152	0.162
EB1810046	5AVN	0874_SD019_180419	Sediment	19/04/2018	<0.0005	<0.0005	0.0022	<0.0005	0.0020	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.209	0.318	0.166	0.180
EB1809799	5AVN	0874_SD123_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	0.0040	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0958	0.0989
EB1810072	5AVN	0874_SD124_180420	Sediment	20/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0168	0.0171
EB1809798	Domestic area	0874_SD010S_180417	Sediment	17/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	99.7	102
EB1809798	Fuel Farm 2 NQ0099	0874_SD024_180417	Sediment	17/04/2018	<0.246	<0.246	<0.246	<0.246	<0.246	<0.616	<0.246	<0.616	<0.616	<0.246	<0.616	-	-	0.0006	0.0006
EB1809230	Ingham Rd Sports Fields	0874_SD020_180411	Sediment	11/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0041	0.0041
EB1809230	Ingham Rd Sports Fields	0874_SD021_180411	Sediment	11/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0041	0.0044
EB1809799	Mount St John	0874_SD112_180419	Sediment	19/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	12.8	13.1
EB1810072	NQ0055 & NQ0107	0874_SD039_180420	Sediment	20/04/2018	<0.0246	<0.0246	<0.0246	<0.0246	<0.0246	<0.0616	<0.0246	<0.0616	<0.0616	<0.0246	<0.0616	-	-	0.0116	0.0124
EB1809230	NQ0105	0874_SD101_180411	Sediment	11/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0209	0.0209
EB1809230	NQ0105	0874_SD102_180411	Sediment	11/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0126	0.0126
EB1809798	NQ0105	0874_SD102_180417	Sediment	17/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0817	0.0835
EB1809440	NQ0105	0874_SD103_180412	Sediment	12/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0301	0.0305
EB1809440	NQ0105	0874_SD104_180412	Sediment	12/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.110	0.112
EB1809440	NQ0105	0874_SD105_180412	Sediment	12/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.398	0.407
EB1809798	NQ0106 & OLAs	0874_SD126_180417	Sediment	17/04/2018	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0025	<0.0010	<0.0025	<0.0025	<0.0010	<0.0025	-	-	2.99	3.11
EB1809798	NQ0106 & OLAs	0874_SD301_180417	Sediment	17/04/2018	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0124	<0.0050	<0.0124	<0.0124	<0.0050	<0.0124	-	-	0.680	0.734
EB1809798	NQ0106 & OLAs	0874_SD302_180417	Sediment	17/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	<0.0005	<0.0012	<0.0012	<0.0005	<0.0012	-	-	0.0153	0.0153
EB1809798	NW Base boundary	0874_SD012_180417	Sediment	17/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.111	0.112
EB1809798	NW Base boundary	0874_SD013_180417	Sediment	17/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0257	0.0260
EB1809798	Pad Brahman	0874_SD016_180417	Sediment	17/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0939	0.0986
EB1810046	Runoff from NQ0052 & NQ0054	0874_SD001A_180419	Sediment	19/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0061	0.0061
EB1809799	The Common discharge	0874_SD131_180419	Sediment	19/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.0017	0.0017
EB1809799	W of Runway 13/31 & Emergency Resp Areas	0874_SD015_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	0.976	1.00
EB1809798	W of Runway 13/31 & Emergency Resp Areas	0874_SD125_180417	Sediment	17/04/2018	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0025	<0.0010	<0.0025	<0.0025	<0.0010	<0.0025	-	-		

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids										
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Sum of PFHxS and PFOS	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.05	0.02
ANZECC PFAS FW 95%					0.13							220						
FSANZ 2017 PFAS drinking water							0.07					0.56						
FSANZ 2017 PFAS recreational water							0.7					5.6						

Lab Report Number	on-Base Area	Field ID	Matrix Type	Date																		
ES1718883	NW Base Boundary	0874 MW002 S_170727	Groundwater	27/07/2017	0.38	0.42	2.79	0.11	3.13	<0.02	5.92	<0.1	0.18	0.8	0.1	0.16	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1718883	NW Base Boundary	0874 MW002 S_170728	Groundwater	28/07/2017	0.39	0.5	3.75	0.13	4.04	<0.02	7.79	<0.1	0.21	0.87	0.12	0.21	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701055	NW Base Boundary	0874 MW002 S_170815	Groundwater	15/08/2017	0.26	0.35	2.97	0.18	2.58	<0.02	5.55	<0.1	0.2	1	0.1	0.17	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701079	38 SQN & Domestic Area	0874 MW006 S_170817	Groundwater	17/08/2017	0.02	0.03	0.19	<0.02	0.06	<0.02	0.25	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	
ET1701079	38 SQN & Domestic Area	0874 MW036 S_170817	Groundwater	17/08/2017	0.08	0.08	1.37	0.03	0.45	<0.02	1.82	<0.1	0.13	0.16	0.08	0.12	0.03	0.04	<0.02	<0.02	<0.05	<0.02
ES1716526	38 SQN & Domestic Area	0874 MW049 S_170630	Groundwater	30/06/2017	0.33	0.22	1.69	0.06	1.74	<0.02	3.43	0.1	0.19	0.52	0.23	0.29	0.07	0.15	0.02	0.02	<0.05	<0.02
ET1701079	38 SQN & Domestic Area	0874 MW049 S_170817	Groundwater	17/08/2017	0.29	0.34	2.26	0.08	1.6	<0.02	3.86	<0.1	0.14	0.36	0.09	0.16	<0.02	0.05	<0.02	<0.02	<0.05	<0.02
ET1701071	38 SQN & Domestic Area	0874 MW061 S_170816	Groundwater	16/08/2017	0.58	0.86	6.83	0.58	14.8	<0.02	21.6	0.3	<0.02	2.12	0.25	0.72	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701079	38 SQN & Domestic Area	0874 MW063 S_170817	Groundwater	17/08/2017	1.17	1.98	13.3	0.75	17.1	<0.02	30.4	0.4	0.75	3.44	0.43	1	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701079	38 SQN & Domestic Area	0874 MW224 S_170817	Groundwater	17/08/2017	0.11	0.07	0.43	0.02	0.36	<0.02	0.79	<0.1	0.09	0.06	0.03	0.02	0.03	<0.02	<0.02	<0.02	<0.05	<0.02
ES1716954	38 SQN & Domestic Area	0874 MW232 S_170710	Groundwater	10/07/2017	2.66	3.13	14.6	0.8	10.4	<0.02	25	0.3	0.7	2.77	0.68	0.97	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1718883	38 SQN & Domestic Area	0874 MW232 S_170727	Groundwater	27/07/2017	1.48	1.93	11.6	0.8	12.9	<0.10	24.5	2.4	<0.10	1.72	0.44	0.73	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10
ET1701079	38 SQN & Domestic Area	0874 MW232 S_170817	Groundwater	17/08/2017	2.49	1.73	13	1	9.52	<0.02	22.5	0.1	0.51	1.41	0.23	0.58	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1803162	38 SQN & Domestic Area	0874 MW232 S_180124	Groundwater	24/01/2018	1.12	1.1	7.88	0.48	8.72	<0.02	16.6	0.4	0.41	1.82	0.3	0.59	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1716526	5 AVN	0874 MW009 S_170630	Groundwater	30/06/2017	1.52	1.4	9.94	0.73	18.8	<0.02	28.7	0.2	0.3	2.54	0.24	0.8	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1718883	5 AVN	0874 MW009 S_170727	Groundwater	27/07/2017	0.82	1.25	7.77	0.23	12.7	<0.02	20.5	0.1	0.37	1.52	0.2	0.62	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701079	5 AVN	0874 MW009 S_170817	Groundwater	17/08/2017	0.94	1.26	9.31	0.64	11.3	<0.02	20.6	0.2	0.41	2.1	0.26	0.97	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701079	5 AVN	0874 MW038 S_170817	Groundwater	17/08/2017	0.51	0.74	4.37	0.12	1.96	<0.02	6.33	<0.1	0.2	0.67	0.13	0.23	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701079	5 AVN	0874 MW043 S_170817	Groundwater	17/08/2017	6.4	13.9	210	6.51	62.6	<0.05	273	1.1	5.35	36.1	3.69	13.6	0.16	<0.05	<0.05	<0.05	<0.12	<0.05
ES1716526	5 AVN	0874 MW114 S_170629	Groundwater	29/06/2017	5.5	3.81	16.3	0.57	10.5	<0.05	26.8	1.2	0.67	6.91	0.54	0.64	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ET1701079	5 AVN	0874 MW114 S_170817	Groundwater	17/08/2017	3.65	3.5	16.2	0.65	8.44	<0.02	24.6	0.4	1.23	6.61	0.5	0.87	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1716526	5 AVN	0874 MW125 D_170630	Groundwater	30/06/2017	1.85	1.78	37.6	1.79	24.6	<0.02	62.2	0.5	0.59	4.34	0.28	0.71	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1718883	5 AVN	0874 MW125 S_170729	Groundwater	29/07/2017	<0.05	<0.05	0.16	<0.05	0.46	<0.05	0.62	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ET1701079	5 AVN	0874 MW125 S_170817	Groundwater	17/08/2017	2.26	2.86	35.9	2.8	30.3	<0.05	66.2	<0.2	1.16	7.29	0.62	1.41	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ET1701079	5 AVN	0874 MW142 S_170817	Groundwater	17/08/2017	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ET1701079	5 AVN	0874 MW247 S_170817	Groundwater	17/08/2017	3.76	3	22.6	3.11	79.3	<0.02	102	0.6	0.96	3.99	0.37	1.71	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701079	5 AVN	0874 MW248 S_170817	Groundwater	17/08/2017	98.6	73.3	475	74.6	693	<0.10	1,170	<0.5	18.9	97.9	9.52	36.6	0.17	<0.10	<0.10	<0.10	<0.25	<0.10
ES1803162	5 AVN	0874 MW248 S_180124	Groundwater	24/01/2018	7	7.8	73.7	6.5	107	<1	181	<5	<1	17.7	1.8	6.5	<1	<1	<1	<1	<2.5	<1
ET1701079	5 AVN	0874 MW249 S_170817	Groundwater	17/08/2017	6.29	3.69	37	2.33	118	<0.10	155	<0.5	2.8	15.2	1.28	3.88	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10
ES1716526	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW013 S_170630	Groundwater	30/06/2017	25.2	19	128	10.2	649	0.13	777	8.2	9.83	63	6.59	30.7	0.17	0.04	<0.02	<0.02	<0.05	<0.02
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW013 S_170727	Groundwater	27/07/2017	8.01	11	39.5	3.51	92.1	<0.10	132	2.8	3.49	15.8	4.3	6.06	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW013 S_170817	Groundwater	17/08/2017	9.65	11.4	45.1	11.1	127	<0.02	172	3.2	8.68	29.2	7.09	8.57	0.07	<0.02	<0.02	<0.02	<0.05	<0.02
ES1716526	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW026 S_170630	Groundwater	30/06/2017	1.43	1.44	10.4	0.93	46.4	<0.02	56.8	0.6	0.51	3.22	0.4	1.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW026 S_170727	Groundwater	27/07/2017	0.89	1.3	8.92	0.7	31	<0.02	39.9	0.3	0.52	2.18	0.47	0.92	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW026 S_170817	Groundwater	17/08/2017	0.91	1.42	10.7	0.89	24.9	<0.02	35.6	0.2	0.65	2.94	0.43	1.24	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701082	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW033 S_170818	Groundwater	18/08/2017	1.36	0.96	10.6	0.9	28	0.29	38.6	<0.1	1.13	2	0.65	1.42	0.04	0.02	<0.02	<0.02	<0.05	<0.02
ET1701082	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW034 S_170818	Groundwater	18/08/2017	10.7	5.28	15.4	0.72	1.56	<0.02	17	<0.1	0.9	2.76	0.25	0.36	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701082	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW051 S_170818	Groundwater	18/08/2017	0.23	0.1	0.89	0.08	0.9	<0.02	1.79	<0.1	<0.02	0.05	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1716526	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW116 S_170630	Groundwater	30/06/2017	27.4	20	74.4	2.63	83.4	0.08	158	5.6	4.62	32.9	3.33	6.54	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW116 S_170727	Groundwater	27/07/2017	38.9	40.8	111	5.21	103	<0.10	214	8.2	13	56.3	14.7	17.1	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10
ET1701055	NQ0054 & Fuel Farm 1 (NQ0052)	0874 MW116 S_170815	Groundwater	15/08/2017	54.4	48.2	169	10.5	147	0.07	316	16.5	21.7	112	20.9	28.0	0.1	<0.02	<0.02	<0.02	<0.05	<0.02
ES1718883																						

						Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids											
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Sum of PFHxS and PFOS	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	
EQL						0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.05	0.02	
ANZECC PFAS FW 95%										0.13						220								
FSANZ 2017 PFAS drinking water												0.07				0.56								
FSANZ 2017 PFAS recreational water												0.7				5.6								
ES1716526	Former Runway 13/31	0874_MW056_S_170630	Groundwater	30/06/2017		1.2	0.82	2.24	<0.05	0.09	<0.05	2.33	<0.2	<0.05	0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ES1718883	Former Runway 13/31	0874_MW056_S_170728	Groundwater	28/07/2017		0.76	0.86	1.93	<0.05	0.12	<0.05	2.05	<0.2	<0.05	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701079	Former Runway 13/31	0874_MW056_S_170817	Groundwater	17/08/2017		0.76	0.75	2.05	<0.05	0.08	<0.05	2.13	<0.2	0.07	0.28	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701071	Former Runway 13/31	0874_MW057_S_170816	Groundwater	16/08/2017		1.72	1.77	8.06	0.43	3.8	<0.05	11.9	<0.2	<0.05	3.99	0.2	0.18	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701071	Former Runway 13/31	0874_MW112_S_170816	Groundwater	16/08/2017		0.92	0.82	3.64	<0.05	0.58	<0.05	4.22	<0.2	<0.05	3.06	0.18	0.08	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701079	Former Runway 13/31	0874_MW102_S_170817	Groundwater	17/08/2017		0.3	0.36	2.23	<0.05	0.08	<0.05	2.31	<0.2	0.1	0.63	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701079	Former Runway 13/31	0874_MW104_S_170817	Groundwater	17/08/2017		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701079	Former Runway 13/31	0874_MW245_S_170817	Groundwater	17/08/2017		7	4.39	20	1.48	4.7	<0.02	24.7	0.3	1.09	3.73	0.33	0.55	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	
ES1803162	Former Runway 13/31	0874_MW245_S_180124	Groundwater	24/01/2018		26.6	44.6	357	20.5	59.1	<0.1	416	9.5	13.6	100	20.5	32.6	0.18	<0.1	<0.1	<0.1	<0.25	<0.1	
ET1701071	Former Runway 13/31	0874_MW246_S_170816	Groundwater	16/08/2017		0.76	0.99	8.69	1.12	23.7	<0.05	32.4	<0.2	<0.05	3.13	0.3	0.64	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701071	Fuel Farm 2 NQ0099	0874_MW081_S_170816	Groundwater	16/08/2017		256	324	4,050	131	2,310	<0.02	6,360	12.2	33.2	822	81.1	130	0.17	<0.02	<0.02	<0.02	<0.05	<0.02	
ES1803162	Fuel Farm 2 NQ0099	0874_MW081_S_180124	Groundwater	24/01/2018		457	826	8520	515	3280	<1	11,800	26.3	152	1390	205	348	<1	<1	<1	<1	<2.5	<1	
ET1701071	Fuel Farm 2 NQ0099	0874_MW090_S_170816	Groundwater	16/08/2017		0.09	0.12	1.76	0.13	5.3	<0.02	7.06	1.2	<0.02	0.45	0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	
ET1701071	Fuel Farm 2 NQ0099	0874_MW005_S_170816	Groundwater	16/08/2017		22.3	31.6	388	26.4	234	<0.05	622	6.1	5.53	92.1	9.5	14.6	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701071	Fuel Farm 2 NQ0099	0874_MW046_S_170816	Groundwater	16/08/2017		3.98	7.77	156	7.54	190	<0.02	346	1	<0.02	52.6	1.57	4.32	0.02	<0.02	<0.02	<0.02	<0.05	<0.02	
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW015_S_170816	Groundwater	16/08/2017		14.2	23.2	332	13.1	198	<0.02	530	3.6	2.79	96.2	5.51	9.04	0.03	<0.02	<0.02	<0.02	<0.05	<0.02	
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW016_S_170816	Groundwater	16/08/2017		44.5	71.4	544	49.4	384	<0.05	928	13.4	9.66	135	15.8	33.5	0.16	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW021_S_170816	Groundwater	16/08/2017		11.8	16.3	229	18.9	479	0.03	708	4.2	2.42	75.1	4.4	9.45	0.07	<0.02	<0.02	<0.02	<0.05	<0.02	
ES1716526	NQ0055 & Former Fire Training Area NQ0107	0874_MW054_S_170630	Groundwater	30/06/2017		5.66	4.75	27.7	1.38	50	<0.02	77.7	1.6	1.42	7.87	0.51	1.19	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	
ES1718883	NQ0055 & Former Fire Training Area NQ0107	0874_MW054_S_170728	Groundwater	28/07/2017		2.59	3.62	16.5	0.4	29.4	<0.02	45.9	0.4	1.11	3.96	0.37	0.76	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW054_S_170815	Groundwater	15/08/2017		3.93	2.89	16.8	1.18	33.7	<0.02	50.5	1.2	1.43	6.37	0.72	1.29	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW055_S_170815	Groundwater	15/08/2017		14.1	15	96.2	7.31	194	<0.02	290	4	6.56	37.6	4.65	12.3	0.39	<0.02	<0.02	<0.02	<0.05	<0.02	
ES1716526	NQ0055 & Former Fire Training Area NQ0107	0874_MW109_S_170629	Groundwater	29/06/2017		153	122	911	73	1,360	<0.02	2,270	42.5	65.4	252	9.77	68.0	0.09	<0.02	<0.02	<0.02	<0.05	<0.02	
ES1718883	NQ0055 & Former Fire Training Area NQ0107	0874_MW109_S_170728	Groundwater	28/07/2017		1.9	2.78	15.4	0.46	22.9	<0.05	38.3	0.4	0.96	3.9	0.46	0.92	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW109_S_170815	Groundwater	15/08/2017		72.1	68.3	501	45.6	765	<0.05	1,270	27.4	35.1	201	22.4	38.8	0.32	<0.05	<0.05	<0.05	<0.12	<0.05	
ES1803162	NQ0055 Fire Station	0874_MW109_S_180124	Groundwater	24/01/2018		73.2	67.2	583	54.8	1200	<1	1780	48.2	37.4	215	22	50	<1	<1	<1	<1	<2.5	<1	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW110_S_170815	Groundwater	15/08/2017		66.7	76.2	606	43.1	616	0.12	1,220	27.8	37.4	212	21.1	36.6	0.46	0.05	<0.05	<0.05	<0.12	<0.05	
ES1716526	NQ0055 & Former Fire Training Area NQ0107	0874_MW138_S_170629	Groundwater	29/06/2017		18.6	17	146	7.4	309	0.16	455	8.4	6	26.2	1.61	4.82	0.08	0.06	<0.02	<0.02	<0.05	<0.02	
ES1718883	NQ0055 & Former Fire Training Area NQ0107	0874_MW138_S_170729	Groundwater	29/07/2017		33.8	49.6	413	7.54															

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOA)	N-Methyl perfluorooctane sulfonamide (MeFOA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFAS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01
ANZECC PFAS FW 95%													
FSANZ 2017 PFAS drinking water													
FSANZ 2017 PFAS recreational water													

Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.54	8.07
ES1718883	NW Base Boundary	0874_MW002_S_170727	Groundwater	27/07/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	9.59	10.2
ES1718883	NW Base Boundary	0874_MW002_S_170728	Groundwater	28/07/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.28	7.81
ET1701055	NW Base Boundary	0874_MW002_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.27	0.3
ET1701079	38 SQN & Domestic Area	0874_MW006_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2.39	2.57
ET1701079	38 SQN & Domestic Area	0874_MW036_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	5.09	5.63
ES1716526	38 SQN & Domestic Area	0874_MW049_S_170630	Groundwater	30/06/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	4.9	5.37
ET1701079	38 SQN & Domestic Area	0874_MW049_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	25.6	27
ET1701071	38 SQN & Domestic Area	0874_MW061_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	37.9	40.6
ET1701079	38 SQN & Domestic Area	0874_MW063_S_170817	Groundwater	17/08/2017	<0.05	0.27	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.21	1.33
ET1701079	38 SQN & Domestic Area	0874_MW224_S_170817	Groundwater	17/08/2017	<0.05	0.11	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	33.2	37.1
ES1716954	38 SQN & Domestic Area	0874_MW232_S_170710	Groundwater	10/07/2017	<0.05	0.11	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	31.3	34
ES1718883	38 SQN & Domestic Area	0874_MW232_S_170727	Groundwater	27/07/2017	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	28	30.7
ET1701079	38 SQN & Domestic Area	0874_MW232_S_170817	Groundwater	17/08/2017	<0.05	0.11	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	21.2	22.8
ES1803162	38 SQN & Domestic Area	0874_MW232_S_180124	Groundwater	24/01/2018	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	34.3	36.9
ES1716526	5 AVN	0874_MW009_S_170630	Groundwater	30/06/2017	<0.05	<0.05	<0.05	<0.05	0.44	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	24.1	25.7
ES1718883	5 AVN	0874_MW009_S_170727	Groundwater	27/07/2017	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	25.5	27.7
ET1701079	5 AVN	0874_MW009_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	0.32	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	8.07	8.93
ET1701079	5 AVN	0874_MW038_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	339	359
ET1701079	5 AVN	0874_MW043_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	42.3	46.6
ES1716526	5 AVN	0874_MW114_S_170629	Groundwater	29/06/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	37.9	42
ET1701079	5 AVN	0874_MW114_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	70.5	74
ES1716526	5 AVN	0874_MW125_D_170630	Groundwater	30/06/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.62	0.62
ES1718883	5 AVN	0874_MW125_S_170729	Groundwater	29/07/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	78.9	84.6
ET1701079	5 AVN	0874_MW125_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.08	0.08
ET1701079	5 AVN	0874_MW142_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	113	120
ET1701079	5 AVN	0874_MW247_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	0.94	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1,430	1,580
ET1701079	5 AVN	0874_MW248_S_170817	Groundwater	17/08/2017	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	214	228
ES1803162	5 AVN	0874_MW248_S_180124	Groundwater	24/01/2018	<1	<1	<1	<1	<1	<2.5	<1	<2.5	<2.5	<1	<2.5	184	199
ET1701079	5 AVN	0874_MW249_S_170817	Groundwater	17/08/2017	<0.10	<0.10	<0.10	<0.10	8.58	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	921	951
ES1716526	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW013_S_170630	Groundwater	30/06/2017	<0.05	0.72	0.07	<0.05	0.3	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	174	189
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW013_S_170727	Groundwater	27/07/2017	<0.10	2.07	<0.10	<0.10	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	244	266
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW013_S_170817	Groundwater	17/08/2017	<0.05	5.39	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	64.2	66.7
ES1716526	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW026_S_170630	Groundwater	30/06/2017	<0.05	0.14	<0.05	<0.05	0.18	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	45.4	47.5
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW026_S_170727	Groundwater	27/07/2017	<0.05	0.16	<0.05	<0.05	0.1	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	42.2	44.6
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW026_S_170817	Groundwater	17/08/2017	<0.05	0.23	<0.05	<0.05	0.08	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	45.4	48.6
ET1701082	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW033_S_170818	Groundwater	18/08/2017	<0.05	0.12	0.15	<0.05	0.98	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	31.9	37.9
ET1701082	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW034_S_170818	Groundwater	18/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2.09	2.27
ET1701082	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW051_S_170818	Groundwater	18/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	238	261
ES1716526	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW116_S_170630	Groundwater	30/06/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	362	408
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW116_S_170727	Groundwater	27/07/2017	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	570	628
ET1701055	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW116_S_170815	Groundwater	15/08/2017	<0.05	0.09	<0.05	<0.05	0.03	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	8.62	8.98
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW118_S_170727	Groundwater	27/07/2017	<0.05	0.25	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	9.25	9.53
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW118_S_170728	Groundwater	28/07/2017	<0.05	0.24	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	5.8	6.08
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW118_S_170817	Groundwater	17/08/2017	<0.05	0.28	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	57.2	63.1
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW120_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	572	598
ET1701055	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW126_S_170815	Groundwater	15/08/2017	<0.05	1.21	0.16	<0.05	0.31	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	55.5	57.9
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW129_S_170817	Groundwater	17/08/2017	<0.05	1.31	0.19	<0.05	0.21	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	443	458
ES1803162	NQ0054	0874_MW126_S_180124	Groundwater	24/01/2018	<0.1	0.46	<0.1	<0.1	0.17	<0.25	<0.1	<0.25	<0.25	<0.1	<0.25		

					(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
					4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOA)	N-Methyl perfluorooctane sulfonamide (MeFOA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFAS	
EQL					0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	
ANZECC PFAS FW 95%																		
FSANZ 2017 PFAS drinking water																		
FSANZ 2017 PFAS recreational water																		
ES1716526	Former Runway 13/31	0874_MW056_S_170630	Groundwater	30/06/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	3.78	4.6	
ES1718883	Former Runway 13/31	0874_MW056_S_170728	Groundwater	28/07/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	3.03	3.89	
ET1701079	Former Runway 13/31	0874_MW056_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	3.24	3.99	
ET1701071	Former Runway 13/31	0874_MW057_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	18	20.2	
ET1701071	Former Runway 13/31	0874_MW112_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	8.46	9.28	
ET1701079	Former Runway 13/31	0874_MW102_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	3.34	3.7	
ET1701079	Former Runway 13/31	0874_MW104_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05	
ET1701079	Former Runway 13/31	0874_MW245_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	37.7	43.6	
ES1803162	Former Runway 13/31	0874_MW245_S_180124	Groundwater	24/01/2018	<0.1	2.02	<0.1	<0.1	<0.1	<0.25	<0.1	<0.25	<0.25	-	<0.25	621	686	
ET1701071	Former Runway 13/31	0874_MW246_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	37.2	39.3	
ET1701071	Fuel Farm 2 NQ0099	0874_MW081_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	0.04	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7,690	8,150	
ES1803162	Fuel Farm 2 NQ0099	0874_MW081_S_180124	Groundwater	24/01/2018	<1	<1	<1	<1	<1	<2.5	<1	<2.5	<2.5	<1	<2.5	14,400	15700	
ET1701071	Fuel Farm 2 NQ0099	0874_MW090_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	8.87	9.12	
ET1701071	Fuel Farm 2 NQ0099	0874_MW005_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	772	830	
ET1701071	Fuel Farm 2 NQ0099	0874_MW046_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	409	425	
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW015_S_170816	Groundwater	16/08/2017	<0.05	0.19	<0.05	<0.05	0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	662	698	
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW016_S_170816	Groundwater	16/08/2017	<0.05	1.78	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	1,180	1,300	
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW021_S_170816	Groundwater	16/08/2017	<0.05	0.59	0.13	<0.05	0.21	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	816	852	
ES1716526	NQ0055 & Former Fire Training Area NQ0107	0874_MW054_S_170630	Groundwater	30/06/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	96	102	
ES1718883	NQ0055 & Former Fire Training Area NQ0107	0874_MW054_S_170728	Groundwater	28/07/2017	<0.05	<0.05	<0.05	<0.05	0.04	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	55.1	59.2	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW054_S_170815	Groundwater	15/08/2017	<0.05	0.05	<0.05	<0.05	0.07	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	65.5	69.7	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW055_S_170815	Groundwater	15/08/2017	<0.05	0.09	<0.05	<0.05	3.37	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	370	396	
ES1716526	NQ0055 & Former Fire Training Area NQ0107	0874_MW109_S_170629	Groundwater	29/06/2017	<0.05	3.98	<0.05	<0.05	0.66	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2,860	3,060	
ES1718883	NQ0055 & Former Fire Training Area NQ0107	0874_MW109_S_170728	Groundwater	28/07/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	46.8	50.1	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW109_S_170815	Groundwater	15/08/2017	0.07	13.8	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	1,680	1,790	
ES1803162	NQ0055 Fire Station	0874_MW109_S_180124	Groundwater	24/01/2018	<1	33	<1	<1	<1	<2.5	<1	<2.5	<2.5	<1	<2.5	2,260	2380	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW110_S_170815	Groundwater	15/08/2017	<0.05	2.64	<0.05	<0.05	0.36	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	1,630	1,750	
ES1716526	NQ0055 & Former Fire Training Area NQ0107	0874_MW138_S_170629	Groundwater	29/06/2017	<0.05	0.28	0.18	<0.05	0.56	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	521	546	
ES1718883	NQ0055 & Former Fire Training Area NQ0107	0874_MW138_S_170729	Groundwater	29/07/2017	<0.05	0.72	<0.05	<0.05	0.12	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	1,010	1,060	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW138_S_170815	Groundwater	15/08/2017	<0.05	3.49	0.05	<0.05	0.14	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	351	370	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW139_S_170815	Groundwater	15/08/2017	0.24	21.8	0.46	<0.05	0.62	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	1,140	1,220	
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW250_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	41.9	45.6	
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW251_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	1.18	1.18	
ET1701055	Pad Brahman	0874_MW121_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	3.35	4.03	
ES1718883	Pad Brahman	0874_MW135_S_170727	Groundwater	27/07/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.16	0.21	
ET1701055	Pad Brahman	0874_MW135_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	14.4	15.6	
ET1701055	Pad Brahman	0874_MW244_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	62.1	70.6	
ES1803162	Pad Brahman	0874_MW244_S_180124	Groundwater	24/01/2018	<0.1													



Table 5 - on-Base Surface Water Dry Season Analytical Results - PFAS

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids										
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Sum of PFHxS and PFOS	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTriDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.05	0.02
ANZECC PFAS FW 95%					0.13							220						
FSANZ 2017 PFAS drinking water							0.07					0.56						
FSANZ 2017 PFAS recreational water							0.7					5.6						

Lab Report Number	Base Area	Field ID	Matrix Type	Date																		
ET1701038	Runoff from NQ0052 & NQ0054	0874_SW001A_S_170814	Water	8/14/2017	2.99	3.68	19.1	1.24	48.1	<0.02	67.2	0.9	1.32	6.17	1.03	1.78	0.13	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701038	Domestic Area	0874_SW010S_S_170814	Water	8/14/2017	0.05	0.03	0.14	<0.02	0.15	<0.02	0.29	<0.1	0.09	0.11	0.04	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701079	NW Base Boundary	0874_SW013_170817	Water	8/17/2017	2.91	1.98	13.9	0.31	0.9	<0.02	14.8	0.2	0.82	2.85	0.24	0.4	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Garbutt Community	0874_SW014_170717	Water	7/17/2017	<0.02	<0.02	0.05	<0.02	0.07	<0.02	0.12	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Garbutt Community	0874_SW017_170717	Water	7/17/2017	<0.02	<0.02	0.11	<0.02	0.13	<0.02	0.24	<0.1	<0.02	0.03	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701038	Pad Brahman	0874_SW016_170814	Water	8/14/2017	0.05	0.04	0.22	<0.02	0.28	<0.02	0.5	<0.1	0.1	0.12	0.03	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701038	5 AVN	0874_SW019_170814	Water	8/14/2017	3.86	4.26	26.8	1.03	31.8	<0.02	58.6	2.3	3.3	11	1.53	3	0.51	0.1	<0.02	<0.02	<0.05	<0.02
ET1701038	5 AVN	0874_SW123_170814	Water	8/14/2017	1.45	1.71	11	0.44	14.3	<0.02	25.3	0.5	0.84	2.83	0.39	0.64	0.03	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	SW of Ingham Road Sports Field	0874_SW021_170718	Water	7/18/2017	0.04	0.02	0.19	<0.02	0.11	<0.02	0.3	<0.1	0.07	0.07	0.04	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701055	NQ0055	0874_SW039_170815	Water	8/15/2017	0.7	0.86	5.38	0.94	24.3	0.26	29.7	0.4	0.85	2.86	0.4	0.57	0.14	0.14	0.04	<0.02	<0.05	<0.02
ET1701082	NQ0105	0874_SW102_170818	Water	8/18/2017	0.14	0.06	0.54	<0.02	0.38	<0.02	0.92	<0.1	0.02	0.06	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701071	NQ0105	0874_SW103_170816	Water	8/16/2017	0.07	0.11	0.89	<0.02	0.11	<0.02	1	<0.1	0.04	0.25	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717807	E of NQ0105	0874_SW209_170717	Water	7/17/2017	<0.05	<0.05	0.16	<0.05	0.52	<0.05	0.68	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717838	Mount St John (on-Base wetland area)	0874_SW112_170718	Water	7/18/2017	<0.02	<0.02	0.04	<0.02	0.06	<0.02	0.1	<0.1	0.05	0.03	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701038	S of Runway 13/31	0874_SW125_170814	Water	8/14/2017	0.36	0.52	3.14	0.11	2.07	<0.02	5.21	<0.1	0.2	1.08	0.12	0.18	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701038	NQ0106 & OLAs	0874_SW126_170814	Water	8/14/2017	0.39	0.43	2.19	0.11	4.65	<0.02	6.84	0.1	0.22	0.95	0.11	0.19	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFAS	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	
ANZECC PFAS FW 95%														
FSANZ 2017 PFAS drinking water														
FSANZ 2017 PFAS recreational water														

Lab Report Number	Base Area	Field ID	Matrix Type	Date													
ET1701038	Runoff from NQ0052 & NQ0054	0874_SW001A_S_170814	Water	8/14/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	81.4	86.4
ET1701038	Domestic Area	0874_SW010S_S_170814	Water	8/14/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.62	0.65
ET1701079	NW Base Boundary	0874_SW013_170817	Water	8/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	22.2	24.5
ES1717838	Garbutt Community	0874_SW014_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.12	0.12
ES1717838	Garbutt Community	0874_SW017_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.29	0.29
ET1701038	Pad Brahman	0874_SW016_170814	Water	8/14/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.84	0.88
ET1701038	5 AVN	0874_SW019_170814	Water	8/14/2017	<0.05	1.09	1.19	<0.05	0.08	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	85.9	91.8
ET1701038	5 AVN	0874_SW123_170814	Water	8/14/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	32	34.1
ES1717838	SW of Ingham Road Sports Field	0874_SW021_170718	Water	7/18/2017	<0.05	0.12	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.66	0.68
ET1701055	NQ0055	0874_SW039_170815	Water	8/15/2017	<0.05	0.1	1.15	<0.05	0.1	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	36.7	39.2
ET1701082	NQ0105	0874_SW102_170818	Water	8/18/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.14	1.2
ET1701071	NQ0105	0874_SW103_170816	Water	8/16/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.36	1.47
ES1717807	E of NQ0105	0874_SW209_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.68	0.68
ES1717838	Mount St John (on-Base wetland area)	0874_SW112_170718	Water	7/18/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.22	0.22
ET1701038	S of Runway 13/31	0874_SW125_170814	Water	8/14/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.15	7.78
ET1701038	NQ0106 & OLAs	0874_SW126_170814	Water	8/14/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	8.8	9.34

	Perfluoroalkane Sulfonic Acids						
	Perfluoropentane sulfonic acid (PFPeS) µg/L	Perfluorobutane sulfonic acid (PFBS) µg/L	Perfluorodecanesulfonic acid (PFDS) µg/L	Perfluorohexane sulfonic acid (PFHxS) µg/L	Perfluoroheptane sulfonic acid (PFHpS) µg/L	Perfluorooctane sulfonic acid (PFOS) µg/L	Sum of PFHxS and PFOS µg/L
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0003
ANZECC PFAS FW 95%						0.13	
DoH and FSANZ drinking water quality value							0.07
DoH and FSANZ recreational water quality value							0.7

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date							
ET1801011	38 SQN & Domestic area	0874_MW006_S_180412	Water	Groundwater	4/12/2018	<0.05	<0.05	<0.05	0.19	<0.05	0.2	0.39
ET1801086	38 SQN & Domestic area	0874_MW036_S_180418	Water	Groundwater	4/18/2018	0.24	0.18	<0.02	4.09	0.08	1.44	5.53
ET1801011	38 SQN & Domestic area	0874_MW049_S_180412	Water	Groundwater	4/12/2018	0.03	0.06	<0.02	0.21	<0.02	1.46	1.67
ET1801086	38 SQN & Domestic area	0874_MW049_S_180418	Water	Groundwater	4/18/2018	0.08	0.12	<0.02	0.74	0.03	1.56	2.3
ET1801059	38 SQN & Domestic area	0874_MW061_S_180417	Water	Groundwater	4/17/2018	0.97	0.67	<0.02	8.75	0.64	20.6	29.4
ET1801059	38 SQN & Domestic area	0874_MW061_S_180417_F	Water	Groundwater	4/17/2018	0.32	0.36	<0.02	0.71	<0.02	<0.01	0.71
ET1801059	38 SQN & Domestic area	0874_MW063_S_180417	Water	Groundwater	4/17/2018	2.4	1.74	<0.02	15.3	1.22	28.3	43.6
ET1801059	38 SQN & Domestic area	0874_MW063_S_180417_F	Water	Groundwater	4/17/2018	0.49	0.74	<0.02	0.42	<0.02	<0.01	0.42
ET1801086	38 SQN & Domestic area	0874_MW224_S_180418	Water	Groundwater	4/18/2018	0.06	0.18	<0.05	0.83	<0.05	1.2	2.03
ET1801059	38 SQN & Domestic area	0874_MW232_S_180417	Water	Groundwater	4/17/2018	0.5	0.57	<0.02	4.3	0.41	9.46	13.8
ET1801059	38 SQN & Domestic area	0874_MW232_S_180417_F	Water	Groundwater	4/17/2018	<0.02	0.18	<0.02	<0.02	<0.02	<0.01	<0.01
ET1801086	5AVN	0874_MW009_S_180418	Water	Groundwater	4/18/2018	0.63	0.7	<0.05	5.43	0.37	10	15.4
ET1801095	5AVN	0874_MW038_S_180419	Water	Groundwater	4/19/2018	56.2	54	5.58	520	21.5	534	1,050
ET1801095	5AVN	0874_MW043_S_180419	Water	Groundwater	4/19/2018	8.7	4.74	<0.05	184	8.08	132	316
ET1801095	5AVN	0874_MW114_S_180419	Water	Groundwater	4/19/2018	2.74	2.35	<0.02	25.6	1.95	45.9	71.5
ET1801086	5AVN	0874_MW125_D_180418	Water	Groundwater	4/18/2018	39.6	32	<0.02	569	22.8	731	1,300
ET1801086	5AVN	0874_MW125_D_180418_F	Water	Groundwater	4/18/2018	3.76	15.3	<0.05	0.65	<0.05	<0.05	0.65
ET1801095	5AVN	0874_MW142_S_180419	Water	Groundwater	4/19/2018	0.0399	0.0362	<0.0005	0.296	0.0088	0.181	0.477
ET1801086	5AVN	0874_MW247_S_180419	Water	Groundwater	4/19/2018	2.27	1.6	<0.02	21.8	1.88	107	129
ET1801086	5AVN	0874_MW247_S_180419_F	Water	Groundwater	4/19/2018	<0.02	0.15	<0.02	<0.02	<0.02	0.01	0.01
ET1801086	5AVN	0874_MW248_S_180419	Water	Groundwater	4/19/2018	73	70	<0.05	727	83	1,510	2,240
ET1801086	5AVN	0874_MW248_S_180419_F	Water	Groundwater	4/19/2018	11.5	34.5	<0.05	3.64	<0.05	0.06	3.7
ET1801086	5AVN	0874_MW249_S_180419	Water	Groundwater	4/19/2018	0.36	0.37	<0.02	2.47	0.11	1.93	4.4
ET1801086	5AVN	0874_MW249_S_180419_F	Water	Groundwater	4/19/2018	<0.02	0.14	<0.02	<0.02	<0.02	<0.01	<0.01
ET1801011	Eastern Base boundary	0874_MW140_D_180412	Water	Groundwater	4/12/2018	0.0146	0.0236	<0.0005	0.135	0.0011	0.0039	0.139
ET1801043	Fuel Farm 2 NQ0099	0874_MW005_S_180416	Water	Groundwater	4/16/2018	20.1	16.4	<0.10	270	14.9	135	405
ET1801043	Fuel Farm 2 NQ0099	0874_MW005_S_180416_F	Water	Groundwater	4/16/2018	2.9	5.06	<0.10	29.5	0.41	0.45	30
ET1801043	Fuel Farm 2 NQ0099	0874_MW046_S_180416	Water	Groundwater	4/16/2018	6.96	5.04	<0.10	88.7	6.64	149	238
ET1801043	Fuel Farm 2 NQ0099	0874_MW081_S_180416	Water	Groundwater	4/16/2018	359	141	0.33	3,320	190	1,800	5,120
ET1801043	Fuel Farm 2 NQ0099	0874_MW081_S_180416_F	Water	Groundwater	4/16/2018	94.4	124	<0.10	243	<0.10	0.28	243
ET1801043	Fuel Farm 2 NQ0099	0874_MW090_S_180416	Water	Groundwater	4/16/2018	0.12	0.08	<0.02	1.61	0.09	2.42	4.03
ET1801024	Ingham Rd Sports Fields	0874_MW226_S_180413	Water	Groundwater	4/13/2018	0.0053	0.0576	<0.0005	0.071	<0.0005	0.0201	0.0911
ET1801024	Ingham Rd Sports Fields	0874_MW227_S_180413	Water	Groundwater	4/13/2018	0.0185	0.0622	<0.0005	0.16	0.0008	0.0239	0.184
ET1801024	Ingham Rd Sports Fields	0874_MW228_S_180413	Water	Groundwater	4/13/2018	0.0099	0.0418	<0.0005	0.0937	<0.0005	0.0217	0.115
ET1801086	Ingham Rd Sports Fields	0874_MW229_S_180418	Water	Groundwater	4/18/2018	0.0145	0.065	<0.0005	0.0908	0.0032	0.124	0.215
ET1801095	Mount St John	0874_MW230_S_180419	Water	Groundwater	4/19/2018	0.1	0.14	<0.02	0.8	<0.02	0.54	1.34
ET1801095	Mount St John	0874_MW234_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.10	<0.10	0.15	<0.10	<0.10	0.15
ET1801095	Mount St John	0874_MW235_S_180419	Water	Groundwater	4/19/2018	0.0185	0.0449	<0.0005	0.13	0.0104	0.121	0.251
ET1801095	Mount St John	0874_MW255_S_180419	Water	Groundwater	4/19/2018	<0.02	0.02	<0.02	0.06	<0.02	0.14	0.2
ET1801059	NQ0052	0874_MW026_S_180417	Water	Groundwater	4/17/2018	0.34	0.28	<0.02	3.06	0.29	12.5	15.6
ET1801059	NQ0052	0874_MW026_S_180417_F	Water	Groundwater	4/17/2018	<0.02	0.22	<0.02	<0.02	<0.02	<0.01	<0.01
ET1801086	NQ0052	0874_MW051_S_180418	Water	Groundwater	4/18/2018	0.06	0.08	<0.02	0.6	0.04	0.79	1.39
ET1801059	NQ0054	0874_MW013_S_180417	Water	Groundwater	4/17/2018	20	17.9	<0.02	71.7	12.1	268	340
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW033_S_180417	Water	Groundwater	4/17/2018	0.92	0.79	0.54	7.99	0.77	30.7	38.7
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW034_S_180417	Water	Groundwater	4/17/2018	4.74	5.8	<0.02	14.5	0.57	2.73	17.2
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW116_S_180417	Water	Groundwater	4/17/2018	9.27	12.1	0.12	34.6	2.62	48.6	83.2

	Perfluoroalkane Sulfonic Acids						
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0003
ANZECC PFAS FW 95%						0.13	
DoH and FSANZ drinking water quality value							0.07
DoH and FSANZ recreational water quality value							0.7

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date							
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW116_S_180417_F	Water	Groundwater	4/17/2018	0.74	3.4	<0.02	0.2	<0.02	<0.02	0.2
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW118_S_180417	Water	Groundwater	4/17/2018	0.07	0.12	<0.02	0.31	<0.02	1.29	1.6
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW120_S_180417	Water	Groundwater	4/17/2018	4.72	4.17	<0.02	29.4	1.52	23.3	52.7
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW120_S_180417_F	Water	Groundwater	4/17/2018	1.1	2.08	<0.05	2.74	<0.05	<0.05	2.74
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW126_S_180417	Water	Groundwater	4/17/2018	15.6	20.2	0.48	81.8	7.92	342	424
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW126_S_180417_F	Water	Groundwater	4/17/2018	0.39	4.8	<0.02	<0.02	<0.02	<0.01	<0.01
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW129_S_180417	Water	Groundwater	4/17/2018	0.93	1.2	1.06	6.22	0.6	45.8	52
ET1801043	NQ0055	0874_MW015_S_180416	Water	Groundwater	4/16/2018	252	206	<0.10	2,580	116	960	3,540
ET1801043	NQ0055	0874_MW016_S_180416	Water	Groundwater	4/16/2018	84.1	68.5	<0.10	909	87.9	492	1,400
ET1801043	NQ0055	0874_MW016_S_180416_F	Water	Groundwater	4/16/2018	4.33	31.3	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801043	NQ0055	0874_MW021_S_180416	Water	Groundwater	4/16/2018	14	13	0.2	158	13.4	355	513
ET1801043	NQ0055	0874_MW054_S_180416	Water	Groundwater	4/16/2018	5.15	4.92	<0.02	32	2.05	93.7	126
ET1801043	NQ0055	0874_MW055_S_180416	Water	Groundwater	4/16/2018	1.4	1.21	<0.02	11.8	0.75	39.9	51.7
ET1801043	NQ0055	0874_MW055_S_180416_F	Water	Groundwater	4/16/2018	0.22	0.95	<0.02	<0.02	<0.02	<0.01	<0.01
ET1801043	NQ0055	0874_MW138_S_180416	Water	Groundwater	4/16/2018	8.78	8.19	0.14	62.1	4.85	93.7	156
ET1801043	NQ0055	0874_MW139_S_180416	Water	Groundwater	4/16/2018	87.1	67.1	0.53	557	58.7	1,660	2,220
ET1801043	NQ0055 & former fire training area NQ0107	0874_MW109_S_180416	Water	Groundwater	4/16/2018	50.8	48.9	<0.10	304	38	666	970
ET1801043	NQ0055 & former fire training area NQ0107	0874_MW110_S_180416	Water	Groundwater	4/16/2018	90.1	65.1	<0.10	582	68.4	1,420	2,000
ET1801011	NQ0105	0874_MW241_S_180412	Water	Groundwater	4/12/2018	0.0334	0.384	<0.0005	2.23	0.0287	0.0739	2.3
ET1801086	NQ0105	0874_MW242_S_180419	Water	Groundwater	4/19/2018	<0.02	0.05	<0.02	0.21	<0.02	0.22	0.43
ET1801086	NQ0105	0874_MW242_S_180419_F	Water	Groundwater	4/19/2018	<0.02	0.05	<0.02	<0.02	<0.02	0.01	0.01
ET1801059	NQ0106	0874_MW243_S_180417	Water	Groundwater	4/17/2018	164	162	<0.10	1,010	76.9	366	1,380
ET1801059	NQ0106	0874_MW243_S_180417_F	Water	Groundwater	4/17/2018	4.91	57.4	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801059	NQ0106 & OLAs	0874_MW136_S_180417	Water	Groundwater	4/17/2018	0.07	0.1	<0.02	0.58	0.04	1.15	1.73
ET1801043	NQ0107	0874_MW250_S_180416	Water	Groundwater	4/16/2018	1.88	2.52	<0.05	11.8	0.6	14.2	26
ET1801043	NQ0107	0874_MW250_S_180416_F	Water	Groundwater	4/16/2018	<0.10	0.22	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801043	NQ0107	0874_MW251_S_180416	Water	Groundwater	4/16/2018	2.19	2.7	<0.10	10.3	0.4	7.03	17.3
ET1801043	NQ0107	0874_MW251_S_180416_F	Water	Groundwater	4/16/2018	0.23	4.17	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801086	NW Base boundary (OLAs)	0874_MW002_S_180418	Water	Groundwater	4/18/2018	0.51	0.68	<0.05	4.01	0.14	2.66	6.67
ET1801059	OLAs	0874_MW122_S_180417	Water	Groundwater	4/17/2018	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	0.1
ET1801059	OLAs	0874_MW265_S_180417	Water	Groundwater	4/17/2018	0.78	1.81	<0.10	2.22	<0.10	0.24	2.46
ET1801059	OLAs (north-east)	0874_MW004_S_180417	Water	Groundwater	4/17/2018	<0.02	0.02	<0.02	0.06	<0.02	0.08	0.14
ET1801086	Pad Brahman	0874_MW121_S_180419	Water	Groundwater	4/19/2018	0.79	1.49	<0.10	2.39	<0.10	0.32	2.71
ET1801086	Pad Brahman	0874_MW121_S_180419_F	Water	Groundwater	4/19/2018	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801059	Pad Brahman	0874_MW135_S_180417	Water	Groundwater	4/17/2018	0.71	0.67	<0.10	7.89	0.16	0.87	8.76
ET1801086	Pad Brahman	0874_MW244_S_180419	Water	Groundwater	4/19/2018	4.61	4.73	<0.10	25.9	0.8	16.2	42.1
ET1801086	Pad Brahman	0874_MW244_S_180419_F	Water	Groundwater	4/19/2018	0.39	4.63	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801059	Runway 13/31	0874_MW245_S_180417	Water	Groundwater	4/17/2018	30.4	18.5	<0.02	259	10.8	60.2	319
ET1801059	Runway 13/31	0874_MW245_S_180417_F	Water	Groundwater	4/17/2018	1.68	3.98	<0.02	8.61	<0.02	<0.01	8.61
ET1801059	Runway 13/31	0874_MW246_S_180417	Water	Groundwater	4/17/2018	5.43	3.93	0.49	53.8	5.18	198	252
ET1801059	Runway 13/31	0874_MW246_S_180417_F	Water	Groundwater	4/17/2018	0.2	2.2	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801086	Runway 13/31	0874_MW246_S_180418	Water	Groundwater	4/18/2018	-	-	-	-	-	-	-
ET1801043	W of Emergency Response Areas	0874_MW112_S_180416	Water	Groundwater	4/16/2018	6.5	7.46	<0.10	36.2	0.34	2.14	38.3
ET1801059	W of Runway 13/31	0874_MW056_S_180417	Water	Groundwater	4/17/2018	0.55	1.14	<0.10	2.77	<0.10	0.69	3.46
ET1801043	W of Runway 13/31	0874_MW057_S_180416	Water	Groundwater	4/16/2018	3.58	4.09	<0.10	17.2	0.73	7.09	24.3
ET1801095	W of Runway 13/31	0874_MW102_S_180419	Water	Groundwater	4/19/2018	0.33	0.45	<0.10	2.96	<0.10	<0.10	2.96
ET1801095	W of Runway 13/31	0874_MW104_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.10	<0.10	0.15	<0.10	<0.10	0.15

	Perfluoroalkane Carboxylic Acids											(n:2) Fluorotelomer Sulfonic Acids			
	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTrDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001
ANZECC PFAS FW 95%									220						
DoH and FSANZ drinking water quality value									0.56						
DoH and FSANZ recreational water quality value									5.6						

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date															
ET1801011	38 SQN & Domestic area	0874_MW006_S_180412	Water	Groundwater	4/12/2018	<0.05	<0.05	<0.05	<0.05	<0.12	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801086	38 SQN & Domestic area	0874_MW036_S_180418	Water	Groundwater	4/18/2018	0.31	0.06	0.05	<0.02	<0.05	0.2	0.53	0.21	0.24	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801011	38 SQN & Domestic area	0874_MW049_S_180412	Water	Groundwater	4/12/2018	0.4	0.77	1.11	0.2	<0.05	0.1	0.33	0.47	1.16	0.16	0.02	<0.05	<0.05	<0.05	<0.05
ET1801086	38 SQN & Domestic area	0874_MW049_S_180418	Water	Groundwater	4/18/2018	0.33	0.38	0.62	0.08	<0.05	0.1	0.39	0.41	0.75	0.07	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	38 SQN & Domestic area	0874_MW061_S_180417	Water	Groundwater	4/17/2018	0.43	<0.02	<0.02	<0.02	<0.05	0.4	2.05	0.28	0.79	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	38 SQN & Domestic area	0874_MW061_S_180417_F	Water	Groundwater	4/17/2018	0.44	<0.02	<0.02	<0.02	<0.05	0.4	1.94	0.2	0.37	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	38 SQN & Domestic area	0874_MW063_S_180417	Water	Groundwater	4/17/2018	1.11	<0.02	<0.02	<0.02	<0.05	0.8	5.41	0.71	1.2	<0.02	<0.02	<0.05	0.27	<0.05	<0.05
ET1801059	38 SQN & Domestic area	0874_MW063_S_180417_F	Water	Groundwater	4/17/2018	1.16	<0.02	<0.02	<0.02	<0.05	0.9	5.14	0.47	0.43	<0.02	<0.02	<0.05	0.13	<0.05	<0.05
ET1801086	38 SQN & Domestic area	0874_MW224_S_180418	Water	Groundwater	4/18/2018	0.08	0.1	<0.05	<0.05	<0.12	<0.2	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	<0.05	<0.05
ET1801059	38 SQN & Domestic area	0874_MW232_S_180417	Water	Groundwater	4/17/2018	0.16	<0.02	<0.02	<0.02	<0.05	0.2	0.61	0.11	0.29	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	38 SQN & Domestic area	0874_MW232_S_180417_F	Water	Groundwater	4/17/2018	0.22	<0.02	<0.02	<0.02	<0.05	0.2	0.83	0.11	0.08	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801086	5AVN	0874_MW009_S_180418	Water	Groundwater	4/18/2018	0.24	<0.05	<0.05	<0.05	<0.12	<0.2	1.36	0.18	0.52	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801095	5AVN	0874_MW038_S_180419	Water	Groundwater	4/19/2018	31.8	0.57	0.1	<0.02	<0.05	16	254	17.6	60.5	0.05	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801095	5AVN	0874_MW043_S_180419	Water	Groundwater	4/19/2018	4.02	0.19	<0.05	<0.05	<0.12	1.8	30.7	3.38	11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801095	5AVN	0874_MW114_S_180419	Water	Groundwater	4/19/2018	0.89	0.05	<0.02	<0.02	<0.05	0.7	3.99	0.6	1.28	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801086	5AVN	0874_MW125_D_180418	Water	Groundwater	4/18/2018	16.7	0.15	<0.02	<0.02	<0.05	6.7	134	8.88	10.6	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801086	5AVN	0874_MW125_D_180418_F	Water	Groundwater	4/18/2018	17	<0.05	<0.05	<0.05	<0.12	7	132	5.86	4.39	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801095	5AVN	0874_MW142_S_180419	Water	Groundwater	4/19/2018	0.0203	0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0682	0.0095	0.0237	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001
ET1801086	5AVN	0874_MW247_S_180419	Water	Groundwater	4/19/2018	0.64	0.04	<0.02	<0.02	<0.05	0.4	4.05	0.41	1.38	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801086	5AVN	0874_MW247_S_180419_F	Water	Groundwater	4/19/2018	0.66	<0.02	<0.02	<0.02	<0.05	0.5	3.71	0.24	0.14	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801086	5AVN	0874_MW248_S_180419	Water	Groundwater	4/19/2018	19.2	0.52	<0.05	<0.05	<0.12	9.3	150	15.2	61	<0.05	<0.05	<0.05	0.18	<0.05	<0.05
ET1801086	5AVN	0874_MW248_S_180419_F	Water	Groundwater	4/19/2018	18	<0.05	<0.05	<0.05	<0.12	9	139	10	22.2	<0.05	<0.05	<0.05	0.08	<0.05	<0.05
ET1801086	5AVN	0874_MW249_S_180419	Water	Groundwater	4/19/2018	0.11	<0.02	<0.02	<0.02	<0.05	0.2	0.41	0.08	0.13	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801086	5AVN	0874_MW249_S_180419_F	Water	Groundwater	4/19/2018	0.11	<0.02	<0.02	<0.02	<0.05	0.2	0.39	0.06	0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801011	Eastern Base boundary	0874_MW140_D_180412	Water	Groundwater	4/12/2018	0.0029	<0.0005	<0.0005	<0.0005	<0.0005	0.003	0.0084	0.0008	0.0007	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001
ET1801043	Fuel Farm 2 NQ0099	0874_MW005_S_180416	Water	Groundwater	4/16/2018	8.92	<0.10	<0.10	<0.10	<0.25	5	54.9	5.21	7.41	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801043	Fuel Farm 2 NQ0099	0874_MW005_S_180416_F	Water	Groundwater	4/16/2018	6.72	<0.10	<0.10	<0.10	<0.25	4.1	37	2.29	1.28	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801043	Fuel Farm 2 NQ0099	0874_MW046_S_180416	Water	Groundwater	4/16/2018	2.42	<0.10	<0.10	<0.10	<0.25	1.2	23.4	1.55	3.62	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801043	Fuel Farm 2 NQ0099	0874_MW081_S_180416	Water	Groundwater	4/16/2018	45.9	0.73	0.1	<0.05	<0.12	19.8	432	58.4	146	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801043	Fuel Farm 2 NQ0099	0874_MW081_S_180416_F	Water	Groundwater	4/16/2018	58.5	<0.10	<0.10	<0.10	<0.25	21.1	548	66.1	69.3	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801043	Fuel Farm 2 NQ0099	0874_MW090_S_180416	Water	Groundwater	4/16/2018	0.03	<0.02	<0.02	<0.02	<0.05	<0.1	0.25	0.03	0.06	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801024	Ingham Rd Sports Fields	0874_MW226_S_180413	Water	Groundwater	4/13/2018	0.0023	<0.0005	<0.0005	<0.0005	<0.0005	0.002	0.0026	0.0008	0.0013	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001
ET1801024	Ingham Rd Sports Fields	0874_MW227_S_180413	Water	Groundwater	4/13/2018	0.0024	<0.0005	<0.0005	<0.0005	<0.0005	0.003	0.0039	0.0008	0.0016	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001
ET1801024	Ingham Rd Sports Fields	0874_MW228_S_180413	Water	Groundwater	4/13/2018	0.0019	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.003	0.0008	0.0014	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001
ET1801086	Ingham Rd Sports Fields	0874_MW229_S_180418	Water	Groundwater	4/18/2018	0.0101	0.0014	<0.0005	<0.0005	<0.0005	<0.002	0.0336	0.0064	0.0056	0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001
ET1801095	Mount St John	0874_MW230_S_180419	Water	Groundwater	4/19/2018	0.04	<0.02	<0.02	<0.02	<0.05	<0.1	0.31	0.03	0.08	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801095	Mount St John	0874_MW234_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.10	<0.10	<0.10	<0.25	<0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801095	Mount St John	0874_MW235_S_180419	Water	Groundwater	4/19/2018	0.128	0.004	<0.0005	<0.0005	<0.0005	0.014	0.213	0.0658	0.171	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001
ET1801095	Mount St John	0874_MW255_S_180419	Water	Groundwater	4/19/2018	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	NQ0052	0874_MW026_S_180417	Water	Groundwater	4/17/2018	0.17	<0.02	<0.02	<0.02	<0.05	0.1	0.81	0.13	0.33	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	NQ0052	0874_MW026_S_180417_F	Water	Groundwater	4/17/2018	0.5	<0.02	<0.02	<0.02	<0.05	0.3	2.24	0.24	0.2	<0.02	<0.02	<0.05	0.05	<0.05	<0.05
ET1801086	NQ0052	0874_MW051_S_180418	Water	Groundwater	4/18/2018	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.03	<0.02	0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	NQ0054	0874_MW013_S_180417	Water	Groundwater	4/17/2018	9.7	0.08	<0.02	<0.02	<0.05	8.1	49.8	10.4	13.6	<0.02	<0.02	<0.05	4	<0.05	<0.05
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW033_S_180417	Water	Groundwater	4/17/2018	1.07	0.13	0.04	<0.02	<0.05	0.6	2.88	1.01	1.71	<0.02	<0.02	<0.05	0.12	0.15	<0.05
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW034_S_180417	Water	Groundwater	4/17/2018	0.99	<0.02	<0.02	<0.02	<0.05	0.8	4.33	0.48	0.5	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW116_S_180417	Water	Groundwater	4/17/2018	4.22	0.02	<0.02	<0.02	<0.05	3.8	22.1	4.19	5.55	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05

	Perfluoroalkane Carboxylic Acids											(n:2) Fluorotelomer Sulfonic Acids			
	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTriDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001
ANZECC PFAS FW 95%									220						
DoH and FSANZ drinking water quality value									0.56						
DoH and FSANZ recreational water quality value									5.6						

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date															
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW116_S_180417_F	Water	Groundwater	4/17/2018	3.33	<0.02	<0.02	<0.02	<0.05	3.2	15.3	1.83	1.07	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW118_S_180417	Water	Groundwater	4/17/2018	0.12	<0.02	<0.02	<0.02	<0.05	0.1	0.18	0.05	0.08	<0.02	<0.02	<0.05	0.09	<0.05	<0.05
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW120_S_180417	Water	Groundwater	4/17/2018	1.62	0.02	<0.02	<0.02	<0.05	1.3	8.97	1.07	1.91	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW120_S_180417_F	Water	Groundwater	4/17/2018	1.75	<0.05	<0.05	<0.05	<0.12	1.4	8.53	0.68	0.59	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW126_S_180417	Water	Groundwater	4/17/2018	11.9	0.47	0.05	<0.02	<0.05	9.9	48.8	8.92	16.1	<0.02	<0.02	<0.05	0.5	0.12	<0.05
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW126_S_180417_F	Water	Groundwater	4/17/2018	9.44	<0.02	<0.02	<0.02	<0.05	8.5	37.6	5.26	4.84	<0.02	<0.02	<0.05	0.29	<0.05	<0.05
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW129_S_180417	Water	Groundwater	4/17/2018	2.74	0.16	0.09	<0.02	<0.05	2	2.82	0.74	2.05	0.02	<0.02	<0.05	1.11	0.87	<0.05
ET1801043	NQ0055	0874_MW015_S_180416	Water	Groundwater	4/16/2018	86.1	0.19	<0.10	<0.10	<0.25	52.2	545	62.3	86.3	<0.10	<0.10	<0.10	0.21	<0.10	<0.10
ET1801043	NQ0055	0874_MW016_S_180416	Water	Groundwater	4/16/2018	31.1	0.21	<0.10	<0.10	<0.25	20.4	166	21.9	39.5	<0.10	<0.10	<0.10	1.38	<0.10	<0.10
ET1801043	NQ0055	0874_MW016_S_180416_F	Water	Groundwater	4/16/2018	32	<0.10	<0.10	<0.10	<0.25	20.9	160	12.3	4.07	<0.10	<0.10	<0.10	0.54	<0.10	<0.10
ET1801043	NQ0055	0874_MW021_S_180416	Water	Groundwater	4/16/2018	6.34	0.1	<0.02	<0.02	<0.05	4.5	34.4	4.08	7.61	<0.02	<0.02	<0.05	0.6	0.14	<0.05
ET1801043	NQ0055	0874_MW054_S_180416	Water	Groundwater	4/16/2018	1.78	0.04	<0.02	<0.02	<0.05	1.2	8.69	0.74	1.44	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801043	NQ0055	0874_MW055_S_180416	Water	Groundwater	4/16/2018	0.65	0.03	<0.02	<0.02	<0.05	0.4	3.36	0.38	1.07	<0.02	<0.02	<0.05	0.05	<0.05	<0.05
ET1801043	NQ0055	0874_MW055_S_180416_F	Water	Groundwater	4/16/2018	1.34	<0.02	<0.02	<0.02	<0.05	0.8	6.56	0.55	0.74	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801043	NQ0055	0874_MW138_S_180416	Water	Groundwater	4/16/2018	5.56	0.1	0.05	<0.02	<0.05	6.4	15.7	1.5	2.57	<0.02	<0.02	<0.05	0.27	0.13	<0.05
ET1801043	NQ0055	0874_MW139_S_180416	Water	Groundwater	4/16/2018	36.5	0.38	<0.10	<0.10	<0.25	27.4	212	32.4	53	<0.10	<0.10	0.16	39.2	0.76	<0.10
ET1801043	NQ0055 & former fire training area NQ0107	0874_MW109_S_180416	Water	Groundwater	4/16/2018	31.3	0.22	<0.10	<0.10	<0.25	25.5	127	17.2	39.8	<0.10	<0.10	<0.10	6.23	<0.10	<0.10
ET1801043	NQ0055 & former fire training area NQ0107	0874_MW110_S_180416	Water	Groundwater	4/16/2018	27.7	0.36	<0.10	<0.10	<0.25	17.3	135	21.6	36.9	<0.10	<0.10	<0.10	15	0.54	<0.10
ET1801011	NQ0105	0874_MW241_S_180412	Water	Groundwater	4/12/2018	0.0386	<0.0005	<0.0005	<0.0005	<0.0005	0.018	0.0887	0.012	0.0046	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001
ET1801086	NQ0105	0874_MW242_S_180419	Water	Groundwater	4/19/2018	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801086	NQ0105	0874_MW242_S_180419_F	Water	Groundwater	4/19/2018	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.05	<0.02	0.01	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801059	NQ0106	0874_MW243_S_180417	Water	Groundwater	4/17/2018	53.1	<0.10	<0.10	<0.10	<0.25	29.3	302	37	49.2	<0.10	<0.10	<0.10	3.15	<0.10	<0.10
ET1801059	NQ0106	0874_MW243_S_180417_F	Water	Groundwater	4/17/2018	35.9	<0.10	<0.10	<0.10	<0.25	20.4	194	13.6	3.89	<0.10	<0.10	<0.10	0.67	<0.10	<0.10
ET1801059	NQ0106 & OLAs	0874_MW136_S_180417	Water	Groundwater	4/17/2018	0.1	<0.02	<0.02	<0.02	<0.05	<0.1	0.22	0.04	0.03	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801043	NQ0107	0874_MW250_S_180416	Water	Groundwater	4/16/2018	0.74	<0.05	<0.05	<0.05	<0.12	0.6	3.86	0.28	0.44	<0.05	<0.05	<0.05	0.06	<0.05	<0.05
ET1801043	NQ0107	0874_MW250_S_180416_F	Water	Groundwater	4/16/2018	0.88	<0.10	<0.10	<0.10	<0.25	0.7	3.74	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801043	NQ0107	0874_MW251_S_180416	Water	Groundwater	4/16/2018	0.67	<0.10	<0.10	<0.10	<0.25	<0.5	3.73	0.27	0.35	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801043	NQ0107	0874_MW251_S_180416_F	Water	Groundwater	4/16/2018	2.68	<0.10	<0.10	<0.10	<0.25	1.6	14.1	0.63	0.21	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801086	NW Base boundary (OLAs)	0874_MW002_S_180418	Water	Groundwater	4/18/2018	0.22	<0.05	<0.05	<0.05	<0.12	<0.2	1.12	0.1	0.16	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801059	OLAs	0874_MW122_S_180417	Water	Groundwater	4/17/2018	<0.05	<0.05	<0.05	<0.05	<0.12	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801059	OLAs	0874_MW265_S_180417	Water	Groundwater	4/17/2018	0.13	<0.10	<0.10	<0.10	<0.25	<0.5	0.47	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801059	OLAs (north-east)	0874_MW004_S_180417	Water	Groundwater	4/17/2018	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ET1801086	Pad Brahman	0874_MW121_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.10	<0.10	<0.10	<0.25	<0.5	0.22	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801086	Pad Brahman	0874_MW121_S_180419_F	Water	Groundwater	4/19/2018	<0.10	<0.10	<0.10	<0.10	<0.25	<0.5	0.18	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801059	Pad Brahman	0874_MW135_S_180417	Water	Groundwater	4/17/2018	0.21	<0.10	<0.10	<0.10	<0.25	<0.5	1.15	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	<0.10	<0.10
ET1801086	Pad Brahman	0874_MW244_S_180419	Water	Groundwater	4/19/2018	0.9	<0.10	<0.10	<0.10	<0.25	<0.5	6.7	0.57	0.84	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801086	Pad Brahman	0874_MW244_S_180419_F	Water	Groundwater	4/19/2018	1.53	<0.10	<0.10	<0.10	<0.25	0.6	11.9	0.75	0.3	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801059	Runway 13/31	0874_MW245_S_180417	Water	Groundwater	4/17/2018	8.59	0.11	<0.02	<0.02	<0.05	8.3	54.4	13.6	21	<0.02	<0.02	<0.05	1.1	0.15	<0.05
ET1801059	Runway 13/31	0874_MW245_S_180417_F	Water	Groundwater	4/17/2018	7.93	<0.02	<0.02	<0.02	<0.05	7.5	44.4	7.66	2.87	<0.02	<0.02	<0.05	0.34	<0.05	<0.05
ET1801059	Runway 13/31	0874_MW246_S_180417	Water	Groundwater	4/17/2018	2.82	<0.10	<0.10	<0.10	<0.25	1.3	20.3	1.5	3.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801059	Runway 13/31	0874_MW246_S_180417_F	Water	Groundwater	4/17/2018	4.23	<0.10	<0.10	<0.10	<0.25	1.9	29.2	1.71	1.28	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801086	Runway 13/31	0874_MW246_S_180418	Water	Groundwater	4/18/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ET1801043	W of Emergency Response Areas	0874_MW112_S_180416	Water	Groundwater	4/16/2018	3.22	<0.10	<0.10	<0.10	<0.25	1.6	19.9	1.06	0.58	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801059	W of Runway 13/31	0874_MW056_S_180417	Water	Groundwater	4/17/2018	0.34	<0.10	<0.10	<0.10	<0.25	0.6	0.85	<0.10	<0.10	<0.10	<0.10	<0.10	0.19	<0.10	<0.10
ET1801043	W of Runway 13/31	0874_MW057_S_180416	Water	Groundwater	4/16/2018	1.47	<0.10	<0.10	<0.10	<0.25	0.8	7.8	0.37	0.37	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801095	W of Runway 13/31	0874_MW102_S_180419	Water	Groundwater	4/19/2018	0.15	<0.10	<0.10	<0.10	<0.25	<0.5	0.81	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801095	W of Runway 13/31	0874_MW104_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.10	<0.10	<0.10	<0.25	<0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

	Perfluoroalkyl Sulfonamides							PFAS	
	Perfluorooctane sulfonamide (FOSA) µg/L	N-Methyl perfluorooctane sulfonamide (MeFOSA) µg/L	perfluorooctane sulfonamidoacetic acid (MeFOSAA) µg/L	perfluorooctane sulfonamidoethanol (MeFOSAE) µg/L	N-Ethyl perfluorooctane sulfonamide (EtFOSA) µg/L	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA) µg/L	perfluorooctane sulfonamidoethanol (EtFOSAE) µg/L	Sum of PFAS µg/L	Sum of PFAS (WA DER List) µg/L
EQL	0.0005	0.001	0.0005	0.001	0.001	0.0005	0.001	0.0003	0.0003
ANZECC PFAS FW 95%									
DoH and FSANZ drinking water quality value									
DoH and FSANZ recreational water quality value									

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date									
ET1801011	38 SQN & Domestic area	0874_MW006_S_180412	Water	Groundwater	4/12/2018	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.39	0.39
ET1801086	38 SQN & Domestic area	0874_MW036_S_180418	Water	Groundwater	4/18/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.63	7.2
ET1801011	38 SQN & Domestic area	0874_MW049_S_180412	Water	Groundwater	4/12/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.48	4.19
ET1801086	38 SQN & Domestic area	0874_MW049_S_180418	Water	Groundwater	4/18/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	5.66	4.4
ET1801059	38 SQN & Domestic area	0874_MW061_S_180417	Water	Groundwater	4/17/2018	0.04	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	35.6	34
ET1801059	38 SQN & Domestic area	0874_MW061_S_180417_F	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	4.74	4.42
ET1801059	38 SQN & Domestic area	0874_MW063_S_180417	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	58.5	54.8
ET1801059	38 SQN & Domestic area	0874_MW063_S_180417_F	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	9.88	9.39
ET1801086	38 SQN & Domestic area	0874_MW224_S_180418	Water	Groundwater	4/18/2018	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	2.7	2.54
ET1801059	38 SQN & Domestic area	0874_MW232_S_180417	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	16.6	15.7
ET1801059	38 SQN & Domestic area	0874_MW232_S_180417_F	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.62	1.62
ET1801086	5AVN	0874_MW009_S_180418	Water	Groundwater	4/18/2018	0.14	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	19.6	18.4
ET1801095	5AVN	0874_MW038_S_180419	Water	Groundwater	4/19/2018	6.72	<0.05	0.04	<0.05	<0.05	<0.02	<0.05	1,580	1,490
ET1801095	5AVN	0874_MW043_S_180419	Water	Groundwater	4/19/2018	0.07	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	389	372
ET1801095	5AVN	0874_MW114_S_180419	Water	Groundwater	4/19/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	86	81.3
ET1801086	5AVN	0874_MW125_D_180418	Water	Groundwater	4/18/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1,570	1,510
ET1801086	5AVN	0874_MW125_D_180418_F	Water	Groundwater	4/18/2018	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	186	182
ET1801095	5AVN	0874_MW142_S_180419	Water	Groundwater	4/19/2018	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.684	0.635
ET1801086	5AVN	0874_MW247_S_180419	Water	Groundwater	4/19/2018	0.73	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	142	137
ET1801086	5AVN	0874_MW247_S_180419_F	Water	Groundwater	4/19/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	5.41	5.41
ET1801086	5AVN	0874_MW248_S_180419	Water	Groundwater	4/19/2018	0.21	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	2,720	2,560
ET1801086	5AVN	0874_MW248_S_180419_F	Water	Groundwater	4/19/2018	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	248	236
ET1801086	5AVN	0874_MW249_S_180419	Water	Groundwater	4/19/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.17	5.7
ET1801086	5AVN	0874_MW249_S_180419_F	Water	Groundwater	4/19/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.95	0.95
ET1801011	Eastern Base boundary	0874_MW140_D_180412	Water	Groundwater	4/12/2018	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.194	0.178
ET1801043	Fuel Farm 2 NQ0099	0874_MW005_S_180416	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	538	503
ET1801043	Fuel Farm 2 NQ0099	0874_MW005_S_180416_F	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	89.7	86.4
ET1801043	Fuel Farm 2 NQ0099	0874_MW046_S_180416	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	288	275
ET1801043	Fuel Farm 2 NQ0099	0874_MW081_S_180416	Water	Groundwater	4/16/2018	0.19	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	6,510	5,960
ET1801043	Fuel Farm 2 NQ0099	0874_MW081_S_180416_F	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	1,220	1,130
ET1801043	Fuel Farm 2 NQ0099	0874_MW090_S_180416	Water	Groundwater	4/16/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	4.69	4.48
ET1801024	Ingham Rd Sports Fields	0874_MW226_S_180413	Water	Groundwater	4/13/2018	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.163	0.158
ET1801024	Ingham Rd Sports Fields	0874_MW227_S_180413	Water	Groundwater	4/13/2018	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.277	0.258
ET1801024	Ingham Rd Sports Fields	0874_MW228_S_180413	Water	Groundwater	4/13/2018	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.174	0.164
ET1801086	Ingham Rd Sports Fields	0874_MW229_S_180418	Water	Groundwater	4/18/2018	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.355	0.336
ET1801095	Mount St John	0874_MW230_S_180419	Water	Groundwater	4/19/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2.04	1.94
ET1801095	Mount St John	0874_MW234_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	0.15	0.15
ET1801095	Mount St John	0874_MW235_S_180419	Water	Groundwater	4/19/2018	0.001	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.922	0.888
ET1801095	Mount St John	0874_MW255_S_180419	Water	Groundwater	4/19/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.24	0.24
ET1801059	NQ0052	0874_MW026_S_180417	Water	Groundwater	4/17/2018	0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	18.1	17.4
ET1801059	NQ0052	0874_MW026_S_180417_F	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	3.75	3.75
ET1801086	NQ0052	0874_MW051_S_180418	Water	Groundwater	4/18/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.62	1.52
ET1801059	NQ0054	0874_MW013_S_180417	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	485	453
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW033_S_180417	Water	Groundwater	4/17/2018	0.6	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	50	47
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW034_S_180417	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	35.4	30.1
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW116_S_180417	Water	Groundwater	4/17/2018	0.03	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	147	135

	Perfluoroalkyl Sulfonamides							PFAS	
	Perfluorooctane sulfonamide (FOSA) μg/L	N-Methyl perfluorooctane sulfonamide (MeFOSA) μg/L	perfluorooctane sulfonamidoacetic acid (MeFOSAA) μg/L	perfluorooctane sulfonamidoethanol (MeFOSAE) μg/L	N-Ethyl perfluorooctane sulfonamide (EtFOSA) μg/L	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA) μg/L	perfluorooctane sulfonamidoethanol (EtFOSAE) μg/L	Sum of PFAS μg/L	Sum of PFAS (WA DER List) μg/L
EQL	0.0005	0.001	0.0005	0.001	0.001	0.0005	0.001	0.0003	0.0003
ANZECC PFAS FW 95%									
DoH and FSANZ drinking water quality value									
DoH and FSANZ recreational water quality value									

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date										
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW116_S_180417_F	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	29.1	28.3	
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW118_S_180417	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2.41	2.34	
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW120_S_180417	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	78	71.7	
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW120_S_180417_F	Water	Groundwater	4/17/2018	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	18.9	17.8	
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW126_S_180417	Water	Groundwater	4/17/2018	0.29	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	565	540	
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW126_S_180417_F	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	71.1	70.7	
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW129_S_180417	Water	Groundwater	4/17/2018	0.38	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	68.8	65.6	
ET1801043	NQ0055	0874_MW015_S_180416	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	4,950	4,580	
ET1801043	NQ0055	0874_MW016_S_180416	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	1,920	1,750	
ET1801043	NQ0055	0874_MW016_S_180416_F	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	265	261	
ET1801043	NQ0055	0874_MW021_S_180416	Water	Groundwater	4/16/2018	0.29	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	612	584	
ET1801043	NQ0055	0874_MW054_S_180416	Water	Groundwater	4/16/2018	0.06	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	152	144	
ET1801043	NQ0055	0874_MW055_S_180416	Water	Groundwater	4/16/2018	0.18	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	61.2	58.8	
ET1801043	NQ0055	0874_MW055_S_180416_F	Water	Groundwater	4/16/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	11.2	10.9	
ET1801043	NQ0055	0874_MW138_S_180416	Water	Groundwater	4/16/2018	0.09	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	210	196	
ET1801043	NQ0055	0874_MW139_S_180416	Water	Groundwater	4/16/2018	0.78	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	2,830	2,680	
ET1801043	NQ0055 & former fire training area NQ0107	0874_MW109_S_180416	Water	Groundwater	4/16/2018	0.25	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	1,360	1,260	
ET1801043	NQ0055 & former fire training area NQ0107	0874_MW110_S_180416	Water	Groundwater	4/16/2018	0.81	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	2,480	2,320	
ET1801011	NQ0105	0874_MW241_S_180412	Water	Groundwater	4/12/2018	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	2.91	2.85	
ET1801086	NQ0105	0874_MW242_S_180419	Water	Groundwater	4/19/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.52	0.52	
ET1801086	NQ0105	0874_MW242_S_180419_F	Water	Groundwater	4/19/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.12	0.12	
ET1801059	NQ0106	0874_MW243_S_180417	Water	Groundwater	4/17/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	2,250	2,010	
ET1801059	NQ0106	0874_MW243_S_180417_F	Water	Groundwater	4/17/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	331	326	
ET1801059	NQ0106 & OLAs	0874_MW136_S_180417	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2.33	2.22	
ET1801043	NQ0107	0874_MW250_S_180416	Water	Groundwater	4/16/2018	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	37	34.5	
ET1801043	NQ0107	0874_MW250_S_180416_F	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	5.54	5.54	
ET1801043	NQ0107	0874_MW251_S_180416	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	27.6	25	
ET1801043	NQ0107	0874_MW251_S_180416_F	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	23.6	23.4	
ET1801086	NW Base boundary (OLAs)	0874_MW002_S_180418	Water	Groundwater	4/18/2018	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	9.6	8.95	
ET1801059	OLAs	0874_MW122_S_180417	Water	Groundwater	4/17/2018	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.1	0.1	
ET1801059	OLAs	0874_MW265_S_180417	Water	Groundwater	4/17/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	5.65	4.87	
ET1801059	OLAs (north-east)	0874_MW004_S_180417	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.16	0.16	
ET1801086	Pad Brahman	0874_MW121_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	5.21	4.42	
ET1801086	Pad Brahman	0874_MW121_S_180419_F	Water	Groundwater	4/19/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	0.18	0.18	
ET1801059	Pad Brahman	0874_MW135_S_180417	Water	Groundwater	4/17/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	11.8	10.9	
ET1801086	Pad Brahman	0874_MW244_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	61.2	55.8	
ET1801086	Pad Brahman	0874_MW244_S_180419_F	Water	Groundwater	4/19/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	20.1	19.7	
ET1801059	Runway 13/31	0874_MW245_S_180417	Water	Groundwater	4/17/2018	0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	486	445	
ET1801059	Runway 13/31	0874_MW245_S_180417_F	Water	Groundwater	4/17/2018	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	85	83.3	
ET1801059	Runway 13/31	0874_MW246_S_180417	Water	Groundwater	4/17/2018	0.75	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	297	285	
ET1801059	Runway 13/31	0874_MW246_S_180417_F	Water	Groundwater	4/17/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	40.7	40.5	
ET1801086	Runway 13/31	0874_MW246_S_180418	Water	Groundwater	4/18/2018	-	-	-	-	-	-	-	-	-	
ET1801043	W of Emergency Response Areas	0874_MW112_S_180416	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	79	72.2	
ET1801059	W of Runway 13/31	0874_MW056_S_180417	Water	Groundwater	4/17/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	7.13	6.58	
ET1801043	W of Runway 13/31	0874_MW057_S_180416	Water	Groundwater	4/16/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	43.5	39.2	
ET1801095	W of Runway 13/31	0874_MW102_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	4.7	4.37	
ET1801095	W of Runway 13/31	0874_MW104_S_180419	Water	Groundwater	4/19/2018	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	0.15	0.15	

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids								
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0003	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.0005
ANZECC PFAS FW 95%						0.13										220
DoH and FSANZ drinking water quality value							0.07									0.56
DoH and FSANZ recreational water quality value							0.7									5.6

Lab Report Number	Location	Field ID	Matrix Type	Date	11	12	0.04	69	5.95	62	131	5.3	0.31	0.08	<0.02	<0.05	3.6	23.9	2.8	4.4
ET1801093	5AVN	0874_SW019_180419	Water	4/19/2018	0.105	0.122	<0.0020	0.869	0.0558	1.57	2.44	<0.0020	<0.0020	<0.0020	<0.0020	<0.0050	0.012	0.206	0.0226	0.0652
ET1800537	5AVN	0874_SW123_180301	Water	3/1/2018	0.325	0.397	<0.0020	2.46	0.168	3.92	6.38	0.145	0.0026	<0.0020	<0.0020	<0.0050	0.038	0.575	0.0582	0.152
ET1800553	5AVN	0874_SW123_180302	Water	3/2/2018	0.142	0.143	<0.0020	1.54	0.079	3.17	4.71	0.0764	0.0026	<0.0020	<0.0020	<0.0050	0.02	0.341	0.041	0.107
ET1800553	5AVN	0874_SW123_180302_F	Water	3/2/2018	0.409	0.489	<0.0100	2.87	0.346	7.02	9.89	0.254	<0.0100	<0.0100	<0.0100	<0.0250	0.148	1.21	0.109	0.307
ET1800576	5AVN	0874_SW123_180303	Water	3/3/2018	0.463	0.544	<0.0100	3.54	0.376	7.33	10.9	0.269	<0.0100	<0.0100	<0.0100	<0.0250	0.22	1.41	0.137	0.345
ET1800572	5AVN	0874_SW123_180304	Water	3/4/2018	1.91	2.72	<0.0200	15.5	1.24	19.9	35.4	0.74	<0.0200	<0.0200	<0.0200	<0.0500	0.35	3.82	0.466	1.04
ET1800572	5AVN	0874_SW123_180304_F	Water	3/4/2018	1.86	2.78	<0.0200	16.5	1.34	20.3	36.8	0.806	<0.0200	<0.0200	<0.0200	<0.0500	0.198	3.99	0.506	0.984
ET1800563	5AVN	0874_SW123_180305	Water	3/5/2018	2.09	2.2	<0.0100	16.7	1.33	20.4	37.1	1.17	0.021	<0.0100	<0.0100	<0.0250	1.12	5.26	0.513	1.28
ET1800563	5AVN	0874_SW123_180305_F	Water	3/5/2018	5.06	6.33	<0.0100	23.4	2.51	20.5	43.9	3.18	0.039	<0.0100	<0.0100	<0.0250	1.53	7.35	0.851	2.71
ET1801082	5AVN	0874_SW123_180418	Water	4/18/2018	2.67	2.96	<0.02	16.6	1.6	25.9	42.5	1.01	0.03	<0.02	<0.02	<0.05	0.8	4.28	0.48	1.06
ET1801082	5AVN	0874_SW123_180418_F	Water	4/18/2018	0.06	0.88	<0.02	<0.02	<0.02	<0.01	<0.01	0.99	<0.02	<0.02	<0.02	<0.05	0.8	3.93	0.34	0.32
ET1801098	5AVN	0874_SW124_180420	Water	4/20/2018	1.59	1.64	<0.0005	12.5	0.355	6.13	18.6	0.493	0.0112	0.0025	<0.0005	<0.0005	0.116	4.05	0.397	0.54
ET1801057	Domestic area	0874_SW010S_180417	Water	4/17/2018	0.09	0.13	<0.02	0.6	0.03	1.33	1.93	0.31	0.02	<0.02	<0.02	<0.05	0.1	0.36	0.26	0.27
ET1801057	Domestic area	0874_SW010S_180417_F	Water	4/17/2018	0.0482	0.0969	<0.0005	0.152	0.002	0.0012	0.153	0.308	0.0074	0.0005	<0.0005	<0.0005	<0.002	0.509	0.26	0.168
ET1801082	Mount St John	0874_SW112_180419	Water	4/19/2018	0.0146	0.0311	<0.0005	0.136	0.0063	0.166	0.302	0.0376	0.0014	0.0034	<0.0005	<0.0005	<0.002	0.0558	0.0093	0.0384
ET1801082	Mount St John	0874_SW112_180419_F	Water	4/19/2018	<0.0005	0.0053	<0.0005	<0.0005	<0.0005	<0.0003	<0.0003	0.036	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0505	0.0061	0.0087
ES1805726	Mount St John	0874_SW130_180221	Water	2/21/2018	0.0243	0.0669	<0.0005	0.0808	0.0063	0.165	0.246	0.0337	0.0013	0.0021	<0.0005	<0.0005	0.019	0.0465	0.0045	0.0139
ET1800983	Mount St John	0874_SW130_180410	Water	4/10/2018	<0.02	<0.02	<0.02	0.03	<0.02	0.03	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01
ET1800537	Mundy Creek discharge	0874_SW132_180301	Water	3/1/2018	2.19	1.75	<0.0020	14.4	0.97	27.3	41.7	1.22	0.0412	<0.0020	<0.0020	<0.0050	0.148	6.46	1.13	2.88
ET1800553	Mundy Creek discharge	0874_SW132_180302	Water	3/2/2018	2.62	2.16	0.0026	15	1.2	27.1	42.1	1.43	0.066	<0.0020	<0.0020	<0.0050	0.196	6.22	1.32	2.63
ET1800553	Mundy Creek discharge	0874_SW132_180302_F	Water	3/2/2018	0.298	0.364	<0.0020	2.14	0.153	4.54	6.68	0.114	0.0022	<0.0020	<0.0020	<0.0050	0.054	0.506	0.0602	0.145
ET1800576	Mundy Creek discharge	0874_SW132_180303	Water	3/3/2018	1.46	1.4	<0.0100	11.9	0.918	28.6	40.5	1.07	0.049	<0.0100	<0.0100	<0.0250	0.899	6.62	1.08	2.69
ET1800576	Mundy Creek discharge	0874_SW132_180303_F	Water	3/3/2018	1.55	1.63	<0.0100	14.7	1.05	35.6	50.3	1.25	0.063	<0.0100	<0.0100	<0.0250	1.04	8.01	1.3	3.04
ET1800572	Mundy Creek discharge	0874_SW132_180304	Water	3/4/2018	2.66	3.46	0.0557	18.8	1.38	27.6	46.4	1.83	0.062	<0.0200	<0.0200	<0.0500	0.39	9.05	1.73	3.72
ET1800572	Mundy Creek discharge	0874_SW132_180304_F	Water	3/4/2018	2.58	3.44	<0.0200	19.8	1.2	26.8	46.6	1.62	0.058	<0.0200	<0.0200	<0.0500	0.294	8.91	1.77	3.71
ET1800563	Mundy Creek discharge	0874_SW132_180305	Water	3/5/2018	1.8	1.82	<0.0100	14.5	0.984	25.2	39.7	1.27	0.054	<0.0100	<0.0100	<0.0250	1.05	7.33	1.28	2.98
ET1800563	Mundy Creek discharge	0874_SW132_180305_F	Water	3/5/2018	3.93	4.35	<0.0100	18.8	1.47	26.5	45.3	2.69	0.094	<0.0100	<0.0100	<0.0250	1.51	10.3	1.47	5
ET1801057	Mundy Creek discharge	0874_SW132_180417	Water	4/17/2018	3.37	3.23	0.114	19.4	0.928	25	44.4	1.6	0.124	0.0026	<0.0005	<0.0005	0.202	8.61	1.51	2.56
ET1801057	Mundy Creek discharge	0874_SW132_180417_F	Water	4/17/2018	0.08	1.35	<0.02	<0.02	<0.02	<0.01	<0.01	1.71	<0.02	<0.02	<0.02	<0.05	1.4	8.24	1.16	0.87
ET1801098	NQ0055	0874_SW039_180420	Water	4/20/2018	40	35.2	<0.02	314	12.4	141	455	17.8	0.27	0.04	<0.02	<0.05	11	98.8	11.1	14.1
ET1801005	NQ0105	0874_SW101_180411	Water	4/11/2018	0.042	0.062	<0.0020	0.391	0.0204	0.652	1.04	0.0248	<0.0020	<0.0020	<0.0020	<0.0050	<0.002	0.084	0.0078	0.0212
ET1800553	NQ0105	0874_SW102_180302	Water	3/2/2018	0.0196	0.0226	<0.0020	0.204	0.0078	0.325	0.529	<0.0020	<0.0020	<0.0020	<0.0020	<0.0050	<0.002	0.0302	0.0032	0.0146
ET1800553	NQ0105	0874_SW102_180302_F	Water	3/2/2018	0.0224	0.023	<0.0020	0.205	0.0094	0.364	0.569	<0.0020	<0.0020	<0.0020	<0.0020	<0.0050	0.117	0.035	0.0034	0.0138
ET1800576	NQ0105	0874_SW102_180303	Water	3/3/2018	0.013	0.014	<0.0100	0.129	<0.0100	0.308	0.437	<0.0100	<0.0100	<0.0100	<0.0100	<0.0250	<0.010	0.037	<0.0100	<0.0100
ET1800576	NQ0105	0874_SW102_180303_F	Water	3/3/2018	0.018	0.018	<0.0100	0.201	0.013	0.373	0.574	<0.0100	<0.0100	<0.0100	<0.0100	<0.0250	<0.010	0.063	<0.0100	0.016
ET1800572	NQ0105	0874_SW102_180304	Water	3/4/2018	0.0199	0.0264	<0.0005	0.281	0.0164	0.506	0.787	0.0098	<0.0005	<0.0005	<0.0005	<0.0005	0.004	0.0471	0.006	0.023
ET1800572	NQ0105	0874_SW102_180304_F	Water	3/4/2018	0.0169	0.0223	<0.0005	0.198	0.0109	0.468	0.666	0.0082	<0.0005	<0.0005	<0.0005	<0.0005	0.003	0.0416	0.0051	0.0195
ET1800563	NQ0105	0874_SW102_180305	Water	3/5/2018	0.019	0.021	<0.0100	0.237	0.018	0.526	0.763	<0.0100	<0.0100	<0.0100	<0.0100	<0.0250	<0.010	0.055	<0.0100	0.022
ET1800563	NQ0105	0874_SW102_180305_F	Water	3/5/2018	0.0292	0.0442	<0.0005	0.166	0.0169	0.656	0.822	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0414	0.0088	0.0283
ET1801044	NQ0105	0874_SW102_180416	Water	4/16/2018	0.1	0.12	<0.02	0.68	<0.02	0.7	1.38	0.04	<0.02	<0.02	<0.02	<0.05	<0.1	0.16	<0.02	0.02
ET1801044	NQ0105	0874_SW102_180416_F	Water	4/16/2018	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	0.04	<0.02	<0.02	<0.02	<0.05	<0.1	0.15	<0.02	<0.01
ET1801010	NQ0105	0874_SW103_180412	Water	4/12/2018	0.1	0.11	<0.02	0.55	0.03	0.84	1.39	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.15	<0.02	0.03
ET1801010	NQ0105	0874_SW104_180412	Water	4/12/2018	0.185	0.146	<0.0005	1.15	0.0351	0.0933	1.24	0.0996	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.2	0.0406	0.0239

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids								
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0003	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.0005
ANZECC PFAS FW 95%						0.13										220
DoH and FSNZ drinking water quality value							0.07									0.56
DoH and FSNZ recreational water quality value							0.7									5.6

Lab Report Number	Location	Field ID	Matrix Type	Date																
ET1801057	NQ0106 & OLAs	0874_SW126_180417	Water	4/17/2018	0.25	0.31	<0.02	1.92	0.13	3.77	5.69	0.16	<0.02	<0.02	<0.02	<0.05	0.2	0.66	0.07	0.13
ET1801057	NQ0106 & OLAs	0874_SW126_180417_F	Water	4/17/2018	0.05	0.23	<0.02	<0.02	<0.02	<0.01	<0.01	0.16	<0.02	<0.02	<0.02	<0.05	0.2	0.64	0.06	0.08
ET1801057	NW Base boundary/OLAs	0874_SW012_180417	Water	4/17/2018	0.306	0.272	0.0099	2.93	0.122	3.66	6.59	0.181	0.0039	0.0011	<0.0005	<0.0005	0.024	0.91	0.096	0.176
ET1801057	NW Base boundary/OLAs	0874_SW013_180417	Water	4/17/2018	0.43	0.39	<0.02	3.54	0.25	5.96	9.5	0.19	<0.02	<0.02	<0.02	<0.05	0.2	0.98	0.11	0.19
ET1801057	NW Base boundary/OLAs	0874_SW013_180417_F	Water	4/17/2018	<0.02	0.06	<0.02	<0.02	<0.02	<0.01	<0.01	0.19	<0.02	<0.02	<0.02	<0.05	0.2	0.87	0.07	0.04
ET1801057	Pad Brahman	0874_SW016_180417	Water	4/17/2018	0.0092	0.0211	<0.0005	0.0769	0.003	0.0885	0.165	0.0119	0.0005	0.0006	<0.0005	<0.0005	<0.002	0.0241	0.012	0.0062
ET1801057	Pad Brahman	0874_SW016_180417_F	Water	4/17/2018	<0.0005	0.0022	<0.0005	<0.0005	<0.0005	<0.0003	<0.0003	0.0105	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0241	0.0036	0.0023
ET1801093	Runoff from NQ0052 & NQ0054	0874_SW001A_180419	Water	4/19/2018	6.44	7.02	0.04	34.8	2.11	50.6	85.4	2.81	0.21	<0.02	<0.02	<0.05	2.1	14.3	2.48	4.66
ET1801057	Runway 13/31	0874_SW125_180417	Water	4/17/2018	0.39	0.37	<0.02	3.62	0.19	3.07	6.69	0.19	<0.02	<0.02	<0.02	<0.05	0.1	1.09	0.11	0.17
ET1801057	Runway 13/31	0874_SW125_180417_F	Water	4/17/2018	<0.02	0.06	<0.02	<0.02	<0.02	<0.01	<0.01	0.18	<0.02	<0.02	<0.02	<0.05	0.1	0.96	0.07	0.03
ET1800553	The Common discharge	0874_SW131_180302	Water	3/2/2018	0.172	0.172	<0.0020	1.72	0.091	3.8	5.52	0.0236	0.0034	<0.0020	<0.0020	<0.0050	0.12	0.411	0.0454	0.122
ET1800553	The Common discharge	0874_SW131_180302_F	Water	3/2/2018	0.159	0.163	<0.0020	1.63	0.085	4.07	5.7	0.0822	0.003	<0.0020	<0.0020	<0.0050	0.041	0.398	0.0436	0.116
ET1800576	The Common discharge	0874_SW131_180303	Water	3/3/2018	0.097	0.106	<0.0100	1.04	0.092	3.5	4.54	0.075	<0.0100	<0.0100	<0.0100	<0.0250	0.078	0.439	0.033	0.111
ET1800576	The Common discharge	0874_SW131_180303_F	Water	3/3/2018	0.093	0.101	<0.0100	1.05	0.088	3.16	4.21	0.062	<0.0100	<0.0100	<0.0100	<0.0250	0.076	0.454	0.039	0.113
ET1800572	The Common discharge	0874_SW131_180304	Water	3/4/2018	0.168	0.208	0.0098	1.9	0.139	4.98	6.88	0.113	<0.0020	<0.0020	<0.0020	<0.0050	0.023	0.486	0.0536	0.142
ET1800572	The Common discharge	0874_SW131_180304_F	Water	3/4/2018	0.149	0.196	0.0078	2.14	0.131	5.02	7.16	0.11	<0.0020	<0.0020	<0.0020	<0.0050	0.02	0.476	0.0542	0.133
ET1800563	The Common discharge	0874_SW131_180305	Water	3/5/2018	0.12	0.123	<0.0100	1.2	0.115	3.89	5.09	0.064	<0.0100	<0.0100	<0.0100	<0.0250	0.267	0.527	0.053	0.125
ET1800563	The Common discharge	0874_SW131_180305_F	Water	3/5/2018	0.213	0.245	<0.0100	1.7	0.114	4.5	6.2	0.111	<0.0100	<0.0100	<0.0100	<0.0250	0.095	0.475	0.048	0.176
ET1801082	The Common discharge	0874_SW131_180419	Water	4/19/2018	0.234	0.219	0.0068	2.28	0.149	2.71	4.99	0.116	0.0028	0.001	<0.0005	<0.0005	0.017	0.714	0.0875	0.142
ET1801082	The Common discharge	0874_SW131_180419_F	Water	4/19/2018	0.0053	0.107	<0.0005	<0.0005	0.002	0.001	0.001	0.128	<0.0005	<0.0005	<0.0005	<0.0005	0.023	0.752	0.0611	0.077
ET1801005	W of Ingham Sports Field adj Base boundary	0874_SW020_180411	Water	4/11/2018	0.0017	0.0191	<0.0005	0.0199	0.0007	0.0253	0.0452	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0033	<0.0005	0.0027
ET1801082	W of Runway 13/31 & Emergency Resp Areas	0874_SW015_180418	Water	4/18/2018	0.0623	0.0866	<0.0005	0.5	0.0186	0.356	0.856	0.0283	0.0011	0.0007	<0.0005	<0.0005	0.01	0.151	0.0166	0.0295

			(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS	
	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTrDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeEQSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeEQSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS	Sum of PFAS (WA DER List)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0005	0.001	0.001	0.001	0.001	0.0005	0.001	0.0005	0.001	0.001	0.0005	0.001	0.0003	0.0003
ANZECC PFAS FW 95%															
DoH and FSANZ drinking water quality value															
DoH and FSANZ recreational water quality value															

Lab Report Number	Location	Field ID	Matrix Type	Date	<0.02	<0.02	<0.05	0.13	0.82	<0.05	0.19	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	202	184
ET1801093	5AVN	0874_SW019_180419	Water	4/19/2018	<0.02	<0.02	<0.05	0.13	0.82	<0.05	0.19	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	202	184
ET1800537	5AVN	0874_SW123_180301	Water	3/1/2018	<0.0020	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	3.03	2.87
ET1800553	5AVN	0874_SW123_180302	Water	3/2/2018	<0.0020	<0.0020	<0.002	<0.002	0.003	<0.002	0.0046	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	8.25	7.75
ET1800553	5AVN	0874_SW123_180302_F	Water	3/2/2018	<0.0020	<0.0020	<0.002	0.009	<0.002	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	5.67	5.45
ET1800576	5AVN	0874_SW123_180303	Water	3/3/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	13.2	12.4
ET1800576	5AVN	0874_SW123_180303_F	Water	3/3/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	0.012	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	14.6	13.8
ET1800572	5AVN	0874_SW123_180304	Water	3/4/2018	<0.0200	<0.0200	<0.020	<0.020	0.024	<0.020	<0.0200	<0.050	<0.0200	<0.050	<0.050	<0.0200	<0.050	47.7	44.6
ET1800572	5AVN	0874_SW123_180304_F	Water	3/4/2018	<0.0200	<0.0200	<0.020	<0.020	<0.020	<0.020	<0.0200	<0.050	<0.0200	<0.050	<0.050	<0.0200	<0.050	49.3	46.1
ET1800563	5AVN	0874_SW123_180305	Water	3/5/2018	<0.0100	<0.0100	<0.010	<0.010	0.027	<0.010	0.038	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	52.1	48.7
ET1800563	5AVN	0874_SW123_180305_F	Water	3/5/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	0.025	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	73.5	65.8
ET1801082	5AVN	0874_SW123_180418	Water	4/18/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.04	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	57.4	53.1
ET1801082	5AVN	0874_SW123_180418_F	Water	4/18/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.32	7.26
ET1801098	5AVN	0874_SW124_180420	Water	4/20/2018	<0.0005	<0.0005	<0.001	0.004	<0.001	<0.001	0.0023	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	27.8	25.9
ET1801057	Domestic area	0874_SW010S_180417	Water	4/17/2018	<0.02	<0.02	<0.05	0.16	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	3.66	3.52
ET1801057	Domestic area	0874_SW010S_180417_F	Water	4/17/2018	<0.0005	<0.0005	<0.001	0.119	0.003	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	1.68	1.62
ET1801082	Mount St John	0874_SW112_180419	Water	4/19/2018	<0.0005	<0.0005	<0.001	0.004	<0.001	<0.001	0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.504	0.478
ET1801082	Mount St John	0874_SW112_180419_F	Water	4/19/2018	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.107	0.107
ES1805726	Mount St John	0874_SW130_180221	Water	2/21/2018	<0.0005	<0.0005	<0.001	0.005	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.469	0.435
ET1800983	Mount St John	0874_SW130_180410	Water	4/10/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.06
ET1800537	Mundy Creek discharge	0874_SW132_180301	Water	3/1/2018	<0.0020	<0.0020	<0.002	0.193	0.042	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	58.7	55.5
ET1800553	Mundy Creek discharge	0874_SW132_180302	Water	3/2/2018	<0.0020	<0.0020	<0.002	0.112	0.034	<0.002	0.013	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	60.1	56.2
ET1800553	Mundy Creek discharge	0874_SW132_180302_F	Water	3/2/2018	<0.0020	<0.0020	<0.002	<0.002	0.003	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	8.38	7.93
ET1800576	Mundy Creek discharge	0874_SW132_180303	Water	3/3/2018	<0.0100	<0.0100	<0.010	0.058	0.018	<0.010	0.018	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	56.8	54.3
ET1800576	Mundy Creek discharge	0874_SW132_180303_F	Water	3/3/2018	<0.0100	<0.0100	<0.010	0.092	0.016	<0.010	<0.0100	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	69.3	66.7
ET1800572	Mundy Creek discharge	0874_SW132_180304	Water	3/4/2018	<0.0200	<0.0200	<0.020	0.092	<0.020	<0.020	<0.0200	<0.050	<0.0200	<0.050	<0.050	<0.0200	<0.050	70.8	66.7
ET1800572	Mundy Creek discharge	0874_SW132_180304_F	Water	3/4/2018	<0.0200	<0.0200	<0.020	0.094	<0.020	<0.020	<0.0200	<0.050	<0.0200	<0.050	<0.050	<0.0200	<0.050	70.3	66.4
ET1800563	Mundy Creek discharge	0874_SW132_180305	Water	3/5/2018	<0.0100	<0.0100	<0.010	0.076	<0.010	<0.010	0.02	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	58.4	55.5
ET1800563	Mundy Creek discharge	0874_SW132_180305_F	Water	3/5/2018	<0.0100	<0.0100	<0.010	0.098	<0.010	<0.010	0.011	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	76.2	70.7
ET1801057	Mundy Creek discharge	0874_SW132_180417	Water	4/17/2018	<0.0005	<0.0005	<0.001	0.068	0.002	<0.001	0.0178	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	66.7	62.2
ET1801057	Mundy Creek discharge	0874_SW132_180417_F	Water	4/17/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	14.8	14.7
ET1801098	NQ0055	0874_SW039_180420	Water	4/20/2018	<0.02	<0.02	<0.05	0.53	<0.05	<0.05	0.04	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	696	644
ET1801005	NQ0105	0874_SW101_180411	Water	4/11/2018	<0.0020	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	1.3	1.24
ET1800553	NQ0105	0874_SW102_180302	Water	3/2/2018	<0.0020	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	0.627	0.6
ET1800553	NQ0105	0874_SW102_180302_F	Water	3/2/2018	<0.0020	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	0.793	0.761
ET1800576	NQ0105	0874_SW102_180303	Water	3/3/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	0.501	0.488
ET1800576	NQ0105	0874_SW102_180303_F	Water	3/3/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	0.702	0.671
ET1800572	NQ0105	0874_SW102_180304	Water	3/4/2018	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.94	0.903
ET1800572	NQ0105	0874_SW102_180304_F	Water	3/4/2018	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.794	0.766
ET1800563	NQ0105	0874_SW102_180305	Water	3/5/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	0.898	0.861
ET1800563	NQ0105	0874_SW102_180305_F	Water	3/5/2018	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.991	0.945
ET1801044	NQ0105	0874_SW102_180416	Water	4/16/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.82	1.72
ET1801044	NQ0105	0874_SW102_180416_F	Water	4/16/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.19	0.19
ET1801010	NQ0105	0874_SW103_180412	Water	4/12/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.81	1.68
ET1801010	NQ0105	0874_SW104_180412	Water	4/12/2018	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	1.97	1.75

			(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTrDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeEQSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeEQSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS	Sum of PFAS (WA DER List)	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.0005	0.0005	0.001	0.001	0.001	0.001	0.0005	0.001	0.0005	0.001	0.001	0.0005	0.001	0.0003	0.0003	
ANZECC PFAS FW 95%																
DoH and FSANZ drinking water quality value																
DoH and FSANZ recreational water quality value																

Lab Report Number	Location	Field ID	Matrix Type	Date																
ET1801057	NQ0106 & OLAs	0874_SW126_180417	Water	4/17/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.6	7.22	
ET1801057	NQ0106 & OLAs	0874_SW126_180417_F	Water	4/17/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.42	1.37	
ET1801057	NW Base boundary/OLAs	0874_SW012_180417	Water	4/17/2018	<0.0005	<0.0005	<0.001	0.011	<0.001	<0.001	0.0018	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	8.7	8.26	
ET1801057	NW Base boundary/OLAs	0874_SW013_180417	Water	4/17/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	12.2	11.6	
ET1801057	NW Base boundary/OLAs	0874_SW013_180417_F	Water	4/17/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.43	1.43	
ET1801057	Pad Brahman	0874_SW016_180417	Water	4/17/2018	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.254	0.241	
ET1801057	Pad Brahman	0874_SW016_180417_F	Water	4/17/2018	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0427	0.0427	
ET1801093	Runoff from NQ0052 & NQ0054	0874_SW001A_180419	Water	4/19/2018	<0.02	<0.02	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	128	119	
ET1801057	Runway 13/31	0874_SW125_180417	Water	4/17/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	9.3	8.72	
ET1801057	Runway 13/31	0874_SW125_180417_F	Water	4/17/2018	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.4	1.4	
ET1800553	The Common discharge	0874_SW131_180302	Water	3/2/2018	<0.0020	<0.0020	<0.002	0.008	0.003	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	6.69	6.42	
ET1800553	The Common discharge	0874_SW131_180302_F	Water	3/2/2018	<0.0020	<0.0020	<0.002	0.009	<0.002	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	6.8	6.55	
ET1800576	The Common discharge	0874_SW131_180303	Water	3/3/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	5.57	5.38	
ET1800576	The Common discharge	0874_SW131_180303_F	Water	3/3/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	5.24	5.06	
ET1800572	The Common discharge	0874_SW131_180304	Water	3/4/2018	<0.0020	<0.0020	<0.002	0.019	<0.002	<0.002	0.0046	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	8.25	7.92	
ET1800572	The Common discharge	0874_SW131_180304_F	Water	3/4/2018	<0.0020	<0.0020	<0.002	0.013	<0.002	<0.002	<0.0020	<0.005	<0.0020	<0.005	<0.005	<0.0020	<0.005	8.45	8.16	
ET1800563	The Common discharge	0874_SW131_180305	Water	3/5/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	6.48	6.25	
ET1800563	The Common discharge	0874_SW131_180305_F	Water	3/5/2018	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.025	<0.0100	<0.025	<0.025	<0.0100	<0.025	7.68	7.35	
ET1801082	The Common discharge	0874_SW131_180419	Water	4/19/2018	<0.0005	<0.0005	<0.001	0.014	<0.001	<0.001	0.0022	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	6.7	6.3	
ET1801082	The Common discharge	0874_SW131_180419_F	Water	4/19/2018	<0.0005	<0.0005	<0.001	0.009	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	1.16	1.16	
ET1801005	W of Ingham Sports Field adj Base boundary	0874_SW020_180411	Water	4/11/2018	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0727	0.0703	
ET1801082	W of Runway 13/31 & Emergency Resp Areas	0874_SW015_180418	Water	4/18/2018	<0.0005	<0.0005	<0.001	0.005	<0.001	<0.001	0.0009	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	1.27	1.18	

Table 8 - off-Base Soil Analytical Results - PFAS

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids											
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorobutanoic acid (PFBA)	Perfluorotetradecanoic acid (PFTrDA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTrDA)	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQI	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	
NEMP – Human health – Industrial/commercial							20									50			
NEMP – Human health – Public open space							1									10			
NEMP – Human health – Residential with minimal opportunities for soil access							2									20			
NEMP – Human health – Residential with garden/accessible soil							0.009									0.1			

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date	Depth																		
ES1730525	Garbutt Community	0874_BH257_1.5_171129	Soil	29/11/2017	1.5	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1730525	Garbutt Community	0874_BH258_3.5_171129	Soil	29/11/2017	3.5	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1730378	Garbutt Community	0874_BH259_4.0_171128	Soil	28/11/2017	4	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1730378	Garbutt Community	0874_BH260_3.0_171128	Soil	28/11/2017	3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1730525	Garbutt Community	0874_BH267_3.0_171129	Soil	29/11/2017	3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1730694	Garbutt Community	0874_BH270_3.0_171130	Soil	30/11/2017	3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1718168	Garbutt Community	0874_MW217_§_0.5_170713	Soil	13/07/2017	0.5	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EB1714585	Garbutt Community	0874_MW218_§_0.2_170713	Soil	13/07/2017	0.2	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1718168	Garbutt Community	0874_MW219_§_0.2_170713	Soil	13/07/2017	0.2	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0003	0.0003	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1718168	Garbutt Community	0874_MW220_§_0.2_170714	Soil	14/07/2017	0.2	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EB1714585	Garbutt Community	0874_MW220_§_3.0_170714	Soil	14/07/2017	3	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1718902	Garbutt Community	0874_MW221_§_1.5_170728	Soil	28/07/2017	1.5	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1718902	Garbutt Community	0874_MW225_§_3.0_170728	Soil	28/07/2017	3	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1730694	Garbutt Community	0874_MW263_2.0_171130	Soil	30/11/2017	2	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	0.0004	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1732609	Garbutt Community	0874_MW266_3.0_171218	Soil	18/12/2017	3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1730694	Garbutt Community	0874_MW268_4.0_171130	Soil	30/11/2017	4	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ET1801697	Garbutt Community	0874_SS200_180625	Soil	25/06/2018	0.01	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	0.001	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ET1801702	Garbutt Community	0874_SS204_180625	Soil	25/06/2018	0.01	<0.0002	<0.0002	<0.0002	0.0016	<0.0002	0.0012	0.003	<0.0002	<0.0002	0.0008	0.0009	<0.001	<0.0005	0.0003	<0.0002	0.0003	0.0004	
ES1718902	Garbutt	0874_MW236_§_6.0_170728	Soil	28/07/2017	6	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW201_§_3.0_170811	Soil	11/08/2017	3	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW202_§_3.0_170812	Soil	12/08/2017	3	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EB1716707	Town Common	0874_MW203_§_4.0_170812	Soil	12/08/2017	4	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW204_§_1.5_170810	Soil	10/08/2017	1.5	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW205_§_1.0_170810	Soil	10/08/2017	1	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW206_§_1.5_170810	Soil	10/08/2017	1.5	0.0004	<0.0002	-	0.0026	<0.0002	<0.0002	0.0026	<0.0002	<0.001	<0.0005	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW206_§_4.0_170810	Soil	10/08/2017	4	0.0004	0.0002	-	0.0022	<0.0002	<0.0002	0.0022	<0.0002	<0.0002	<0.001	<0.0005	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW207_§_1.5_170810	Soil	10/08/2017	1.5	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW208_§_2.0_170810	Soil	10/08/2017	2	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EB1714211	Cleveland Bay/Rowes Bay	0874_MW209_§_1.5_170710	Soil	10/07/2017	1.5	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EB1714774	Cleveland Bay/Rowes Bay	0874_MW210_§_0.2_170710	Soil	10/07/2017	0.2	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0008	0.0008	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EB1714266	Rowes Bay	0874_MW211_§_0.5_170711	Soil	11/07/2017	0.5	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1714865	Rowes Bay	0874_MW242_§_2.5_170612	Soil	12/06/2017	2.5	<0.0002	<0.0002	-	0.0006	<0.0002	0.0013	0.0019	<0.0002	<0.0002	<0.001	<0.0005	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ET1801701	Rowes Bay	0874_SS202_180626	Soil	26/06/2018	0.01	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0012	0.0012	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EB1815767	Rowes Bay	0874_SS203_180628	Soil	28/06/2018	0.01	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0006	0.0004	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
ES1718168	Belgian Gardens	0874_MW216_§_0.2_170713	Soil	13/07/2017	0.2	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	&									

Table 8 - off-Base Soil Analytical Results - PFAS

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-nonyl perfluorooctane sulfonamidoacetic acid (MeC8SAA) (N-fluetyl)	perfluorooctane sulfonamidoethanol (MeC8SF)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS	Sum of PFAS (WA DER List)	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQI	0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	
NEMP – Human health – Industrial/commercial														
NEMP – Human health – Public open space														
NEMP – Human health – Residential with minimal opportunities for soil access														
NEMP – Human health – Residential with garden/accessible soil														

Lab Report Number	Off-Base Area	Field ID	Matrix Type	Date	Depth														
ES1730525	Garbutt Community	0874_BH257_1.5_171129	Soil	29/11/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1730525	Garbutt Community	0874_BH258_3.5_171129	Soil	29/11/2017	3.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1730378	Garbutt Community	0874_BH259_4.0_171128	Soil	28/11/2017	4	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1730378	Garbutt Community	0874_BH260_3.0_171128	Soil	28/11/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1730525	Garbutt Community	0874_BH267_3.0_171129	Soil	29/11/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1730694	Garbutt Community	0874_BH270_3.0_171130	Soil	30/11/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1718168	Garbutt Community	0874_MW217_S_0.5_170713	Soil	13/07/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
EB1714585	Garbutt Community	0874_MW218_S_0.2_170713	Soil	13/07/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1718168	Garbutt Community	0874_MW219_S_0.2_170713	Soil	13/07/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	
ES1718168	Garbutt Community	0874_MW220_S_0.2_170714	Soil	14/07/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
EB1714585	Garbutt Community	0874_MW220_S_3.0_170714	Soil	14/07/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1718902	Garbutt Community	0874_MW221_S_1.5_170728	Soil	28/07/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1718902	Garbutt Community	0874_MW225_S_3.0_170728	Soil	28/07/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1730694	Garbutt Community	0874_MW263_2.0_171130	Soil	30/11/2017	2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	
ES1732609	Garbutt Community	0874_MW266_3.0_171218	Soil	18/12/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1730694	Garbutt Community	0874_MW268_4.0_171130	Soil	30/11/2017	4	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ET1801697	Garbutt Community	0874_SS200_180625	Soil	25/06/2018	0.01	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	
ET1801702	Garbutt Community	0874_SS204_180625	Soil	25/06/2018	0.01	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	
ES1718902	Garbutt	0874_MW236_S_6.0_170728	Soil	28/07/2017	6	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW201_S_3.0_170811	Soil	11/08/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW202_S_3.0_170812	Soil	12/08/2017	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
EB1716707	Town Common	0874_MW203_S_4.0_170812	Soil	12/08/2017	4	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW204_S_1.5_170810	Soil	10/08/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW205_S_1.0_170810	Soil	10/08/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW206_S_1.5_170810	Soil	10/08/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0039	0.0035	
ES1720186	Town Common	0874_MW206_S_4.0_170810	Soil	10/08/2017	4	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0036	0.0032	
ES1720186	Town Common	0874_MW207_S_1.5_170810	Soil	10/08/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1720186	Town Common	0874_MW208_S_2.0_170810	Soil	10/08/2017	2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
EB1714211	Cleveland Bay/Rowes Bay	0874_MW209_S_1.5_170710	Soil	10/07/2017	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
EB1714774	Cleveland Bay/Rowes Bay	0874_MW210_S_0.2_170710	Soil	10/07/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0008	0.0008	
EB1714266	Rowes Bay	0874_MW211_S_0.5_170711	Soil	11/07/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1714865	Rowes Bay	0874_MW242_S_2.5_170612	Soil	12/06/2017	2.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0021	0.0021	
ET1801701	Rowes Bay	0874_SS202_180626	Soil	26/06/2018	0.01	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	
EB1815767	Rowes Bay	0874_SS203_180628	Soil	28/06/2018	0.01	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	
ES1718168	Belgian Gardens	0874_MW216_S_0.2_170713	Soil	13/07/2017	0.2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1730692	Belgian Gardens	0874_MW256_4.0_171201	Soil	1/12/2017	4	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1732537	Belgian Gardens	0874_MW261_10.0_171219	Soil	19/12/2017	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1804071	Belgian Gardens	0874_MW269_0.5_171219	Soil	19/12/2017	0.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ES1718902	Bushland Beach	0874_MW231_S_1.0_170731	Soil	31/07/2017	1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
EB1802408	Pallarenda	0874_MW233_S_3.0_180118	Soil	18/01/2018	3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
ET1801700	Pallarenda	0874_SS201_180627	Soil	27/06/2018	0.01	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	-	-	
EB1802408	Pallarenda	0874_MW252_S_1.5_180119	Soil	19/01/2018	1.5	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	
EB1802408	Pallarenda	0874_MW253_S_1.5_180118	Soil	18/01/2018	1.5	<0.0005													

					NA	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids										
					Moisture Content	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)
					%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					1	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002
NEMP – Human health – Industrial/commercial												20					50						
NEMP – Human health – Public open space												1					10						
NEMP – Human health – Residential with minimal opportunities for soil access												2					20						
NEMP – Human health – Residential with garden/accessible soil												0.009					0.1						
Lab Report Number	off-Base Area	Field ID	Matrix Type	Date																			
ES1717810	Background (outside IIA)	0874_SD211_170714	Sediment	14/07/2017	22.9	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	Background (outside IIA)	0874_SD212_170713	Sediment	13/07/2017	28.1	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	0.0031	0.0034	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	Background (outside IIA)	0874_SD213_170712	Sediment	12/07/2017	52.5	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	0.0007	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Bohle River	0874_SD129_170717	Sediment	17/07/2017	33.4	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	0.0007	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	Bohle River	0874_SD201_170717	Sediment	17/07/2017	32.1	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	Bohle River	0874_SD202_170715	Sediment	15/07/2017	67.8	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0031	0.0031	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	Bohle River	0874_SD203_170714	Sediment	14/07/2017	35.2	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0006	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	Bohle River	0874_SD204_170714	Sediment	14/07/2017	59.4	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	0.0013	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Cleveland Bay	0874_SD107_170717	Sediment	17/07/2017	49.8	<0.0002	<0.0002	0.0014	<0.0002	<0.0002	0.0154	0.0168	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	Cleveland Bay	0874_SD210_170717	Sediment	17/07/2017	34.9	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	0.002	0.0023	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1714865	Commercial Property - Garbutt	0874_SD113_170612	Sediment	12/06/2017	12.6	0.0012	0.0028	0.0047	<0.0002	<0.0002	0.0005	0.0052	<0.001	<0.0002	0.0023	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Commercial Property - Garbutt	0874_SD117_170718	Sediment	18/07/2017	40.7	0.0005	0.0007	0.0078	0.0007	0.0002	0.0409	0.0487	<0.001	<0.0002	0.0013	0.0003	0.0012	<0.0002	<0.0002	<0.0002	0.0003	<0.0005	<0.0002
ET1701071	Downstream of Fuel Farm 1 (NQ0052) & NQ0054	0874_SD119_170816	Sediment	16/08/2017	40.2	0.0013	0.0007	0.0234	0.0025	<0.0002	0.187	0.21	<0.001	<0.0002	0.0016	0.0002	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	East of NQ0105	0874_SD209_170717	Sediment	17/07/2017	68.7	<0.0002	<0.0002	0.0012	<0.0002	<0.0002	0.0194	0.0206	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ET1701071	Ecological Area (within the Common)	0874_SD106_170816	Sediment	16/08/2017	21.3	0.0004	0.0004	0.0022	<0.0002	<0.0002	0.0052	0.0074	<0.001	<0.0002	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ET1701082	Ecological Area (within the Common)	0874_SD110_170818	Sediment	18/08/2017	50.2	0.0012	0.0007	0.0133	0.0011	<0.0002	0.0628	0.0761	<0.001	<0.0002	0.0023	0.0002	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ET1701082	Ecological Area (within the Common)	0874_SD111_170818	Sediment	18/08/2017	35.9	0.0002	<0.0002	0.0049	0.0008	<0.0002	0.0664	0.0713	<0.001	<0.0002	0.0007	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Garbutt Community	0874_SD014_170717	Sediment	17/07/2017	75.3	<0.0002	<0.0002	0.0014	<0.0002	<0.0002	0.0052	0.0066	<0.001	<0.0002	0.0003	<0.0002	0.0003	<0.0002	0.0005	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Garbutt Community	0874_SD017_170717	Sediment	17/07/2017	34.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Garbutt Community	0874_SD120_170717	Sediment	17/07/2017	39.6	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Garbutt Community	0874_SD127_170717	Sediment	17/07/2017	70.2	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Garbutt Community	0874_SD128_170717	Sediment	17/07/2017	56	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	0.0005	0.0007	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Garbutt Community	0874_SD115_170717	Sediment	17/07/2017	40.4	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0014	0.0014	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Garbutt Community	0874_SD118_170717	Sediment	17/07/2017	56.9	0.0005	0.0009	0.0052	0.0004	<0.0002	0.0171	0.0223	<0.001	<0.0002	0.0012	0.0003	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	Mundy Ck Catchment (off-Base)	0874_SD208_170714	Sediment	14/07/2017	42.4	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	0.0011	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Rowes Bay	0874_SD114_170717	Sediment	17/07/2017	85.9	<0.0002	<0.0002	0.001	0.0003	<0.0002	0.0096	0.0106	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	0.0003	<0.0002	0.0003	<0.0006	<0.0002
ES1717838	Rowes Bay	0874_SD108_170717	Sediment	17/07/2017	32.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	0.0011	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Rowes Bay	0874_SD109_170718	Sediment	18/07/2017	30.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717838	Rowes Bay	0874_SD116_170717	Sediment	17/07/2017	37.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	0.0009	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	The Common	0874_SD205_170715	Sediment	15/07/2017	55.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	The common	0874_SD206_170713	Sediment	13/07/2017	33.6	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0006	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
ES1717810	The Common	0874_SD207_170715	Sediment	15/07/2017	49.5	<0.0002	<0.0002	0.001	<0.0002	<0.0002	0.0073	0.0083	<0.001	<0.0002	0.0007	0.0002	0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002

					(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
					4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)		Sum of PFAS	Sum of PFAS (WA DER List)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg
EQL					0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005		0.0002	0.0002
NEMP – Human health – Industrial/commercial																		
NEMP – Human health – Public open space																		
NEMP – Human health – Residential with minimal opportunities for soil access																		
NEMP – Human health – Residential with garden/accessible soil																		
Lab Report Number	off-Base Area	Field ID	Matrix Type	Date														
ES1717810	Background (outside IIA)	0874_SD211_170714	Sediment	14/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
ES1717810	Background (outside IIA)	0874_SD212_170713	Sediment	13/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0034	0.0034	
ES1717810	Background (outside IIA)	0874_SD213_170712	Sediment	12/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0007	0.0007	
ES1717838	Bohle River	0874_SD129_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0007	0.0007	
ES1717810	Bohle River	0874_SD201_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
ES1717810	Bohle River	0874_SD202_170715	Sediment	15/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0031	0.0031	
ES1717810	Bohle River	0874_SD203_170714	Sediment	14/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	
ES1717810	Bohle River	0874_SD204_170714	Sediment	14/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0013	0.0013	
ES1717838	Cleveland Bay	0874_SD107_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0168	0.0168	
ES1717810	Cleveland Bay	0874_SD210_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0027	0.0027	
ES1714865	Commercial Property - Garbutt	0874_SD113_170612	Sediment	12/06/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0117	0.0105	
ES1717838	Commercial Property - Garbutt	0874_SD117_170718	Sediment	18/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0542	0.0522	
ET1701071	Downstream of Fuel Farm 1 (NQ0052) & NQ0054	0874_SD119_170816	Sediment	16/08/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.218	0.214	
ES1717810	East of NQ0105	0874_SD209_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0206	0.0206	
ET1701071	Ecological Area (within the Common)	0874_SD106_170816	Sediment	16/08/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0091	0.0087	
ET1701082	Ecological Area (within the Common)	0874_SD110_170818	Sediment	18/08/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	0.0006	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0831	0.0802	
ET1701082	Ecological Area (within the Common)	0874_SD111_170818	Sediment	18/08/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0733	0.0723	
ES1717838	Garbutt Community	0874_SD014_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0077	0.0072	
ES1717838	Garbutt Community	0874_SD017_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
ES1717838	Garbutt Community	0874_SD120_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
ES1717838	Garbutt Community	0874_SD127_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	
ES1717838	Garbutt Community	0874_SD128_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0007	0.0007	
ES1717838	Garbutt Community	0874_SD115_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0014	0.0014	
ES1717838	Garbutt Community	0874_SD118_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0264	0.0255	
ES1717810	Mundy Ck Catchment (off-Base)	0874_SD208_170714	Sediment	14/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0011	0.0011	
ES1717838	Rowes Bay	0874_SD114_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0006	<0.0002	<0.0006	<0.0006	<0.0002	<0.0006	0.0119	0.0106	
ES1717838	Rowes Bay	0874_SD108_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0011	0.0011	
ES1717838	Rowes Bay	0874_SD109_170718	Sediment	18/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
ES1717838	Rowes Bay	0874_SD116_170717	Sediment	17/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0009	0.0009	
ES1717810	The Common	0874_SD205_170715	Sediment	15/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
ES1717810	The common	0874_SD206_170713	Sediment	13/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	
ES1717810	The Common	0874_SD207_170715	Sediment	15/07/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0102	0.0102	

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids											
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorobutanoic acid (PFBA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorohexanoic acid (PFHxA)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptanoic acid (PFHpA)	Perfluorotetradecanoic acid (PFTrDA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTrDA)	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial							20										50		
NEMP – Human health – Public open space							1										10		
NEMP – Human health – Residential with garden/accessible soil							0.009										0.1		
NEMP – Human health – Residential with minimal opportunities for soil access							2										20		

Lab Report Number	Location	Field ID	Matrix Type	Date																
EB1809799	Background (outside IA)	0874_SD211_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Background (outside IA)	0874_SD212_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Background (outside IA)	0874_SD213_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0022	0.0022	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1810072	Bohle River	0874_SD129_180420	Sediment	20/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1810072	Bohle River	0874_SD201_180420	Sediment	20/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Bohle River	0874_SD202_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0012	0.0012	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Bohle River	0874_SD203_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Bohle River	0874_SD204_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809052	Cleveland Bay	0874_SD210_180410	Sediment	10/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0015	0.0015	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1810046	Downstream of Fuel Farm 1 (NQ0052) & NQ0054	0874_SD121_180419	Sediment	19/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	0.0009	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809230	Ecological Area	0874_SD110_180411	Sediment	11/04/2018	0.0008	0.0011	<0.0002	0.0094	0.0011	0.096	0.105	<0.0002	<0.001	<0.0002	<0.0002	0.0022	<0.0002	0.0003	0.0009	<0.0002
EB1809230	Ecological Area	0874_SD111_180411	Sediment	11/04/2018	0.0003	0.0002	<0.0002	0.004	0.0002	0.0172	0.0212	<0.0002	<0.001	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	<0.0005	<0.0002
EB1809799	Garbutt Community	0874_SD014_180419	Sediment	19/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1810072	Garbutt Community	0874_SD120_180420	Sediment	20/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1810072	Garbutt Community	0874_SD127_180420	Sediment	20/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.001	0.001	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1810072	Garbutt Community	0874_SD128_180420	Sediment	20/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
ES1805726	Garbutt Community	0874_SD130_180221	Sediment	21/02/2018	<0.0002	0.0003	<0.0002	0.0007	<0.0002	0.0044	0.0051	<0.0002	<0.001	<0.0002	<0.0002	0.0004	<0.0002	<0.0006	0.0004	<0.0002
EB1809052	Garbutt Community	0874_SD130_180410	Sediment	10/04/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0018	0.0018	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0006	<0.0002	<0.0002
EB1809052	Commercial Property - Garbutt	0874_SD113_180410	Sediment	10/04/2018	0.0019	0.0026	<0.0002	0.0384	0.0032	0.205	0.243	0.0012	<0.001	<0.0002	<0.0002	0.0062	<0.0002	0.0012	<0.0005	0.0033
EB1810046	Commercial Property - Garbutt	0874_SD117_180419	Sediment	19/04/2018	0.0012	0.0015	0.0006	0.0098	0.0008	0.0672	0.077	0.0007	<0.001	<0.0002	<0.0002	0.0038	<0.0002	0.0006	<0.0005	0.0016
EB1810072	Rowes Bay	0874_SD107_180420	Sediment	20/04/2018	<0.0002	<0.0002	<0.0002	0.0016	<0.0002	0.0053	0.0069	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809052	Rowes Bay	0874_SD108_180410	Sediment	10/04/2018	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0032	0.0035	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809052	Rowes Bay	0874_SD109_180410	Sediment	10/04/2018	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	0.0039	0.0043	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	0.0004	<0.0002
EB1809052	Rowes Bay	0874_SD114_180410	Sediment	10/04/2018	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0045	0.0048	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809052	Rowes Bay	0874_SD115_180410	Sediment	10/04/2018	0.0003	0.0006	0.0012	0.0072	0.0008	0.0526	0.0598	0.0002	<0.001	<0.0002	<0.0002	0.0013	<0.0002	0.0002	<0.0005	0.0009
EB1809052	Rowes Bay	0874_SD116_180410	Sediment	10/04/2018	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	0.0047	0.0054	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809052	Rowes Bay	0874_SD118_180410	Sediment	10/04/2018	0.0003	0.0005	0.0008	0.006	0.0006	0.047	0.053	0.0002	<0.001	<0.0002	<0.0002	0.0013	<0.0002	0.0003	<0.0005	0.001
EB1809052	Rowes Bay	0874_SD208_180410	Sediment	10/04/2018	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.0116	0.0121	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	0.0003	<0.0002
EB1809799	Town Common	0874_SD205_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	0.0058	0.0066	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Town Common	0874_SD206_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0015	0.0018	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Town Common	0874_SD207_180418	Sediment	18/04/2018	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	0.0042	0.0046	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	perfluorooctane sulfonamidacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (MeFOSAE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSAE)	Sum of PFAS (WA DER List)	Sum of PFAS	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	
NEMP – Human health – Industrial/commercial														
NEMP – Human health – Public open space														
NEMP – Human health – Residential with garden/accessible soil														
NEMP – Human health – Residential with minimal opportunities for soil access														

Lab Report Number	Location	Field ID	Matrix Type	Date	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Background (outside IA)	0874_SD211_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Background (outside IA)	0874_SD212_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Background (outside IA)	0874_SD213_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0022	0.0022
EB1810072	Bohle River	0874_SD129_180420	Sediment	20/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003
EB1810072	Bohle River	0874_SD201_180420	Sediment	20/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
EB1809799	Bohle River	0874_SD202_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0012	0.0012
EB1809799	Bohle River	0874_SD203_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004
EB1809799	Bohle River	0874_SD204_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0005
EB1809052	Cleveland Bay	0874_SD210_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0015	0.0015
EB1810046	Downstream of Fuel Farm 1 (NQ0052) & NQ0054	0874_SD121_180419	Sediment	19/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0009	0.0009
EB1809230	Ecological Area	0874_SD110_180411	Sediment	11/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.110	0.112
EB1809230	Ecological Area	0874_SD111_180411	Sediment	11/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0219	0.0224
EB1809799	Garbutt Community	0874_SD014_180419	Sediment	19/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002
EB1810072	Garbutt Community	0874_SD120_180420	Sediment	20/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
EB1810072	Garbutt Community	0874_SD127_180420	Sediment	20/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0010	0.0010
EB1810072	Garbutt Community	0874_SD128_180420	Sediment	20/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
ES1805726	Garbutt Community	0874_SD130_180221	Sediment	21/02/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0006	<0.0002	<0.0006	<0.0006	<0.0002	<0.0006	0.0062	0.0065
EB1809052	Garbutt Community	0874_SD130_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0006	<0.0002	<0.0006	<0.0006	<0.0002	<0.0006	0.0018	0.0018
EB1809052	Commercial Property - Garbutt	0874_SD113_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.258	0.263
EB1810046	Commercial Property - Garbutt	0874_SD117_180419	Sediment	19/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0852	0.0878
EB1810072	Rowes Bay	0874_SD107_180420	Sediment	20/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0069	0.0069
EB1809052	Rowes Bay	0874_SD108_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0035	0.0035
EB1809052	Rowes Bay	0874_SD109_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0047	0.0047
EB1809052	Rowes Bay	0874_SD114_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0048	0.0048
EB1809052	Rowes Bay	0874_SD115_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0630	0.0656
EB1809052	Rowes Bay	0874_SD116_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0054	0.0054
EB1809052	Rowes Bay	0874_SD118_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0563	0.0580
EB1809052	Rowes Bay	0874_SD208_180410	Sediment	10/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0124	0.0124
EB1809799	Town Common	0874_SD205_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0066	0.0066
EB1809799	Town Common	0874_SD206_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0018	0.0018
EB1809799	Town Common	0874_SD207_180418	Sediment	18/04/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0046	0.0046

EQL	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids											
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorobutanoic acid (PFBA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTrDA)	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
ANZECC PFAS FW 95%	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.1	0.05	0.02	0.02	0.01	0.02	0.02	
FSANZ 2017 PFAS drinking water							0.13									220			
FSANZ 2017 PFAS recreational water							0.7									0.56			

Lab Report Number	Off-Base Area	Field ID	Matrix Type	Date	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ES1721256	Private Land Extraction Bores	0874 BW001 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801677	Private Land Extraction Bores	0874 BW001 180627	Groundwater	27/06/2018	<0.0005	0.0055	<0.0005	0.0035	0.0007	0.0126	0.0161	0.0021	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	0.0011	<0.0005	0.0011	<0.0005	<0.0005
ES1721257	Private Land Extraction Bores	0874 BW002 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.03	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801687	Private Land Extraction Bores	0874 BW002 180627	Groundwater	27/06/2018	<0.0005	0.0058	<0.0005	0.0046	<0.0005	0.0518	0.0564	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	0.0013	<0.0005	<0.0005
ES1721258	Private Land Extraction Bores	0874 BW003 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801683	Private Land Extraction Bores	0874 BW003 180627	Groundwater	27/06/2018	0.0005	0.0082	<0.0005	0.0041	<0.0005	0.0066	0.0107	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
ES1721260	Private Land Extraction Bores	0874 BW004 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801675	Private Land Extraction Bores	0874 BW004 180628	Groundwater	28/06/2018	0.0010	0.0065	<0.0005	0.0064	0.0012	0.0218	0.0282	0.0006	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
ES1721263	Private Land Extraction Bores	0874 BW005 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	0.04	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.03	<0.02	<0.02
ET1801686	Private Land Extraction Bores	0874 BW005 180627	Groundwater	27/06/2018	0.0010	0.0087	<0.0005	0.0115	0.0017	0.0219	0.0334	0.0081	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	0.0206	0.0040	0.0090	<0.0005	<0.0005
ES1721264	Private Land Extraction Bores	0874 BW006 170823	Groundwater	23/08/2017	0.03	0.04	<0.02	0.14	<0.02	0.1	0.24	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.04	<0.02	0.01	<0.02	<0.02
ET1801693	Private Land Extraction Bores	0874 BW006 180626	Groundwater	26/06/2018	0.0163	0.0335	<0.0005	0.106	0.0058	0.0740	0.180	0.0069	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	0.0092	0.0039	0.0062	<0.0005	<0.0005
ES1721265	Private Land Extraction Bores	0874 BW007 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.04	<0.02	<0.02
ET1801689	Private Land Extraction Bores	0874 BW007 180626	Groundwater	26/06/2018	0.0006	0.0066	<0.0005	0.0046	0.0006	0.0209	0.0255	0.0129	0.0021	<0.0005	<0.0005	<0.002	<0.0005	0.0154	0.0162	0.0332	<0.0005	<0.0005
ES1721267	Private Land Extraction Bores	0874 BW008 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801696	Private Land Extraction Bores	0874 BW008 180628	Groundwater	28/06/2018	<0.0005	0.0025	<0.0005	<0.0005	<0.0005	<0.003	#	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
ES1721268	Private Land Extraction Bores	0874 BW009 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801680	Private Land Extraction Bores	0874 BW009 180627	Groundwater	27/06/2018	<0.0005	0.0106	<0.0005	0.0042	0.0011	0.0177	0.0219	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	0.0021	<0.0005	<0.0005
ES1721270	Private Land Extraction Bores	0874 BW010 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801701	Private Land Extraction Bores	0874 BW010 180626	Groundwater	26/06/2018	0.0006	0.0215	<0.0005	0.0101	0.0013	0.0150	0.0251	0.0049	0.0009	<0.0005	<0.0005	<0.002	<0.0005	0.0032	0.0056	0.0079	<0.0005	<0.0005
ES1721272	Private Land Extraction Bores	0874 BW011 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ES1721273	Private Land Extraction Bores	0874 BW012 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ES1721276	Private Land Extraction Bores	0874 BW013 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801681	Private Land Extraction Bores	0874 BW013 180627	Groundwater	27/06/2018	0.0025	0.0141	<0.0005	0.0111	0.0015	0.0320	0.0431	0.0055	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	0.0031	0.0018	0.0015	<0.0005	<0.0005
ES1721277	Private Land Extraction Bores	0874 BW014 170823	Groundwater	23/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801699	Private Land Extraction Bores	0874 BW014 180627	Groundwater	27/06/2018	0.0009	0.0064	<0.0005	0.0084	0.0011	0.0137	0.0221	0.0036	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	0.0025	0.0028	0.0058	<0.0005	<0.0005
ES1721279	Private Land Extraction Bores	0874 BW015 170824	Groundwater	24/08/2017	0.07	0.07	<0.02	0.84	<0.02	0.4	1.24	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.06	0.02	0.03	<0.02	<0.02
ET1801702	Private Land Extraction Bores	0874 BW015 180625	Groundwater	25/06/2018	0.0759	0.0999	<0.0005	0.723	0.0222	0.422	1.145	0.0189	0.0017	<0.0005	<0.0005	<0.002	<0.0005	0.0500	0.0214	0.0247	<0.0005	<0.0005
ES1721280	Private Land Extraction Bores	0874 BW016 170824	Groundwater	24/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.03	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ES1721281	Private Land Extraction Bores	0874 BW017 170824	Groundwater	24/08/2017	<0.02	0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.01	<0.02	<0.02
ES1721282	Private Land Extraction Bores	0874 BW018 170824	Groundwater	24/08/2017	<0.02	<0.02	<0.02	0.07	<0.02	0.02	0.09	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.02	<0.02	<0.01	<0.02	<0.02
ES1721283	Private Land Extraction Bores	0874 BW019 170824	Groundwater	24/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1800003	Private Land Extraction Bores	0874 BW020 171213	Groundwater	13/12/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801684	Private Land Extraction Bores	0874 BW020 180627	Groundwater	27/06/2018	0.0008	0.0070	<0.0005	0.0242	0.0010	0.0100	0.0342	0.0016	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	0.0018	0.0012	0.0007	<0.0005	<0.0005
ET1800005	Private Land Extraction Bores	0874 BW021 171214	Groundwater	14/12/2017	<0.02	<0.02	<0.02	0.02	<0.02	0.03	0.05	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801692	Private Land Extraction Bores	0874 BW021 180625	Groundwater	25/06/2018	0.0022	0.0042	<0.0005	0.0359	0.0011	0.0121	0.0480	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	0.0019	<0.0005	<0.0005
ET1800006	Private Land Extraction Bores	0874 BW022 171214	Groundwater	14/12/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.03	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801700	Private Land Extraction Bores	0874 BW022 180627	Groundwater	27/06/2018	<0.0005	0.0054	<0.0005	0.0025	0.0006	0.0054	0.0079	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
ET1801688	Private Land Extraction Bores	0874 BW023 180626	Groundwater	26/06/2018	0.0005	0.0102	<0.0005	0.0030	<0.0005	0.0109	0.0139	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	0.0007	<0.0005	<0.0005
ET1800155	Private Land Extraction Bores	0874 BW024 180118	Groundwater	18/01/2018	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801690	Private Land Extraction Bores																					

EQL	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids													
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorooctadecane sulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDDA)	Perfluorobutanoic acid (PFBA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTrDA)			
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
ANZECC PFAS FW 95%	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.1	0.05	0.02	0.02		220	0.02	0.02		
FSANZ 2017 PFAS drinking water							0.07										0.56				
FSANZ 2017 PFAS recreational water							0.7										5.6				

Lab Report Number	Off-Base Area	Field ID	Matrix Type	Date																			
ET1701038	Cleveland Bay	0874_MW209_S_170814	Groundwater	14/08/2017	<0.02	0.03	<0.02	0.09	<0.02	0.1	0.19	0.03	<0.02	<0.02	<0.02	<0.1	<0.05	0.04	<0.02	0.02	<0.02	<0.02	<0.02
ET1701038	Cleveland Bay	0874_MW210_S_170814	Groundwater	14/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701038	Cleveland Bay	0874_MW211_S_170814	Groundwater	14/08/2017	<0.02	<0.02	<0.02	0.02	<0.02	0.05	0.07	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701055	Rowes Bay	0874_MW212_S_170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701055	Rowes Bay	0874_MW213_S_170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701771	Rowes Bay	0874_MW256_S_171207	Groundwater	7/12/2017	<0.02	<0.02	<0.02	0.02	<0.02	0.07	0.09	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
ES1803162	Rowes Bay	0874_MW264_S_180123	Groundwater	23/01/2018	<0.02	<0.02	<0.02	0.02	<0.02	<0.01	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701038	Rowes Bay Landfill	0874_MWRB1_S_170814	Groundwater	14/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.12	0.12	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701082	Rowes Bay Landfill	0874_MWRB2_S_170818	Groundwater	18/08/2017	<0.02	0.07	<0.02	0.04	<0.02	0.04	0.08	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701038	Rowes Bay Landfill	0874_MWRB3_S_170814	Groundwater	14/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	0.05	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701038	Rowes Bay Landfill	0874_MWRB5_S_170814	Groundwater	14/08/2017	0.1	0.04	<0.02	0.38	<0.02	0.09	0.47	0.04	<0.02	<0.02	<0.02	<0.1	<0.05	0.11	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701055	Belgian Gardens	0874_MW214_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1701055	Belgian Gardens	0874_MW215_S_170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	0.02	<0.02	<0.01	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701055	Belgian Gardens	0874_MW216_S_170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	0.08	<0.02	0.27	0.35	0.03	<0.02	<0.02	<0.02	<0.1	<0.05	0.07	<0.02	0.02	<0.02	<0.02	<0.02
ET1701144	Belgian Gardens	0874_MW216_S_170904	Groundwater	4/09/2017	<0.02	<0.02	<0.02	0.05	<0.02	0.22	0.27	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.04	<0.02	0.02	<0.02	<0.02	<0.02
ES1803162	Belgian Gardens	0874_MW269_S_180123	Groundwater	23/01/2018	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701055	Garbutt Community	0874_MW217_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1701055	Garbutt Community	0874_MW218_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1701055	Garbutt Community	0874_MW219_S_170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701055	Garbutt Community	0874_MW220_S_170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	0.03	<0.02	<0.01	0.03	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701055	Garbutt Community	0874_MW221_S_170815	Groundwater	15/08/2017	0.56	0.5	<0.02	4.44	0.17	1.26	5.7	0.18	<0.02	<0.02	<0.02	0.1	<0.05	1.24	0.09	0.12	<0.02	<0.02	<0.02
ET1701082	Garbutt Community	0874_MW222_S_170818	Groundwater	18/08/2017	0.04	0.1	<0.02	0.27	<0.02	0.07	0.34	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701079	Garbutt Community	0874_MW223_S_170817	Groundwater	17/08/2017	0.64	0.95	<0.02	4.94	0.22	6.64	11.6	0.23	<0.02	<0.02	<0.02	<0.1	<0.05	0.67	0.09	0.23	<0.02	<0.02	<0.02
ET1701055	Garbutt Community	0874_MW225_S_170815	Groundwater	15/08/2017	<0.02	0.04	<0.02	0.11	<0.02	0.21	0.32	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.01	<0.02	<0.02	<0.02
ET1701144	Garbutt Community	0874_MW225_S_170904	Groundwater	4/09/2017	<0.02	0.04	<0.02	0.07	<0.02	0.2	0.27	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.01	<0.02	<0.02	<0.02
ET1701055	Garbutt Community	0874_MW236_S_170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701771	Garbutt Community	0874_MW257_S_171207	Groundwater	7/12/2017	<0.02	0.04	<0.02	0.02	<0.02	0.08	0.1	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
ET1701771	Garbutt Community	0874_MW258_S_171207	Groundwater	7/12/2017	<0.02	0.04	<0.02	0.12	<0.02	0.52	0.64	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.04	<0.02	<0.02	<0.02
ET1701771	Garbutt Community	0874_MW259_S_171207	Groundwater	7/12/2017	<0.02	0.04	<0.02	0.04	<0.02	0.08	0.12	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
ET1701771	Garbutt Community	0874_MW260_S_171207	Groundwater	7/12/2017	<0.02	0.02	<0.02	0.05	<0.02	0.08	0.13	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.01	<0.02	<0.02	<0.02
ES1803162	Garbutt Community	0874_MW266_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1701771	Garbutt Community	0874_MW267_S_171207	Groundwater	7/12/2017	0.06	0.08	<0.02	0.2	<0.02	0.37	0.57	0.07	<0.02	<0.02	<0.02	<0.1	<0.05	0.06	0.03	0.04	<0.02	<0.02	<0.02
ES1803162	Garbutt Community	0874_MW267_S_180123	Groundwater	23/01/2018	0.08	0.08	<0.02	0.37	0.02	0.32	0.69	0.05	<0.02	<0.02	<0.02	<0.1	<0.05	0.08	0.03	0.03	<0.02	<0.02	<0.02
ET1701771	Garbutt Community	0874_MW268_S_171207	Groundwater	7/12/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ET1701771	Garbutt Community	0874_MW263_S_171207	Groundwater	7/12/2017	0.06	0.09	<0.02	0.48	<0.02	0.68	1.16	0.03	<0.02	<0.02	<0.02	<0.1	<0.05	0.06	0.03	0.06	<0.02	<0.02	<0.02
ET1701771	Garbutt Community	0874_MW270_S_171207	Groundwater	7/12/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
ES1803162	Garbutt Community	0874_MW270_S_180123	Groundwater	23/01/2018	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
ET1701069	Garbutt Community	0874_MW401_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1701069	Garbutt Community	0874_MW402_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	0.16	<0.05	0.17	0.33	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ET1701069	Garbutt Community	0874_MW403_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	0.06	<0.05	<0.05	<0.05	<0.05	<0.05
ET1701069	Garbutt Community	0874_MW405_S_170816	Groundwater	16/08/2017	0.14	0.16	<0.05	0.72	<0.05	0.1	0.82	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	0.11	<0.05	<0.05	<0.05	<0.05	<0.05
ET1701080	Garbutt Community	0874_MW406_S_170818	Groundwater	18/08/2017	0.31	0.2	<0.02	1.39	<0.02	0.1	1.49	0.09	<0.02	<0.02	<0.02	<0.1	<0.05	1.34	<0.02	<0.01	<0.02	<0.02	<0.02

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids										
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorobutanoic acid (PFBA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTrDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.1	0.05	0.02	0.02	0.01	0.02	0.02
ANZECC PFAS FW 95%						0.13										220		
FSANZ 2017 PFAS drinking water							0.07									0.56		
FSANZ 2017 PFAS recreational water							0.7									5.6		

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date																			
ET1701070	Commercial Property - Garbutt	0874 MW414 S 170816	Groundwater	16/08/2017	0.07	0.06	<0.02	0.53	<0.02	0.91	1.44	0.5	<0.02	<0.02	<0.02	<0.02	0.3	<0.05	0.26	0.12	0.06	<0.02	<0.02
ET1701070	Commercial Property - Garbutt	0874 MW415 S 170816	Groundwater	16/08/2017	0.36	0.24	<0.02	2.7	<0.02	0.39	3.09	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.15	<0.02	<0.01	<0.02	<0.02	
ET1701070	Commercial Property - Garbutt	0874 MW422 S 170816	Groundwater	16/08/2017	0.14	0.18	<0.02	0.29	<0.02	<0.01	0.29	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	
ET1701067	Commercial Property - Garbutt	0874 MW437 S 170816	Groundwater	16/08/2017	<0.02	0.04	<0.02	0.12	<0.02	0.09	0.21	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	
ET1701067	Commercial Property - Garbutt	0874 MW439 S 170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	0.27	<0.05	0.06	0.33	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	0.06	<0.05	<0.05	<0.05	<0.05	
ET1701072	Commercial Property - Garbutt	0874 MW455 S 170816	Groundwater	16/08/2017	0.4	0.34	<0.02	2.76	<0.02	2.32	5.08	0.14	<0.02	<0.02	<0.02	<0.1	<0.05	0.7	<0.02	<0.01	<0.02	<0.02	
ET1701072	Commercial Property - Garbutt	0874 MW456 S 170816	Groundwater	16/08/2017	0.13	0.11	<0.02	0.72	<0.02	0.21	0.93	0.06	<0.02	0.02	<0.02	<0.1	<0.05	0.25	<0.02	<0.01	<0.02	<0.02	
ET1701072	Commercial Property - Garbutt	0874 MW457 S 170816	Groundwater	16/08/2017	0.1	0.06	<0.02	1.24	0.03	1.18	2.42	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.14	<0.02	<0.01	<0.02	<0.02	
ET1701072	Commercial Property - Garbutt	0874 MW459 S 170816	Groundwater	16/08/2017	0.5	0.38	<0.02	3.04	<0.02	2.2	5.24	0.15	<0.02	<0.02	<0.02	<0.1	<0.05	0.85	<0.02	<0.01	<0.02	<0.02	
ET1701072	Commercial Property - Garbutt	0874 MW460 S 170816	Groundwater	16/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	0.06	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.04	0.03	<0.01	<0.02	<0.02	
ET1701072	Commercial Property - Garbutt	0874 MW463 S 170816	Groundwater	16/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	0.05	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.04	<0.02	<0.01	<0.02	<0.02	
ET1701072	Commercial Property - Garbutt	0874 MW465 S 170816	Groundwater	16/08/2017	0.02	0.04	<0.02	0.27	<0.02	0.53	0.8	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	0.03	<0.02	<0.01	<0.02	<0.02	
ET1701072	Commercial Property - Garbutt	0874 MW466 S 170816	Groundwater	16/08/2017	0.05	0.05	<0.02	0.48	<0.02	0.5	0.98	0.04	<0.02	<0.02	<0.02	<0.1	<0.05	0.05	<0.02	0.01	<0.02	<0.02	
ET1701055	Bushland Beach	0874 MW231 S 170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	
ES1803162	Pallarenda	0874 MW233 S 180123	Groundwater	23/01/2018	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	0.05	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	
ES1803162	Pallarenda	0874 MW252 S 180123	Groundwater	23/01/2018	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	
ES1803162	Pallarenda	0874 MW253 S 180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	
ET1701055	Bohle	0874 MW237 S 170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	
ET1701055	Bohle	0874 MW238 S 170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	
ET1701055	Bohle	0874 MW239 S 170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	0.04	<0.02	0.02	0.06	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	0.01	<0.02	<0.02	
ET1701055	Bohle	0874 MW240 S 170815	Groundwater	15/08/2017	<0.02	<0.02	<0.02	0.06	<0.02	0.03	0.09	<0.02	<0.02	<0.02	<0.02	<0.1	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	
ES1803162	Mt St John	0874 MW254 S 180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	
ES1803162	Mt St John	0874 MW262 S 180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	

[illegible]

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOA)	N-Methyl perfluorooctane sulfonamide (MeFOA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EFOA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EFOAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EFOSE)	Sum of PFAS (WA DER List)	Sum of PFAS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01
ANZECC PFAS FW 95%													
FSANZ 2017 PFAS drinking water													
FSANZ 2017 PFAS recreational water													

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date													
ET1701038	Cleveland Bay	0874_MW209_S_170814	Groundwater	14/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.31	0.31
ET1701038	Cleveland Bay	0874_MW210_S_170814	Groundwater	14/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02
ET1701038	Cleveland Bay	0874_MW211_S_170814	Groundwater	14/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.07	0.07
ET1701055	Rowes Bay	0874_MW212_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01
ET1701055	Rowes Bay	0874_MW213_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
ET1701771	Rowes Bay	0874_MW256_S_171207	Groundwater	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.11	0.11
ES1803162	Rowes Bay	0874_MW264_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02
ET1701038	Rowes Bay Landfill	0874_MWRB1_S_170814	Groundwater	14/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.12	0.12
ET1701082	Rowes Bay Landfill	0874_MWRB2_S_170818	Groundwater	18/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.15	0.15
ET1701038	Rowes Bay Landfill	0874_MWRB3_S_170814	Groundwater	14/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05
ET1701038	Rowes Bay Landfill	0874_MWRB5_S_170814	Groundwater	14/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.66	0.76
ET1701055	Belgian Gardens	0874_MW214_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ET1701055	Belgian Gardens	0874_MW215_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02
ET1701055	Belgian Gardens	0874_MW216_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.47	0.47
ET1701144	Belgian Gardens	0874_MW216_S_170904	Groundwater	4/09/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.33	0.33
ES1803162	Belgian Gardens	0874_MW269_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01
ET1701055	Garbutt Community	0874_MW217_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ET1701055	Garbutt Community	0874_MW218_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.08	0.08
ET1701055	Garbutt Community	0874_MW219_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
ET1701055	Garbutt Community	0874_MW220_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03
ET1701055	Garbutt Community	0874_MW221_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.93	8.66
ET1701082	Garbutt Community	0874_MW222_S_170818	Groundwater	18/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.46	0.5
ET1701079	Garbutt Community	0874_MW223_S_170817	Groundwater	17/08/2017	<0.05	<0.05	<0.05	<0.05	0.04	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	13.8	14.6
ET1701055	Garbutt Community	0874_MW225_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.37	0.37
ET1701144	Garbutt Community	0874_MW225_S_170904	Groundwater	4/09/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.32	0.32
ET1701055	Garbutt Community	0874_MW236_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
ET1701771	Garbutt Community	0874_MW257_S_171207	Groundwater	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.16	0.16
ET1701771	Garbutt Community	0874_MW258_S_171207	Groundwater	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.72	0.72
ET1701771	Garbutt Community	0874_MW259_S_171207	Groundwater	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.18	0.18
ET1701771	Garbutt Community	0874_MW260_S_171207	Groundwater	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.16	0.16
ES1803162	Garbutt Community	0874_MW266_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ET1701771	Garbutt Community	0874_MW267_S_171207	Groundwater	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.85	0.91
ES1803162	Garbutt Community	0874_MW267_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.96	1.06
ET1701771	Garbutt Community	0874_MW268_S_171207	Groundwater	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
ET1701771	Garbutt Community	0874_MW263_S_171207	Groundwater	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.43	1.49
ET1701771	Garbutt Community	0874_MW270_S_171207	Groundwater	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
ES1803162	Garbutt Community	0874_MW270_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02
ET1701069	Garbutt Community	0874_MW401_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.1	0.1
ET1701069	Garbutt Community	0874_MW402_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.33	0.33
ET1701069	Garbutt Community	0874_MW403_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.15	0.15
ET1701069	Garbutt Community	0874_MW405_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	1.09	1.23
ET1701080	Garbutt Community	0874_MW406_S_170818	Groundwater	18/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	3.12	3.43

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EFOSE)	Sum of PFAS (WA DER List)	Sum of PFAS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01
ANZECC PFAS FW 95%													
FSANZ 2017 PFAS drinking water													
FSANZ 2017 PFAS recreational water													

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date													
ET1701070	Commercial Property - Garbutt	0874_MW414_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2.74	2.81
ET1701070	Commercial Property - Garbutt	0874_MW415_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	3.48	3.84
ET1701070	Commercial Property - Garbutt	0874_MW422_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.47	0.61
ET1701067	Commercial Property - Garbutt	0874_MW437_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.25	0.25
ET1701067	Commercial Property - Garbutt	0874_MW439_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.39	0.39
ET1701072	Commercial Property - Garbutt	0874_MW455_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.26	6.66
ET1701072	Commercial Property - Garbutt	0874_MW456_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.35	1.5
ET1701072	Commercial Property - Garbutt	0874_MW457_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2.62	2.75
ET1701072	Commercial Property - Garbutt	0874_MW459_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.62	7.12
ET1701072	Commercial Property - Garbutt	0874_MW460_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.13	0.13
ET1701072	Commercial Property - Garbutt	0874_MW463_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.09
ET1701072	Commercial Property - Garbutt	0874_MW465_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.87	0.89
ET1701072	Commercial Property - Garbutt	0874_MW466_S_170816	Groundwater	16/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.13	1.18
ET1701055	Bushland Beach	0874_MW231_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ES1803162	Pallarenda	0874_MW233_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05
ES1803162	Pallarenda	0874_MW252_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02
ES1803162	Pallarenda	0874_MW253_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ET1701055	Bohle	0874_MW237_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
ET1701055	Bohle	0874_MW238_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ET1701055	Bohle	0874_MW239_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.07	0.07
ET1701055	Bohle	0874_MW240_S_170815	Groundwater	15/08/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.09
ES1803162	Mt St John	0874_MW254_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ES1803162	Mt St John	0874_MW262_S_180123	Groundwater	23/01/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05

Table 12 - off-Base Groundwater Analytical Results Wet Season - PFAS

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids											
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTriDA)	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0003	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	
ANZECC PFAS FW 95%						0.13										220			
DoH and FSANZ drinking water quality value							0.07									0.56			
DoH and FSANZ recreational water quality value							0.7									5.6			

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date	0.0033	0.0225	<0.0005	0.0287	0.0022	0.0734	0.102	0.0031	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0077	0.0021	0.0058	<0.0005	<0.0005
ET1801006	Belgian Gardens	0874_MW214_S_180411	Water	Groundwater	11/04/2018	0.0033	0.0225	<0.0005	0.0287	0.0022	0.0734	0.102	0.0031	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0077	0.0021	0.0058	<0.0005	<0.0005
ET1801006	Belgian Gardens	0874_MW215_S_180411	Water	Groundwater	11/04/2018	0.0044	0.0677	<0.0005	0.0314	<0.0005	0.0163	0.0477	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	0.0014	<0.0005	<0.0005
ET1801006	Belgian Gardens	0874_MW216_S_180411	Water	Groundwater	11/04/2018	<0.02	0.06	<0.02	0.38	<0.02	0.19	0.57	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	0.01	<0.02	<0.02
ET1801006	Belgian Gardens	0874_MW256_S_180411	Water	Groundwater	11/04/2018	0.0014	0.0178	<0.0005	0.0144	0.0014	0.0806	0.0950	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0016	0.0014	0.0118	<0.0005	<0.0005
ET1801006	Belgian Gardens	0874_MW261_S_180411	Water	Groundwater	11/04/2018	0.0017	0.0117	<0.0005	0.0248	<0.0005	0.0143	0.0391	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	0.0025	<0.0005	<0.0005
ET1800988	Belgian Gardens	0874_MW269_S_180410	Water	Groundwater	10/04/2018	<0.0005	0.0128	<0.0005	0.0061	<0.0005	0.0346	0.0407	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	0.0027	<0.0005	<0.0005
ET1801095	Bohle	0874_MW237_S_180419	Water	Groundwater	19/04/2018	0.0017	0.0107	<0.0005	0.0172	0.0021	0.0629	0.0801	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0028	<0.0005	0.0019	<0.0005	<0.0005
ET1801095	Bohle	0874_MW238_S_180419	Water	Groundwater	19/04/2018	0.0025	0.0193	<0.0005	0.0270	0.0025	0.0620	0.0890	0.0180	0.0010	0.0028	<0.0005	<0.0005	0.029	0.0085	0.0089	0.0386	<0.0005	<0.0005
ET1801086	Bohle	0874_MW239_S_180419	Water	Groundwater	19/04/2018	0.0139	0.0346	<0.0005	0.137	0.0026	0.285	0.422	0.0033	0.0029	0.0022	<0.0005	<0.0005	<0.002	0.0394	0.0084	0.0183	<0.0005	<0.0005
ET1801086	Bohle	0874_MW239_S_180419_F	Water	Groundwater	19/04/2018	<0.0005	0.0073	<0.0005	<0.0005	<0.0005	<0.0003	<0.0003	0.0041	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0291	0.0035	0.0035	<0.0005	<0.0005
ET1801095	Bohle	0874_MW240_S_180419	Water	Groundwater	19/04/2018	0.0092	0.0222	<0.0005	0.0910	0.0119	0.267	0.358	0.0120	0.0019	<0.0005	<0.0005	<0.0005	0.006	0.0332	0.0066	0.0203	<0.0005	<0.0005
ET1801086	Bushland Beach	0874_MW231_S_180418	Water	Groundwater	18/04/2018	0.0006	0.0023	<0.0005	0.0069	<0.0005	0.0244	0.0313	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0005	<0.0005	<0.0005	<0.0005	<0.0005
ET1801006	Cleveland Bay/Rowes Bay	0874_MW209_S_180411	Water	Groundwater	11/04/2018	<0.02	0.12	<0.02	0.22	<0.02	0.22	0.44	0.03	<0.02	<0.02	<0.02	<0.05	<0.1	0.03	<0.02	0.02	<0.02	<0.02
ET1801006	Cleveland Bay/Rowes Bay	0874_MW210_S_180411	Water	Groundwater	11/04/2018	<0.02	<0.02	<0.02	0.02	<0.02	0.05	0.07	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801095	Commercial property - Garbutt	0874_MW405_S_180419	Water	Groundwater	19/04/2018	0.30	0.42	<0.10	1.98	<0.10	<0.10	1.98	0.10	<0.10	<0.10	<0.10	<0.25	<0.5	0.3	<0.10	<0.10	<0.10	<0.10
ET1801011	Commercial property - Garbutt	0874_MW414_S_180412	Water	Groundwater	12/04/2018	0.03	0.06	<0.02	0.39	0.03	1.21	1.60	1.02	0.08	<0.02	<0.02	<0.05	1.2	0.59	0.55	0.38	<0.02	<0.02
ET1801011	Commercial property - Garbutt	0874_MW415_S_180412	Water	Groundwater	12/04/2018	0.52	0.35	<0.02	2.93	0.12	1.41	4.34	0.04	<0.02	<0.02	<0.02	<0.05	0.2	0.2	0.06	0.16	<0.02	<0.02
ET1801011	Commercial property - Garbutt	0874_MW422_S_180412	Water	Groundwater	12/04/2018	0.03	0.04	<0.02	0.05	<0.02	<0.01	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801011	Commercial property - Garbutt	0874_MW437_S_180412	Water	Groundwater	12/04/2018	0.05	0.08	<0.02	0.25	<0.02	0.06	0.31	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.03	<0.02	<0.01	<0.02	<0.02
ET1801011	Commercial property - Garbutt	0874_MW439_S_180412	Water	Groundwater	12/04/2018	0.10	0.10	<0.05	0.58	<0.05	0.08	0.66	<0.05	<0.05	<0.05	<0.05	<0.12	<0.2	0.09	<0.05	<0.05	<0.05	<0.05
ET1801011	Commercial property - Garbutt	0874_MW455_S_180412	Water	Groundwater	12/04/2018	<0.02	0.03	<0.02	0.14	<0.02	0.51	0.65	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801011	Commercial property - Garbutt	0874_MW456_S_180412	Water	Groundwater	12/04/2018	0.04	0.05	<0.02	0.40	<0.02	0.59	0.99	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.03	<0.02	0.01	<0.02	<0.02
ET1801011	Commercial property - Garbutt	0874_MW457_S_180412	Water	Groundwater	12/04/2018	0.49	0.46	<0.02	2.12	0.25	6.13	8.25	0.22	0.05	<0.02	<0.02	<0.05	0.3	1.07	0.19	0.39	<0.02	<0.02
ET1801011	Commercial property - Garbutt	0874_MW459_S_180412	Water	Groundwater	12/04/2018	0.39	0.41	<0.02	2.13	0.24	4.53	6.66	0.12	<0.02	<0.02	<0.02	<0.05	0.2	0.58	0.06	0.13	<0.02	<0.02
ET1801011	Commercial property - Garbutt	0874_MW460_S_180412	Water	Groundwater	12/04/2018	0.451	0.490	<0.0005	3.91	0.284	0.145	4.06	0.204	0.0007	<0.0005	<0.0005	<0.0005	0.030	0.724	0.165	0.165	<0.0005	<0.0005
ET1801011	Commercial property - Garbutt	0874_MW463_S_180412	Water	Groundwater	12/04/2018	0.0581	0.0342	<0.0005	0.720	0.0376	0.103	0.823	0.0281	0.0009	0.0010	<0.0005	<0.0005	<0.002	0.0511	0.0157	0.0224	<0.0005	<0.0005
ET1801011	Commercial property - Garbutt	0874_MW465_S_180412	Water	Groundwater	12/04/2018	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801011	Commercial property - Garbutt	0874_MW466_S_180412	Water	Groundwater	12/04/2018	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801086	Garbutt	0874_MW223_S_180418	Water	Groundwater	18/04/2018	0.65	0.79	<0.02	4.61	0.17	9.89	14.5	0.27	<0.02	<0.02	<0.02	<0.05	0.2	1.14	0.18	0.37	<0.02	<0.02
ET1800988	Garbutt	0874_MW236_S_180410	Water	Groundwater	10/04/2018	0.0010	0.0050	<0.0005	0.0051	<0.0005	0.0035	0.0086	<0.0005	0.0010	0.0022	<0.0005	<0.0005	<0.002	0.001	0.0017	0.0051	<0.0005	<0.0005
ET1800988	Garbutt Community	0874_MW257_S_180410	Water	Groundwater	10/04/2018	0.0022	0.0267	<0.0005	0.0292	0.0019	0.0622	0.0914	0.0023	0.0007	<0.0005	<0.0005	<0.0005	<0.002	0.0015	0.0018	0.0034	<0.0005	<0.0005
ET1800988	Garbutt Community	0874_MW258_S_180410	Water	Groundwater	10/04/2018	<0.02	0.04	<0.02	0.26	<0.02	0.23	0.49	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	0.02	<0.02	<0.02
ET1800988	Garbutt Community	0874_MW259_S_180410	Water	Groundwater	10/04/2018	<0.02	0.03	<0.02	0.13	<0.02	0.12	0.25	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02
ET1800988	Garbutt Community	0874_MW260_S_180410	Water	Groundwater	10/04/2018	<0.02	<0.02	<0.02	0.14	<0.02	0.10	0.24	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02
ET1800988	Garbutt Community	0874_MW263_S_180410	Water	Groundwater	10/04/2018	0.07	0.10	<0.02	0.68	<0.02	0.41	1.09	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.04	0.02	0.03	<0.02	<0.02
ET1800988	Garbutt Community	0874_MW266_S_180410	Water	Groundwater	10/04/2018	<0.0005	0.0127	<0.0005	0.0030														



Table 12 - off-Base Groundwater Analytical Results Wet Season - PFAS

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids											
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTriDA)	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0003	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	
ANZECC PFAS FW 95%						0.13										220			
DoH and FSANZ drinking water quality value							0.07									0.56			
DoH and FSANZ recreational water quality value							0.7									5.6			

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date																		
ET1801024	Rowes Bay	0874_MW264_S_180413	Water	Groundwater	13/04/2018	0.222	0.351	<0.0005	0.904	0.0132	0.0438	0.948	0.103	<0.0005	<0.0005	<0.0005	<0.0005	0.030	0.076	0.031	0.017	<0.0005	<0.0005
ET1801100	Rowes Bay Landfill	0874_MWRB1_180420	Water	Groundwater	20/04/2018	<0.02	<0.02	<0.02	<0.02	<0.02	0.10	0.10	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801024	Rowes Bay Landfill	0874_MWRB2_S_180413	Water	Groundwater	13/04/2018	0.0016	0.0138	<0.0005	0.0267	<0.0005	0.0309	0.0576	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0006	<0.0005	0.0006	<0.0005	<0.0005
ET1801024	Rowes Bay Landfill	0874_MWRB3_S_180413	Water	Groundwater	13/04/2018	<0.0005	0.0063	<0.0005	0.0067	<0.0005	0.0244	0.0311	<0.0005	0.0016	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	0.0005	0.0021	<0.0005	<0.0005
ET1801024	Rowes Bay Landfill	0874_MWRB5_S_180413	Water	Groundwater	13/04/2018	<0.02	<0.02	<0.02	0.07	<0.02	0.07	0.14	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.02	<0.02	<0.01	<0.02	<0.02
ET1801024	Rowes Bay Landfill	0874_MWRB5_S_180413_F	Water	Groundwater	13/04/2018	<0.02	<0.02	<0.02	0.04	<0.02	<0.01	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	0.03	<0.02	<0.01	<0.02	<0.02
ET1801100	Town Common	0874_MW201_180420	Water	Groundwater	20/04/2018	<0.0005	0.0016	<0.0005	0.0062	<0.0005	0.0223	0.0285	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	0.0006	<0.0005	<0.0005	<0.0005	<0.0005
ET1801100	Town Common	0874_MW202_180420	Water	Groundwater	20/04/2018	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.5	<0.10	<0.10	<0.10	<0.10	<0.10
ET1801100	Town Common	0874_MW203_180420	Water	Groundwater	20/04/2018	<0.0005	0.0026	<0.0005	0.0020	<0.0005	0.0021	0.0041	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
ET1801024	Town Common	0874_MW204_S_180413	Water	Groundwater	13/04/2018	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02
ET1801024	Town Common	0874_MW205_S_180413	Water	Groundwater	13/04/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801043	Town Common	0874_MW206_S_180416	Water	Groundwater	16/04/2018	0.74	0.77	<0.02	4.54	0.05	<0.01	4.54	0.26	<0.02	<0.02	<0.02	<0.05	0.2	1.5	0.09	0.03	<0.02	<0.02
ET1801024	Town Common	0874_MW207_S_180413	Water	Groundwater	13/04/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05
ET1801006	Town Common	0874_MW208_S_180411	Water	Groundwater	11/04/2018	<0.02	0.08	<0.02	0.09	<0.02	0.06	0.15	<0.02	<0.02	<0.02	<0.02	<0.05	<0.1	<0.02	<0.02	<0.01	<0.02	<0.02

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	perfluorooctane sulfonamidoacetic acid (MeFOSA)	perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSA)	perfluorooctane sulfonamidoethanol (EtFOSE)		Sum of PFAS	Sum of PFAS (WA DER List)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		µg/L	µg/L
EQL	0.001	0.001	0.001	0.001	0.0005	0.001	0.0005	0.001	0.001	0.0005	0.001		0.0003	0.0003
ANZECC PFAS FW 95%														
DoH and FSANZ drinking water quality value														
DoH and FSANZ recreational water quality value														

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date													
ET1801006	Belgian Gardens	0874_MW214_S_180411	Water	Groundwater	11/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.149	0.143
ET1801006	Belgian Gardens	0874_MW215_S_180411	Water	Groundwater	11/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.121	0.117
ET1801006	Belgian Gardens	0874_MW216_S_180411	Water	Groundwater	11/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.64	0.64
ET1801006	Belgian Gardens	0874_MW256_S_180411	Water	Groundwater	11/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.130	0.128
ET1801006	Belgian Gardens	0874_MW261_S_180411	Water	Groundwater	11/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0550	0.0533
ET1800988	Belgian Gardens	0874_MW269_S_180410	Water	Groundwater	10/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0562	0.0562
ET1801095	Bohle	0874_MW237_S_180419	Water	Groundwater	19/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0993	0.0955
ET1801095	Bohle	0874_MW238_S_180419	Water	Groundwater	19/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.220	0.211
ET1801086	Bohle	0874_MW239_S_180419	Water	Groundwater	19/04/2018	<0.001	<0.001	<0.001	<0.001	0.0064	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.554	0.526
ET1801086	Bohle	0874_MW239_S_180419_F	Water	Groundwater	19/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0475	0.0475
ET1801095	Bohle	0874_MW240_S_180419	Water	Groundwater	19/04/2018	<0.001	<0.001	<0.001	<0.001	0.0034	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.485	0.458
ET1801086	Bushland Beach	0874_MW231_S_180418	Water	Groundwater	18/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0347	0.0341
ET1801006	Cleveland Bay/Rowes Bay	0874_MW209_S_180411	Water	Groundwater	11/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.64	0.64
ET1801006	Cleveland Bay/Rowes Bay	0874_MW210_S_180411	Water	Groundwater	11/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.07	0.07
ET1801095	Commercial property - Garbutt	0874_MW405_S_180419	Water	Groundwater	19/04/2018	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.25	3.10	2.80
ET1801011	Commercial property - Garbutt	0874_MW414_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	5.54	5.40
ET1801011	Commercial property - Garbutt	0874_MW415_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	5.99	5.35
ET1801011	Commercial property - Garbutt	0874_MW422_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.12	0.09
ET1801011	Commercial property - Garbutt	0874_MW437_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.47	0.42
ET1801011	Commercial property - Garbutt	0874_MW439_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.95	0.85
ET1801011	Commercial property - Garbutt	0874_MW455_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.68	0.68
ET1801011	Commercial property - Garbutt	0874_MW456_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.12	1.08
ET1801011	Commercial property - Garbutt	0874_MW457_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	11.7	10.9
ET1801011	Commercial property - Garbutt	0874_MW459_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	8.79	8.16
ET1801011	Commercial property - Garbutt	0874_MW460_S_180412	Water	Groundwater	12/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	6.57	5.83
ET1801011	Commercial property - Garbutt	0874_MW463_S_180412	Water	Groundwater	12/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	1.07	0.974
ET1801011	Commercial property - Garbutt	0874_MW465_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02
ET1801011	Commercial property - Garbutt	0874_MW466_S_180412	Water	Groundwater	12/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
ET1801086	Garbutt	0874_MW223_S_180418	Water	Groundwater	18/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	18.3	17.4
ET1800988	Garbutt	0874_MW236_S_180410	Water	Groundwater	10/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0256	0.0214
ET1800988	Garbutt Community	0874_MW257_S_180410	Water	Groundwater	10/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.132	0.127
ET1800988	Garbutt Community	0874_MW258_S_180410	Water	Groundwater	10/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.55	0.55
ET1800988	Garbutt Community	0874_MW259_S_180410	Water	Groundwater	10/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.28	0.28
ET1800988	Garbutt Community	0874_MW260_S_180410	Water	Groundwater	10/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.24	0.24
ET1800988	Garbutt Community	0874_MW263_S_180410	Water	Groundwater	10/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.35	1.28
ET1800988	Garbutt Community	0874_MW266_S_180410	Water	Groundwater	10/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0242	0.0242
ET1800988	Garbutt Community	0874_MW267_S_180410	Water	Groundwater	10/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.27	1.20
ET1800988	Garbutt Community	0874_MW268_S_180410	Water	Groundwater	10/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0034	0.0034
ET1800988	Garbutt Community	0874_MW270_S_180410	Water	Groundwater	10/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0138	0.0124
ET1801006	Garbutt Community	0874_MW217_S_180411	Water	Groundwater	11/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0021	0.0021
ET1800988	Garbutt Community	0874_MW218_S_180410	Water	Groundwater	10/04/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.13	0.13
ET1800988	Garbutt Community	0874_MW219_S_180410	Water	Groundwater	10/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0213	0.0196
ET1800988	Garbutt Community	0874_MW220_S_180410	Water	Groundwater	10/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.151	0.140
ET1800988	Garbutt Community	0874_MW221_S_180410	Water	Groundwater	10/04/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	9.21	8.60
ET1801086	Garbutt Community	0874_MW222_S_180418	Water	Groundwater	18/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<					



Table 12 - off-Base Groundwater Analytical Results Wet Season - PFAS

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides								PFAS	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-methyl perfluorooctane sulfonamide (MeFOSA)	perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeEOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtEOSE)	Sum of PFAS	Sum of PFAS (WA DER List)	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.001	0.001	0.001	0.001	0.0005	0.001	0.0005	0.001	0.001	0.0005	0.001	0.0003	0.0003	
ANZECC PFAS FW 95%														
DoH and FSANZ drinking water quality value														
DoH and FSANZ recreational water quality value														

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date													
ET1801024	Rowes Bay	0874_MW264_S_180413	Water	Groundwater	13/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	1.79	1.56
ET1801100	Rowes Bay Landfill	0874_MWRB1_180420	Water	Groundwater	20/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.10	0.10
ET1801024	Rowes Bay Landfill	0874_MWRB2_S_180413	Water	Groundwater	13/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0742	0.0726
ET1801024	Rowes Bay Landfill	0874_MWRB3_S_180413	Water	Groundwater	13/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0416	0.0400
ET1801024	Rowes Bay Landfill	0874_MWRB5_S_180413	Water	Groundwater	13/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.16	0.16
ET1801024	Rowes Bay Landfill	0874_MWRB5_S_180413_F	Water	Groundwater	13/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.07	0.07
ET1801100	Town Common	0874_MW201_180420	Water	Groundwater	20/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0307	0.0307
ET1801100	Town Common	0874_MW202_180420	Water	Groundwater	20/04/2018	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.25	<0.10	<0.25	<0.10	<0.10	<0.10
ET1801100	Town Common	0874_MW203_180420	Water	Groundwater	20/04/2018	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0067	0.0067
ET1801024	Town Common	0874_MW204_S_180413	Water	Groundwater	13/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
ET1801024	Town Common	0874_MW205_S_180413	Water	Groundwater	13/04/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ET1801043	Town Common	0874_MW206_S_180416	Water	Groundwater	16/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	8.18	7.39
ET1801024	Town Common	0874_MW207_S_180413	Water	Groundwater	13/04/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ET1801006	Town Common	0874_MW208_S_180411	Water	Groundwater	11/04/2018	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.23	0.23

	Perfluoroalkane Sulfonic Acids						
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Sum of PFHxS and PFOS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.02	0.02	0.02	0.01	0.02	0.01
ANZECC PFAS FW 95%					0.13		
FSANZ 2017 PFAS drinking water							0.07
FSANZ 2017 PFAS recreational water							0.7

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date							
ES1717838	Garbutt Community	0874_SW014_170717	Water	7/17/2017	<0.02	<0.02	0.05	<0.02	0.07	<0.02	0.12
ES1717838	Garbutt Community	0874_SW017_170717	Water	7/17/2017	<0.02	<0.02	0.11	<0.02	0.13	<0.02	0.24
ES1717838	Garbutt Community	0874_SW120_170717	Water	7/17/2017	<0.02	<0.02	0.12	<0.02	0.14	<0.02	0.26
ES1717838	Garbutt Community	0874_SW127_170717	Water	7/17/2017	<0.02	<0.02	0.06	<0.02	0.05	<0.02	0.11
ES1717838	Garbutt Community	0874_SW128_170717	Water	7/17/2017	<0.02	<0.02	0.07	<0.02	0.03	<0.02	0.1
ES1717838	Garbutt Community	0874_SW115_170718	Water	7/18/2017	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	0.04
ES1717838	Garbutt Community	0874_SW118_170718	Water	7/18/2017	0.97	1.14	4.85	0.3	5.21	<0.02	10.1
ET1701071	Commercial Property - Garbutt	0874_SW113_170816	Water	8/16/2017	0.47	0.37	2.39	<0.02	1.4	<0.02	3.79
ES1717838	Commercial Property - Garbutt	0874_SW117_170718	Water	7/18/2017	1.98	2.04	10.8	0.64	14.1	<0.05	24.9
ET1701071	Ecological Area (within The Common)	0874_SW106_170816	Water	8/16/2017	2.82	3.41	16	0.13	11.7	<0.02	27.7
ET1701082	Ecological Area (within The Common)	0874_SW110_170818	Water	8/18/2017	0.66	0.41	3.53	0.21	2.73	<0.02	6.26
ET1701082	Ecological Area (within The Common)	0874_SW111_170818	Water	8/18/2017	0.72	0.47	3.74	0.19	2.32	<0.02	6.06
ES1717838	The Common	0874_SW112_170718	Water	7/18/2017	<0.02	<0.02	0.04	<0.02	0.06	<0.02	0.1
ES1717807	The Common	0874_SW205_170715	Water	7/15/2017	<0.02	<0.02	0.16	<0.02	0.24	<0.02	0.4
ES1717807	The Common	0874_SW206_170715	Water	7/15/2017	<0.05	<0.05	0.22	<0.05	0.17	<0.05	0.39
ES1717807	The Common	0874_SW207_170715	Water	7/15/2017	<0.05	<0.05	0.18	<0.05	0.18	<0.05	0.36
ES1717838	Cleveland Bay	0874_SW107_170717	Water	7/17/2017	<0.05	<0.05	0.15	<0.05	0.14	<0.05	0.29
ES1717807	Cleveland Bay	0874_SW210_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ES1717838	Rowes Bay	0874_SW108_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ES1717838	Rowes Bay	0874_SW109_170718	Water	7/18/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ES1717838	Rowes Bay	0874_SW114_170718	Water	7/18/2017	0.02	<0.02	0.02	<0.02	0.05	<0.02	0.07
ES1717838	Rowes Bay	0874_SW116_170718	Water	7/18/2017	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	0.03
ES1717838	Bohle River	0874_SW129_170717	Water	7/17/2017	<0.02	<0.02	0.02	<0.02	0.08	<0.02	0.1
ES1717807	Bohle River	0874_SW201_170717	Water	7/17/2017	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.01
ES1717807	Bohle River	0874_SW202_170715	Water	7/15/2017	<0.05	<0.05	0.09	<0.05	0.1	<0.05	0.19
ES1717807	Bohle River	0874_SW203_170714	Water	7/14/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ES1717807	Bohle River	0874_SW204_170714	Water	7/14/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ES1717807	Mundy Ck Catchment (off-Base)	0874_SW208_170717	Water	7/17/2017	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.02
ES1717807	E of NQ0105	0874_SW209_170717	Water	7/17/2017	<0.05	<0.05	0.16	<0.05	0.52	<0.05	0.68
ES1717807	Background (outside IIA)	0874_SW211_170714	Water	7/14/2017	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.01
ES1717807	Background (outside IIA)	0874_SW212_170713	Water	7/13/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ES1717807	Background (outside IIA)	0874_SW213_170712	Water	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

	Perfluoroalkane Carboxylic Acids										
	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.05	0.02
ANZECC PFAS FW 95%					220						
FSANZ 2017 PFAS drinking water					0.56						
FSANZ 2017 PFAS recreational water					5.6						

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date											
ES1717838	Garbutt Community	0874_SW014_170717	Water	7/17/2017	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Garbutt Community	0874_SW017_170717	Water	7/17/2017	<0.1	<0.02	0.03	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Garbutt Community	0874_SW120_170717	Water	7/17/2017	<0.1	0.03	0.03	0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Garbutt Community	0874_SW127_170717	Water	7/17/2017	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Garbutt Community	0874_SW128_170717	Water	7/17/2017	<0.1	<0.02	<0.02	<0.02	<0.01	0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Garbutt Community	0874_SW115_170718	Water	7/18/2017	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Garbutt Community	0874_SW118_170718	Water	7/18/2017	0.3	0.4	1.77	0.46	0.7	0.04	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701071	Commercial Property - Garbutt	0874_SW113_170816	Water	8/16/2017	<0.1	0.22	0.92	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Commercial Property - Garbutt	0874_SW117_170718	Water	7/18/2017	1	<0.05	3.63	0.75	1.07	0.16	<0.05	<0.05	<0.05	<0.12	<0.05
ET1701071	Ecological Area (within The Common)	0874_SW106_170816	Water	8/16/2017	0.6	1.3	7.76	0.76	1.18	0.06	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701082	Ecological Area (within The Common)	0874_SW110_170818	Water	8/18/2017	<0.1	0.17	0.6	0.06	0.12	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ET1701082	Ecological Area (within The Common)	0874_SW111_170818	Water	8/18/2017	<0.1	0.18	0.7	0.07	0.14	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	The Common	0874_SW112_170718	Water	7/18/2017	<0.1	0.05	0.03	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717807	The Common	0874_SW205_170715	Water	7/15/2017	<0.1	0.02	0.03	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717807	The Common	0874_SW206_170715	Water	7/15/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717807	The Common	0874_SW207_170715	Water	7/15/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717838	Cleveland Bay	0874_SW107_170717	Water	7/17/2017	<0.2	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717807	Cleveland Bay	0874_SW210_170717	Water	7/17/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717838	Rowes Bay	0874_SW108_170717	Water	7/17/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717838	Rowes Bay	0874_SW109_170718	Water	7/18/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717838	Rowes Bay	0874_SW114_170718	Water	7/18/2017	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Rowes Bay	0874_SW116_170718	Water	7/18/2017	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717838	Bohle River	0874_SW129_170717	Water	7/17/2017	<0.1	<0.02	<0.02	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717807	Bohle River	0874_SW201_170717	Water	7/17/2017	<0.1	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717807	Bohle River	0874_SW202_170715	Water	7/15/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717807	Bohle River	0874_SW203_170714	Water	7/14/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717807	Bohle River	0874_SW204_170714	Water	7/14/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717807	Mundy Ck Catchment (off-Base)	0874_SW208_170717	Water	7/17/2017	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717807	E of NQ0105	0874_SW209_170717	Water	7/17/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717807	Background (outside IIA)	0874_SW211_170714	Water	7/14/2017	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
ES1717807	Background (outside IIA)	0874_SW212_170713	Water	7/13/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05
ES1717807	Background (outside IIA)	0874_SW213_170712	Water	7/12/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05

	(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOS)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFAS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01
ANZECC PFAS FW 95%													
FSANZ 2017 PFAS drinking water													
FSANZ 2017 PFAS recreational water													

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date													
ES1717838	Garbutt Community	0874_SW014_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.12	0.12
ES1717838	Garbutt Community	0874_SW017_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.29	0.29
ES1717838	Garbutt Community	0874_SW120_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.38	0.38
ES1717838	Garbutt Community	0874_SW127_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.11	0.11
ES1717838	Garbutt Community	0874_SW128_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.1	0.12
ES1717838	Garbutt Community	0874_SW115_170718	Water	7/18/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04
ES1717838	Garbutt Community	0874_SW118_170718	Water	7/18/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	14.7	16.1
ET1701071	Commercial Property - Garbutt	0874_SW113_170816	Water	8/16/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	5.45	5.82
ES1717838	Commercial Property - Garbutt	0874_SW117_170718	Water	7/18/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	33.3	36.2
ET1701071	Ecological Area (within The Common)	0874_SW106_170816	Water	8/16/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	42.1	45.7
ET1701082	Ecological Area (within The Common)	0874_SW110_170818	Water	8/18/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.87	8.49
ET1701082	Ecological Area (within The Common)	0874_SW111_170818	Water	8/18/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.87	8.53
ES1717838	The Common	0874_SW112_170718	Water	7/18/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.22	0.22
ES1717807	The Common	0874_SW205_170715	Water	7/15/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.47	0.47
ES1717807	The Common	0874_SW206_170715	Water	7/15/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.39	0.39
ES1717807	The Common	0874_SW207_170715	Water	7/15/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.36	0.36
ES1717838	Cleveland Bay	0874_SW107_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.35	0.35
ES1717807	Cleveland Bay	0874_SW210_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ES1717838	Rowes Bay	0874_SW108_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ES1717838	Rowes Bay	0874_SW109_170718	Water	7/18/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ES1717838	Rowes Bay	0874_SW114_170718	Water	7/18/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.09
ES1717838	Rowes Bay	0874_SW116_170718	Water	7/18/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03
ES1717838	Bohle River	0874_SW129_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.11	0.11
ES1717807	Bohle River	0874_SW201_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02
ES1717807	Bohle River	0874_SW202_170715	Water	7/15/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.19	0.19
ES1717807	Bohle River	0874_SW203_170714	Water	7/14/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ES1717807	Bohle River	0874_SW204_170714	Water	7/14/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ES1717807	Mundy Ck Catchment (off-Base)	0874_SW208_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02
ES1717807	E of NQ0105	0874_SW209_170717	Water	7/17/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	0.68	0.68
ES1717807	Background (outside IIA)	0874_SW211_170714	Water	7/14/2017	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
ES1717807	Background (outside IIA)	0874_SW212_170713	Water	7/13/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05
ES1717807	Background (outside IIA)	0874_SW213_170712	Water	7/12/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	<0.05	<0.05

	Perfluoroalkane Sulfonic Acids							Perfluoroalkane Carboxylic Acids					
	Perfluoropentane sulfonic acid (PFPeS)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluoropentanoic acid (PFPeA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorobutanoic acid (PFBA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0003	0.0005	0.0005	0.0005	0.0005	0.0005	0.002
ANZECC PFAS FW 95%						0.13							
DoH and FSANZ drinking water quality value							0.07						
DoH and FSANZ recreational water quality value							0.7						

Lab Report Number	Location	Field ID	Matrix Type	Date	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	<0.0003	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002
ET1801082	Background (outside IA)	0874_SW211_180418	Water	4/18/2018	<0.0005	<0.0005	<0.0005	0.0103	<0.0005	0.0053	0.0156	0.0022	<0.0005	<0.0005	<0.0005	0.006
ET1801082	Background (outside IA)	0874_SW212_180418	Water	4/18/2018	<0.0005	<0.0005	<0.0005	0.0012	<0.0005	0.0013	0.0025	<0.0005	<0.0005	<0.0005	<0.0005	<0.002
ET1801082	Background (outside IA)	0874_SW213_180418	Water	4/18/2018	<0.0005	<0.0005	<0.0005	0.0028	<0.0005	0.0031	0.0059	0.0064	<0.0005	<0.0005	<0.0005	<0.002
ET1801098	Bohle River	0874_SW129_180420	Water	4/20/2018	<0.0005	0.0032	<0.0005	0.0022	<0.0005	0.0017	0.0039	0.0064	<0.0005	<0.0005	<0.0005	<0.002
ET1801098	Bohle River	0874_SW201_180420	Water	4/20/2018	<0.0005	0.0029	0.0026	0.0022	<0.0005	0.0017	0.0039	0.0064	<0.0005	<0.0005	<0.0005	<0.002
ET1801082	Bohle River	0874_SW202_180418	Water	4/18/2018	0.0182	0.0289	<0.0005	0.153	0.0061	0.125	0.278	0.0121	<0.0005	<0.0005	<0.0005	<0.002
ET1801082	Bohle River	0874_SW203_180418	Water	4/18/2018	0.0032	0.022	<0.0005	0.0261	0.0011	0.0191	0.0452	0.0031	<0.0005	<0.0005	<0.0005	<0.002
ET1801082	Bohle River	0874_SW204_180418	Water	4/18/2018	0.0021	0.0023	<0.0005	0.015	0.0006	0.0082	0.0232	0.0014	<0.0005	<0.0005	<0.0005	<0.002
ET1800983	Cleveland Bay	0874_SW210_180410	Water	4/10/2018	0.0053	0.0085	<0.0005	0.0383	0.0012	0.0381	0.0764	0.0036	<0.0005	<0.0005	<0.0005	<0.002
ET1800983	Commercial Property - Garbutt	0874_SW113_180410	Water	4/10/2018	0.45	0.47	<0.02	5.33	0.14	3.08	8.41	0.2	<0.02	<0.02	<0.02	<0.1
ET1801093	Commercial Property - Garbutt	0874_SW117_180419	Water	4/19/2018	2.96	3.16	<0.02	13.9	0.93	18.4	32.3	1.25	0.09	<0.02	<0.02	1
ET1801093	Commercial Property - Garbutt	0874_SW117_180419_F	Water	4/19/2018	<0.02	0.73	<0.02	<0.02	<0.02	<0.01	<0.01	1.21	<0.02	<0.02	<0.02	0.9
ET1801098	Commercial Property - Garbutt	0874_SW119_180420	Water	4/20/2018	3.85	3.93	0.0249	21.1	0.87	14.7	35.8	1.62	0.0622	0.0009	<0.0005	0.496
ET1801005	Ecological Area	0874_SW110_180411	Water	4/11/2018	0.32	0.37	<0.02	2.87	0.16	3.45	6.32	0.19	<0.02	<0.02	<0.02	<0.1
ET1801005	Ecological Area	0874_SW111_180411	Water	4/11/2018	0.14	0.19	<0.02	1.44	0.09	2.73	4.17	0.1	<0.02	<0.02	<0.02	<0.1
ET1801082	Garbutt	0874_SW014_180419	Water	4/19/2018	0.0041	0.023	<0.0005	0.034	0.0019	0.031	0.065	0.0089	0.0006	0.0007	<0.0005	0.006
ET1801082	Garbutt	0874_SW014_180419_F	Water	4/19/2018	<0.0005	0.0021	<0.0005	<0.0005	<0.0005	<0.0003	<0.0003	0.0085	<0.0005	<0.0005	<0.0005	<0.002
ET1801005	Garbutt	0874_SW017_180411	Water	4/11/2018	<0.02	0.02	<0.02	0.11	<0.02	0.1	0.21	<0.02	<0.02	<0.02	<0.02	<0.1
ET1801098	Garbutt	0874_SW120_180420	Water	4/20/2018	<0.02	0.02	<0.02	0.15	<0.02	0.1	0.25	0.02	<0.02	<0.02	<0.02	<0.1
ET1801098	Garbutt Community	0874_SW127_180420	Water	4/20/2018	0.0045	0.0207	<0.0005	0.0315	0.0008	0.0228	0.0543	0.0062	0.0009	0.0007	<0.0005	0.004
ET1801098	Garbutt Community	0874_SW128_180420	Water	4/20/2018	0.0047	0.0214	<0.0005	0.0375	0.001	0.0199	0.0574	0.0051	0.0008	0.0005	<0.0005	0.004
ET1801098	Rowes Bay	0874_SW107_180420	Water	4/20/2018	0.0813	0.167	<0.0005	0.489	0.0084	0.124	0.613	0.0188	<0.0005	<0.0005	<0.0005	<0.002
ET1800983	Rowes Bay	0874_SW108_180410	Water	4/10/2018	0.0353	0.0428	<0.0005	0.175	0.0081	0.16	0.335	0.0117	<0.0005	<0.0005	<0.0005	<0.002
ET1800983	Rowes Bay	0874_SW109_180410	Water	4/10/2018	0.0182	0.02	<0.0005	0.118	0.0056	0.157	0.275	0.0084	0.0005	<0.0005	<0.0005	<0.002
ET1800983	Rowes Bay	0874_SW114_180410	Water	4/10/2018	0.0067	0.0292	<0.0005	0.0551	0.0038	0.215	0.27	0.0084	0.0016	0.0009	<0.0005	<0.002
ET1800983	Rowes Bay	0874_SW115_180410	Water	4/10/2018	0.15	0.125	<0.0005	0.784	0.0501	1.06	1.84	0.0639	0.0026	<0.0005	<0.0005	<0.002
ET1800983	Rowes Bay	0874_SW116_180410	Water	4/10/2018	0.0696	0.0747	<0.0005	0.383	0.0203	0.489	0.872	0.0317	0.002	<0.0005	<0.0005	<0.002
ET1800983	Rowes Bay	0874_SW118_180410	Water	4/10/2018	0.52	0.55	<0.02	6.14	0.22	7.04	13.2	0.3	<0.02	<0.02	<0.02	<0.1
ET1800983	Rowes Bay	0874_SW208_180410	Water	4/10/2018	0.0367	0.0428	<0.0005	0.191	0.0128	0.368	0.559	0.0171	0.0013	<0.0005	<0.0005	<0.002
ET1801082	Town Common	0874_SW205_180418	Water	4/18/2018	<0.05	0.1	<0.05	0.48	<0.05	0.39	0.87	0.06	<0.05	<0.05	<0.05	<0.2
ET1801082	Town Common	0874_SW206_180418	Water	4/18/2018	<0.10	<0.10	<0.10	0.16	<0.10	<0.10	0.16	<0.10	<0.10	<0.10	<0.10	<0.5
ET1801082	Town Common	0874_SW207_180418	Water	4/18/2018	<0.10	0.1	<0.10	0.18	<0.10	0.21	0.39	<0.10	<0.10	<0.10	<0.10	<0.5

	Carboxylic Acids					(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonates			
	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTTrDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	perfluorooctane sulfonamidoethanol (MeFOSE)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001	0.0005	0.001	0.0005	0.001
ANZECC PFAS FW 95%			220										
DoH and FSANZ drinking water quality value			0.56										
DoH and FSANZ recreational water quality value			5.6										

Lab Report Number	Location	Field ID	Matrix Type	Date	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorotridecanoic acid (PFTTrDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	perfluorooctane sulfonamidoethanol (MeFOSE)
ET1801082	Background (outside IA)	0874_SW211_180418	Water	4/18/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801082	Background (outside IA)	0874_SW212_180418	Water	4/18/2018	0.0019	0.0012	0.0009	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801082	Background (outside IA)	0874_SW213_180418	Water	4/18/2018	<0.0005	0.0008	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801098	Bohle River	0874_SW129_180420	Water	4/20/2018	0.0042	0.0016	0.0051	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801098	Bohle River	0874_SW201_180420	Water	4/20/2018	0.0036	0.0008	0.006	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801082	Bohle River	0874_SW202_180418	Water	4/18/2018	0.0504	0.0067	0.0111	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801082	Bohle River	0874_SW203_180418	Water	4/18/2018	0.0088	0.0015	0.0021	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801082	Bohle River	0874_SW204_180418	Water	4/18/2018	0.0049	0.0009	0.0007	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1800983	Cleveland Bay	0874_SW210_180410	Water	4/10/2018	0.0081	0.0023	0.0028	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1800983	Commercial Property - Garbutt	0874_SW113_180410	Water	4/10/2018	0.96	0.18	0.25	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
ET1801093	Commercial Property - Garbutt	0874_SW117_180419	Water	4/19/2018	6.17	1.11	1.88	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
ET1801093	Commercial Property - Garbutt	0874_SW117_180419_F	Water	4/19/2018	5.57	0.7	0.44	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
ET1801098	Commercial Property - Garbutt	0874_SW119_180420	Water	4/20/2018	10.4	1.56	2.68	<0.0005	<0.0005	<0.001	0.039	<0.001	<0.001	0.0042	<0.001	<0.0005	<0.001
ET1801005	Ecological Area	0874_SW110_180411	Water	4/11/2018	0.96	0.1	0.23	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
ET1801005	Ecological Area	0874_SW111_180411	Water	4/11/2018	0.43	0.05	0.11	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
ET1801082	Garbutt	0874_SW014_180419	Water	4/19/2018	0.0102	0.0038	<0.01	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801082	Garbutt	0874_SW014_180419_F	Water	4/19/2018	0.0097	0.002	0.0018	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801005	Garbutt	0874_SW017_180411	Water	4/11/2018	<0.02	<0.02	<0.01	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
ET1801098	Garbutt	0874_SW120_180420	Water	4/20/2018	0.04	<0.02	0.04	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
ET1801098	Garbutt Community	0874_SW127_180420	Water	4/20/2018	0.0079	0.0029	0.0052	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801098	Garbutt Community	0874_SW128_180420	Water	4/20/2018	0.0073	0.0022	0.0034	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801098	Rowes Bay	0874_SW107_180420	Water	4/20/2018	0.0822	0.0038	0.0085	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1800983	Rowes Bay	0874_SW108_180410	Water	4/10/2018	0.052	0.0058	0.0097	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1800983	Rowes Bay	0874_SW109_180410	Water	4/10/2018	0.0332	0.0081	0.0149	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1800983	Rowes Bay	0874_SW114_180410	Water	4/10/2018	0.011	0.0051	0.0123	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1800983	Rowes Bay	0874_SW115_180410	Water	4/10/2018	0.276	0.0526	0.0908	<0.0005	<0.0005	<0.001	0.004	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1800983	Rowes Bay	0874_SW116_180410	Water	4/10/2018	0.127	0.0265	0.0448	<0.0005	<0.0005	<0.001	0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1800983	Rowes Bay	0874_SW118_180410	Water	4/10/2018	1.37	0.32	0.5	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
ET1800983	Rowes Bay	0874_SW208_180410	Water	4/10/2018	0.0681	0.0148	0.027	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001
ET1801082	Town Common	0874_SW205_180418	Water	4/18/2018	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12
ET1801082	Town Common	0874_SW206_180418	Water	4/18/2018	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.25
ET1801082	Town Common	0874_SW207_180418	Water	4/18/2018	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.25

	namides			PFAS	
	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS	Sum of PFAS (WA DER List)
	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.0005	0.001	0.0003	0.0003
ANZECC PFAS FW 95%					
DoH and FSANZ drinking water quality value					
DoH and FSANZ recreational water quality value					

Lab Report Number	Location	Field ID	Matrix Type	Date					
ET1801082	Background (outside IA)	0874_SW211_180418	Water	4/18/2018	<0.001	<0.0005	<0.001	0.0005	0.0005
ET1801082	Background (outside IA)	0874_SW212_180418	Water	4/18/2018	<0.001	<0.0005	<0.001	0.11	0.108
ET1801082	Background (outside IA)	0874_SW213_180418	Water	4/18/2018	<0.001	<0.0005	<0.001	0.0033	0.0033
ET1801098	Bohle River	0874_SW129_180420	Water	4/20/2018	<0.001	<0.0005	<0.001	0.0264	0.0264
ET1801098	Bohle River	0874_SW201_180420	Water	4/20/2018	<0.001	<0.0005	<0.001	0.0262	0.0236
ET1801082	Bohle River	0874_SW202_180418	Water	4/18/2018	<0.001	<0.0005	<0.001	0.412	0.387
ET1801082	Bohle River	0874_SW203_180418	Water	4/18/2018	<0.001	<0.0005	<0.001	0.087	0.0827
ET1801082	Bohle River	0874_SW204_180418	Water	4/18/2018	<0.001	<0.0005	<0.001	0.0361	0.0334
ET1800983	Cleveland Bay	0874_SW210_180410	Water	4/10/2018	<0.001	<0.0005	<0.001	0.108	0.102
ET1800983	Commercial Property - Garbutt	0874_SW113_180410	Water	4/10/2018	<0.05	<0.02	<0.05	11.1	10.5
ET1801093	Commercial Property - Garbutt	0874_SW117_180419	Water	4/19/2018	<0.05	<0.02	<0.05	50.8	46.9
ET1801093	Commercial Property - Garbutt	0874_SW117_180419_F	Water	4/19/2018	<0.05	<0.02	<0.05	9.55	9.55
ET1801098	Commercial Property - Garbutt	0874_SW119_180420	Water	4/20/2018	<0.001	<0.0005	<0.001	61.3	56.5
ET1801005	Ecological Area	0874_SW110_180411	Water	4/11/2018	<0.05	<0.02	<0.05	8.65	8.17
ET1801005	Ecological Area	0874_SW111_180411	Water	4/11/2018	<0.05	<0.02	<0.05	5.28	5.05
ET1801082	Garbutt	0874_SW014_180419	Water	4/19/2018	<0.001	<0.0005	<0.001	0.131	0.124
ET1801082	Garbutt	0874_SW014_180419_F	Water	4/19/2018	<0.001	<0.0005	<0.001	0.0241	0.0241
ET1801005	Garbutt	0874_SW017_180411	Water	4/11/2018	<0.05	<0.02	<0.05	0.23	0.23
ET1801098	Garbutt	0874_SW120_180420	Water	4/20/2018	<0.05	<0.02	<0.05	0.37	0.37
ET1801098	Garbutt Community	0874_SW127_180420	Water	4/20/2018	<0.001	<0.0005	<0.001	0.108	0.101
ET1801098	Garbutt Community	0874_SW128_180420	Water	4/20/2018	<0.001	<0.0005	<0.001	0.108	0.101
ET1801098	Rowes Bay	0874_SW107_180420	Water	4/20/2018	<0.001	<0.0005	<0.001	0.983	0.893
ET1800983	Rowes Bay	0874_SW108_180410	Water	4/10/2018	<0.001	<0.0005	<0.001	0.5	0.457
ET1800983	Rowes Bay	0874_SW109_180410	Water	4/10/2018	<0.001	<0.0005	<0.001	0.384	0.36
ET1800983	Rowes Bay	0874_SW114_180410	Water	4/10/2018	<0.001	<0.0005	<0.001	0.349	0.336
ET1800983	Rowes Bay	0874_SW115_180410	Water	4/10/2018	<0.001	<0.0005	<0.001	2.66	2.46
ET1800983	Rowes Bay	0874_SW116_180410	Water	4/10/2018	<0.001	<0.0005	<0.001	1.27	1.18
ET1800983	Rowes Bay	0874_SW118_180410	Water	4/10/2018	<0.05	<0.02	<0.05	17	16.2
ET1800983	Rowes Bay	0874_SW208_180410	Water	4/10/2018	<0.001	<0.0005	<0.001	0.78	0.729
ET1801082	Town Common	0874_SW205_180418	Water	4/18/2018	<0.12	<0.05	<0.12	1.21	1.21
ET1801082	Town Common	0874_SW206_180418	Water	4/18/2018	<0.25	<0.10	<0.25	0.16	0.16
ET1801082	Town Common	0874_SW207_180418	Water	4/18/2018	<0.25	<0.10	<0.25	0.62	0.62

Table 15 - Aquatic Biota Analytical Results - PFAS

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared
1	ES1717792001	2270642A	0874	BO001	170717	0874_BO001_GFC_170717	FW Impact	composite	Whole	35	1	Fish	consumer	consumer whole	Freshwater Glassfish	<i>Ambassis agrammus</i>	Ambassidae	Bohle River	Bohle River		5.1
1	ES1717792002	2270642A	0874	BO001	170717	0874_BO001_RFC_170717	FW Impact	composite	Whole	12	1	Fish	consumer	consumer whole	Rainbowfish	<i>Melanotaenia splendida spl</i>	Melanotaeniidae	Bohle River	Bohle River		7.1
1	ES1717792003	2270642A	0874	BO002	170716	0874_BO002_M1F_170716	ES Impact	individual	Flesh	1	1	Fish	detritivore	detritivore flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		28.2
1	ES1717792004	2270642A	0874	BO002	170716	0874_BO002_M1L_170716	ES Impact	individual	Liver	1	1	Fish	detritivore	detritivore liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		1.1
1	ES1717792005	2270642A	0874	BO002	170716	0874_BO002_M2_170716	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		17.7
1	ES1717792006	2270642A	0874	BO002	170716	0874_BO002_M3_170716	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		17.2
1	ES1717792007	2270642A	0874	BO002	170716	0874_BO002_M4_170716	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		23.1
1	ES1717792008	2270642A	0874	BO002	170716	0874_BO002_M5_170716	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		12
1	ES1717792009	2270642A	0874	BO002	170716	0874_BO002_B1_170716	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River		125
1	ES1717792010	2270642A	0874	BO002	170716	0874_BO002_B2_170716	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River		14.4
1	ES1717792011	2270642A	0874	BO002	170716	0874_BO002_RC_170716	ES Impact	composite	Whole	2	1	Fish	consumer	consumer whole	Silver biddy	<i>Gerres subfasciatus</i>	Gerreidae	Bohle River	Bohle River		17.7
1	ES1717792012	2270642A	0874	BO002	170716	0874_BO002_UF1_170716	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Silver javelin	<i>Pomadasy s argenteus</i>	Haemulidae	Bohle River	Bohle River		5
1	ES1717792013	2270642A	0874	BO002	170716	0874_BO002_BS1_170716	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Gizzard shad	<i>Anodontostoma chacunda</i>	Clupeidae	Bohle River	Bohle River		3.8
1	ES1717792014	2270642A	0874	BO002	170716	0874_BO002_GFC_170716	ES Impact	composite	Whole	5	1	Fish	consumer	consumer whole	Glassfish	<i>Ambassis nalua</i>	Ambassidae	Bohle River	Bohle River		6.8
1	ES1717792015	2270642A	0874	BO002	170716	0874_BO002_PFC_170716	ES Impact	composite	Whole	18	1	Fish	consumer	consumer whole	Ponyfish	<i>Leiognathus equulus</i>	Leiognathidae	Bohle River	Bohle River		44.8
1	ES1717792016	2270642A	0874	BO002	170716	0874_BO002_PC_170716	ES Impact	composite	Whole	6	1	Crustacean	omnivore	omnivore prawn	Banana prawn	<i>Fenneropenaeus merguensis</i>	Penaeidae	Bohle River	Bohle River		16.8
1	ES1717792017	2270642A	0874	BO002	170716	0874_BO002_C1_170716	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		21.1
1	ES1717792018	2270642A	0874	BO003	170714	0874_BO003_C1_170714	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		36.5
1	ES1717792019	2270642A	0874	BO003	170714	0874_BO003_C2_170714	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		21.1
1	ES1717792020	2270642A	0874	BO003	170714	0874_BO003_C3_170714	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		9.3
1	ES1717792021	2270642A	0874	BO003	170714	0874_BO003_SAM_170714	ES Impact	composite	plant	1	1	Plant	primary producer	primary producer	Samphire	<i>Halosarcia halecnemoides</i>	Amaranthaceae	Bohle River	Bohle River		81.5
1	ES1717792022	2270642A	0874	BO004	170714	0874_BO004_C1_170714	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		40.1
1	ES1717792023	2270642A	0874	BO004	170714	0874_BO004_C2_170714	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		39
1	ES1717792024	2270642A	0874	BO004	170714	0874_BO004_C3_170714	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		30.8
1	ES1717792025	2270642A	0874	BO004	170714	0874_BO004_OCF_170714	ES Impact	composite	Flesh	6	1	Bivalve	primary consumer	primary consumer	Oyster	<i>Saccostrea sp.</i>	Ostreidea	Bohle River	Bohle River		5.5
1	ES1717792026	2270642A	0874	BO004	170714	0874_BO004_OCS_170714	ES Impact	composite	shell	6	1	Bivalve	primary consumer	primary consumer	Oyster	<i>Saccostrea sp.</i>	Ostreidea	Bohle River	Bohle River		22.2
1	ES1717792027	2270642A	0874	BO005	170715	0874_BO005_M1_170715	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		88
1	ES1717792028	2270642A	0874	BO005	170715	0874_BO005_UFC_170715	ES Impact	composite	Whole	4	1	Fish	consumer	consumer whole	Silver javelin	<i>Pomadasy s argenteus</i>	Haemulidae	Town Common	Town Common		29.4
1	ES1717792029	2270642A	0874	BO005	170715	0874_BO005_PFC_170715	ES Impact	composite	Whole	3	1	Fish	consumer	consumer whole	Ponyfish	<i>Leiognathus equulus</i>	Leiognathidae	Town Common	Town Common		13.8
1	ES1717792030	2270642A	0874	BO005	170715	0874_BO005_C1_170715	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		20
1	ES1717792031	2270642A	0874	BO005	170715	0874_BO005_C2_170715	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		41.5
1	ES1717792032	2270642A	0874	BO005	170715	0874_BO005_C3_170715	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		21.8
1	ES1717792033	2270642A	0874	BO005	170715	0874_BO005_BARNF_170715	ES Impact	composite	Flesh	10	1	Crustacean	primary consumer	primary consumer	Rose Barnacle	<i>Tesseropora rosea</i>	Tetracitidae	Town Common	Town Common		12.4
1	ES1717792034	2270642A	0874	BO005	170715	0874_BO005_SAM_170715	ES Impact	composite	plant	1	1	Plant	primary producer	primary producer	Samphire	<i>Halosarcia halecnemoides</i>	Amaranthaceae	Town Common	Town Common		41.9
1	ES1717792035	2270642A	0874	BO006	170715	0874_BO006_B1L_170715	ES Impact	individual	Liver	1	1	Fish	consumer	consumer liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Town Common	Town Common		1
1	ES1717792036	2270642A	0874	BO006	170715	0874_BO006_B1F_170715	ES Impact	individual	Flesh	1	1	Fish	consumer	consumer flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Town Common	Town Common		26
1	ES1717792037	2270642A	0874	BO006	170715	0874_BO006_C1_170715	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		7.3
1	ES1717792038	2270642A	0874	BO006	170715	0874_BO006_C2_170715	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		26.6
1	ES1717792039	2270642A	0874	BO006	170715	0874_BO006_C3_170715	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		35.8
1	ES1717792040	2270642A	0874	BO006	170715	0874_BO006_C4_170715	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		17.5
1	ES1717792041	2270642A	0874	BO007	170716	0874_BO007_B1F_170716	ES Impact	individual	Flesh	1	1	Fish	consumer	consumer flesh	Bream	<i>Acanthopagrus auratus</i>	Sparidae	Town Common	Town Common		6
1	ES1717792042	2270642A	0874	BO007	170716	0874_BO007_B2_170716	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Bream	<i>Acanthopagrus auratus</i>	Sparidae	Town Common	Town Common		16.3
1	ES1717792043	2270642A	0874	BO007	170716	0874_BO007_B3_170716	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Bream	<i>Acanthopagrus auratus</i>	Sparidae	Town Common	Town Common		16.3
1	ES1717792044	2270642A	0874	BO007	170716	0874_BO007_W1F_170716	ES Impact	individual	Flesh	1	1	Fish	consumer	consumer whole	Whiting	<i>Sillago sihama</i>	Sillaginidae	Town Common	Town Common		20.6
1	ES1717792045	2270642A	0874	BO007	170716	0874_BO007_M1_170716	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		13.9
1	ES1717792046	2270642A	0874	BO007	170716	0874_BO007_M2_170716	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		15.3
1	ES1717792047	2270642A	0874	BO007	170716	0874_BO007_M3_170716	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		23.8
1	ES1717792048	2270642A	0874	BO007	170716	0874_BO007_M4_170716	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		20.5
1	ES1717792049	2270642A	0874	BO007	170716	0874_BO007_M5_170716	ES Impact	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		12.6
1	ES1717792050	2270642A	0874	BO007	170716	0874_BO007_Q1F_170716	ES Impact	individual	Flesh	1	1	Fish	apex predator	apex predator flesh	Queenfish	<i>Scomberoides sp.</i>	Carangidae	Town Common	Town Common		19.4
1	ES1717792051	2270642A	0874	BO007	170716	0874_BO007_BSC_170716	ES Impact	composite	Whole	5	1	Fish	consumer	consumer whole	Gizzard shad	<i>Anodontostoma chacunda</i>	Clupeidae	Town Common	Town Common		31.1
1	ES1717792052	2270642A	0874	BO007	170716	0874_BO007_PFC_170716	ES Impact	composite	Whole	9	1	Fish	consumer	consumer whole	Ponyfish	<i>Leiognathus equulus</i>	Leiognathidae	Town Common	Town Common		46.2
1	ES1717792053	2270642A	0874	BO007	170716	0874_BO007_UF1_170716	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Silver javelin	<i>Pomadasy s argenteus</i>	Haemulidae	Town Common	Town Common		38.1
1	ES1717792054	2270642A	0874	BO007	170716	0874_BO007_R1_170716	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Silver biddy	<i>Gerres filamentosus</i>	Gerreidae	Town Common	Town Common		23.1
1	ES1717792055	2270642A	0874	BO007	170716	0874_BO007_GFC_170716	ES Impact	composite	Whole	4	1	Fish	consumer	consumer whole	Glassfish	<i>Ambassis nalua</i>	Ambassidae	Town Common	Town Common		3.5
1	ES1717792056	2270642A	0874	BO007	170716	0874_BO007_PC_170716	ES Impact	composite	Whole	3	1	Crustacean	omnivore	omnivore prawn	Banana prawn	<i>Fenneropenaeus merguensis</i>	Penaeidae	Town Common	Town Common		4.4
1	ES1717792057	2270642A	0874	BO007	170717	0874_BO007_C1_170716	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		23.4
1	ES1717792058	2270642A	0874	BO007	170718	0874_BO007_C2_170716	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		37.8
1	ES1717792059	2270642A	0874	BO007	170719	0874_BO007_C3_170716	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		19.5
1	ES1717792060	2270642A	0874	BO008	170717	0874_BO008_M1F_170717	ES Impact	individual	Flesh	1	1	Fish	detritivore	detritivore flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Rowes Bay	M		

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared
1	ES1717792076	2270642A	0874	BO010	170718	0874_BO010_PFC_170718	ES Impact	composite	Whole	2	1	Fish	consumer	consumer whole	Ponyfish	<i>Leiognathus equulus</i>	Leiognathidae	Rowes Bay	Three Mile Creek		6.4
1	ES1717792077	2270642A	0874	BO010	170718	0874_BO010_UF1_170718	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Silver javelin	<i>Pomadasys argenteus</i>	Haemulidae	Rowes Bay	Three Mile Creek		3
1	ES1717792078	2270642A	0874	BO010	170718	0874_BO010_RC_170718	ES Impact	composite	Whole	2	1	Fish	consumer	consumer whole	Silver biddy	<i>Gerres filamentosus</i>	Gerreidae	Rowes Bay	Three Mile Creek		42.6
1	ES1717792079	2270642A	0874	BO010	170718	0874_BO010_GF1_170718	ES Impact	individual	Whole	1	1	Fish	consumer	consumer whole	Glassfish	<i>Ambassis nalua</i>	Ambassidae	Rowes Bay	Three Mile Creek		0.3
1	ES1717792080	2270642A	0874	BO010	170718	0874_BO010_SAM_170718	ES Impact	composite	plant	1	1	Plant	primary producer	primary producer	Samphire	<i>Halosarcia halecnemoides</i>	Amaranthaceae	Rowes Bay	Three Mile Creek		84
1	ES1717821001	2270642A	0874	BO010	170718	0874_BO010_C1_170718	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Rowes Bay	Three Mile Creek		23.7
1	ES1717821002	2270642A	0874	BO010	170718	0874_BO010_C2_170718	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Rowes Bay	Three Mile Creek		11.6
1	ES1717821003	2270642A	0874	BO010	170718	0874_BO010_C3_170718	ES Impact	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Rowes Bay	Three Mile Creek		13.5
1	ES1717821004	2270642A	0874	BO011	170714	0874_BO011_GFC_170714	FW Comparative	composite	Whole	10	1	Fish	consumer	consumer whole	Freshwater Glassfish	<i>Ambassis agrammus</i>	Ambassidae	Comparative	Alligator Creek		20.2
1	ES1717821005	2270642A	0874	BO011	170714	0874_BO011_RFC_170714	FW Comparative	composite	Whole	12	1	Fish	consumer	consumer whole	Rainbowfish	<i>Melanotaenia splendida spl</i>	Melanotaeniidae	Comparative	Alligator Creek		17.2
1	ES1717821006	2270642A	0874	BO011	170714	0874_BO011_MBC_170714	FW Comparative	composite	Whole	13	1	Crustacean	omnivore	omnivore prawn	Macrobrachium	<i>Macrobrachium</i>	Macrobrachium	Comparative	Alligator Creek		73.1
1	ES1717821007	2270642A	0874	BO012	170713	0874_BO012_C1_170713	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Gordon Creek		27.8
1	ES1717821008	2270642A	0874	BO012	170713	0874_BO012_C2_170713	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Gordon Creek		24
1	ES1717821009	2270642A	0874	BO012	170713	0874_BO012_C3_170713	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Gordon Creek		20.3
1	ES1717821010	2270642A	0874	BO012	170713	0874_BO012_OFC_170713	ES Comparative	composite	Flesh	7	1	Bivalve	primary consumer	primary consumer	Oyster	<i>Saccostrea sp.</i>	Ostreidea	Comparative	Gordon Creek		32.3
1	ES1717821011	2270642A	0874	BO012	170713	0874_BO012_BSC_170713	ES Comparative	composite	Whole	6	1	Fish	consumer	consumer whole	Gizzard shad	<i>Anodontostoma chacunda</i>	Clupeidae	Comparative	Gordon Creek		115
1	ES1717821012	2270642A	0874	BO012	170713	0874_BO012_GC_170713	ES Comparative	composite	Whole	2	1	Fish	consumer	consumer whole	Silver biddy	<i>Gerres filamentosus</i>	Gerreidae	Comparative	Gordon Creek		9.5
1	ES1717821013	2270642A	0874	BO012	170713	0874_BO012_GFC_170713	ES Comparative	composite	Whole	2	1	Fish	consumer	consumer whole	Glassfish	<i>Ambassis nalua</i>	Ambassidae	Comparative	Gordon Creek		2.7
1	ES1717821014	2270642A	0874	BO012	170713	0874_BO012_PFC_170713	ES Comparative	composite	Whole	6	1	Fish	consumer	consumer whole	Ponyfish	<i>Leiognathus equulus</i>	Leiognathidae	Comparative	Gordon Creek		18.3
1	ES1717821015	2270642A	0874	BO012	170713	0874_BO012_PC_170713	ES Comparative	composite	Whole	6	1	Crustacean	omnivore	omnivore prawn	Banana prawn	<i>Fenneropenaeus merguensis</i>	Penaeidae	Comparative	Gordon Creek		49.1
1	ES1717821016	2270642A	0874	BO012	170713	0874_BO012_SJ1_170713	ES Comparative	individual	Whole	1	1	Fish	consumer	consumer whole	Silver javelin	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Gordon Creek		6.9
1	ES1717821017	2270642A	0874	BO012	170713	0874_BO012_MP1_170713	ES Comparative	individual	Whole	1	1	Fish	consumer	consumer whole	Moses perch	<i>Lutjanus russelli</i>	Moses perch	Comparative	Gordon Creek		27.9
1	ES1717821018	2270642A	0874	BO012	170713	0874_BO012_M1F_170713	ES Comparative	individual	Flesh	1	1	Fish	detritivore	detritivore flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Gordon Creek		36.2
1	ES1717821019	2270642A	0874	BO012	170713	0874_BO012_M1L_170713	ES Comparative	individual	Liver	1	1	Fish	detritivore	detritivore liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Gordon Creek		3
1	ES1717821020	2270642A	0874	BO012	170713	0874_BO012_M2F_170713	ES Comparative	individual	Flesh	1	1	Fish	detritivore	detritivore flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Gordon Creek		34
1	ES1717821021	2270642A	0874	BO012	170713	0874_BO012_M2L_170713	ES Comparative	individual	Liver	1	1	Fish	detritivore	detritivore liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Gordon Creek		1
1	ES1717821022	2270642A	0874	BO012	170713	0874_BO012_M3_170713	ES Comparative	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Gordon Creek		15.2
1	ES1717821023	2270642A	0874	BO012	170713	0874_BO012_M4_170713	ES Comparative	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Gordon Creek		10.4
1	ES1717821024	2270642A	0874	BO012	170713	0874_BO012_M5_170713	ES Comparative	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Gordon Creek		9.3
1	ES1717821025	2270642A	0874	BO012	170713	0874_BO012_SAM_170713	ES Comparative	composite	plant	1	1	Plant	primary producer	primary producer	Samphire	<i>Halosarcia halecnemoides</i>	Amaranthaceae	Comparative	Gordon Creek		45.7
1	ES1717821026	2270642A	0874	BO013	170712	0874_BO013_C1_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		24.2
1	ES1717821027	2270642A	0874	BO013	170712	0874_BO013_C2_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		13.4
1	ES1717821028	2270642A	0874	BO013	170712	0874_BO013_C3_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		60.9
1	ES1717821029	2270642A	0874	BO013	170712	0874_BO013_C4_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		11.8
1	ES1717821030	2270642A	0874	BO013	170712	0874_BO013_C5_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		36.7
1	ES1717821031	2270642A	0874	BO013	170712	0874_BO013_C6_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		39.5
1	ES1717821032	2270642A	0874	BO013	170712	0874_BO013_C7_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		31.4
1	ES1717821033	2270642A	0874	BO013	170712	0874_BO013_C8_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		17.9
1	ES1717821034	2270642A	0874	BO013	170712	0874_BO013_C9_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		34.3
1	ES1717821035	2270642A	0874	BO013	170712	0874_BO013_C10_170712	ES Comparative	individual	Flesh	1	1	Crustacean	omnivore	omnivore mud crab	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Althaus Creek		12
1	ES1717821036	2270642A	0874	BO013	170712	0874_BO013_SAM_170712	ES Comparative	composite	plant	1	1	Plant	primary producer	primary producer	Samphire	<i>Halosarcia halecnemoides</i>	Amaranthaceae	Comparative	Althaus Creek		49.4
1	ES1717821037	2270642A	0874	BO013	170712	0874_BO013_OCF_170712	ES Comparative	composite	Flesh	7	1	Bivalve	primary consumer	primary consumer	Oyster	<i>Saccostrea spp.</i>	Ostreidea	Comparative	Althaus Creek		28.5
1	ES1717821038	2270642A	0874	BO013	170712	0874_BO013_OCS_170712	ES Comparative	composite	shell	7	1	Bivalve	primary consumer	primary consumer	Oyster	<i>Saccostrea spp.</i>	Ostreidea	Comparative	Althaus Creek		54.1
1	ES1717821039	2270642A	0874	BO013	170712	0874_BO013_M1F_170712	ES Comparative	individual	Flesh	1	1	Fish	detritivore	primary consumer	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Althaus Creek		29.5
1	ES1717821040	2270642A	0874	BO013	170712	0874_BO013_M1L_170712	ES Comparative	individual	Liver	1	1	Fish	detritivore	detritivore flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Althaus Creek		2.7
1	ES1717821041	2270642A	0874	BO013	170712	0874_BO013_M2F_170712	ES Comparative	individual	Flesh	1	1	Fish	detritivore	detritivore liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Althaus Creek		14.6
1	ES1717821042	2270642A	0874	BO013	170712	0874_BO013_M2L_170712	ES Comparative	individual	Liver	1	1	Fish	detritivore	detritivore flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Althaus Creek		1.7
1	ES1717821043	2270642A	0874	BO013	170712	0874_BO013_M3_170712	ES Comparative	individual	Whole	1	1	Fish	detritivore	detritivore liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Althaus Creek		23.6
1	ES1717821044	2270642A	0874	BO013	170712	0874_BO013_M4_170712	ES Comparative	individual	Whole	1	1	Fish	detritivore	detritivore whole	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Althaus Creek		26.6
1	ES1717821045	2270642A	0874	BO013	170712	0874_BO013_MP1_170712	ES Comparative	individual	Whole	1	1	Fish	consumer	consumer whole	Moses perch	<i>Lutjanus russelli</i>	Moses perch	Comparative	Althaus Creek		86.5
1	ES1717821046	2270642A	0874	BO013	170712	0874_BO013_MP2_170712	ES Comparative	individual	Whole	1	1	Fish	consumer	consumer whole	Moses perch	<i>Lutjanus russelli</i>	Moses perch	Comparative	Althaus Creek		41.8
1	ES1717821047	2270642A	0874	BO013	170712	0874_BO013_B1F_170712	ES Comparative	individual	Flesh	1	1	Fish	consumer	consumer flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Althaus Creek		24.2
1	ES1717821048	2270642A	0874	BO013	170712	0874_BO013_B1L_170712	ES Comparative	individual	Liver	1	1	Fish	consumer	consumer liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Althaus Creek		0.9
1	ES1717821049	2270642A	0874	BO013	170712	0874_BO013_B2_170712	ES Comparative	individual	Whole	1	1	Fish	consumer	consumer whole	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Althaus Creek		29.1
1	ES1717821050	2270642A	0874	BO013	170712	0874_BO013_UF1_170712	ES Comparative	individual	Whole	1	1	Fish	consumer	consumer whole	Silver javelin	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Althaus Creek		51.6
1	ES1717821051	2270642A	0874	BO013	170712	0874_BO013_BSC_170712	ES Comparative	composite	Whole	5	1	Fish	consumer	consumer whole	Gizzard shad	<i>Anodontostoma chacunda</i>	Clupeidae	Comparative	Althaus Creek		109
1	ES1717821052	2270642A	0874	BO013	170712	0874_BO013_PFC_170712	ES Comparative	composite	Whole	4	1	Fish	consumer	consumer whole	Ponyfish	<i>Leiognathus equulus</i>	Leiognathidae	Comparative	Althaus Creek		15.5
1	ES1717821053	2270642A	0874	BO013	170712	0874_BO013_SBC_170712	ES Comparative	composite	Whole	5	1	Fish	consumer	consumer whole	Southern herring	<i>Herklotsichthys castelnaui</i>	Clupeidae	Comparative	Althaus Creek		59.9
2	ES1730645001	2270642A	0874	BO002	171130	0874_BO002_PO1_171130	ES Impact	composite	Organ	8	1	Crustacean	Omnivore	Omnivore Organ	Banana prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Bohle River	Bohle River		14
2	ES1730645002	2270642A	0874	BO002	171130	0874_BO002_PF1_171130	ES Impact	composite	Flesh	8	1	Crustacean	Omnivore	Omnivore Flesh	Banana prawn						

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared
2	ES1730645018	2270642A	0874	BO002	171130	0874_BO002_ML3_171130	ES Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		15.4
2	ES1730645019	2270642A	0874	BO002	171130	0874_BO002_MF4_171130	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		30.7
2	ES1730645020	2270642A	0874	BO002	171130	0874_BO002_ML4_171130	ES Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		15.6
2	ES1730645021	2270642A	0874	BO002	171130	0874_BO002_MF5_171130	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		115
2	ES1730645022	2270642A	0874	BO002	171130	0874_BO002_ML5_171130	ES Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		14.6
2	ES1730645023	2270642A	0874	BO007	171201	0874_BO007_BF1_171201	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Town Common	Town Common		52.4
2	ES1730645024	2270642A	0874	BO007	171201	0874_BO007_BL1_171201	ES Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Town Common	Town Common		14.8
2	ES1730645025	2270642A	0874	BO007	171201	0874_BO007_CO1_171201	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		50.5
2	ES1730645026	2270642A	0874	BO007	171201	0874_BO007_CF1_171201	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		68.9
2	ES1730645027	2270642A	0874	BO007	171201	0874_BO007_CO2_171201	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		61.5
2	ES1730645028	2270642A	0874	BO007	171201	0874_BO007_CF2_171201	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		134
2	ES1730645029	2270642A	0874	BO007	171201	0874_BO007_CO3_171201	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		46.9
2	ES1730645030	2270642A	0874	BO007	171201	0874_BO007_CF3_171201	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		64.4
2	ES1730645031	2270642A	0874	BO007	171201	0874_BO007_CO4_171201	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		52
2	ES1730645032	2270642A	0874	BO007	171201	0874_BO007_CF4_171201	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		62.6
2	ES1730645033	2270642A	0874	BO007	171201	0874_BO007_CO5_171201	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		50.4
2	ES1730645034	2270642A	0874	BO007	171201	0874_BO007_CF5_171201	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		67
2	ES1730645035	2270642A	0874	BO007	171201	0874_BO007_CO6_171201	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		141
2	ES1730645036	2270642A	0874	BO007	171201	0874_BO007_CF6_171201	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		49.8
2	ES1730645037	2270642A	0874	BO007	171201	0874_BO007_CO7_171201	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		70.2
2	ES1730645038	2270642A	0874	BO007	171201	0874_BO007_CF7_171201	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		68.1
2	ES1730645039	2270642A	0874	BO007	171201	0874_BO007_CO8_171201	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		68.3
2	ES1730645040	2270642A	0874	BO007	171201	0874_BO007_CF8_R1_171201	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		72.3
2	ES1730645041	2270642A	0874	BO007	171201	0874_BO007_CF8_R2_171201	ES Impact	individual	Flesh	1	2	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Town Common	Town Common		69.6
2	ES1730645042	2270642A	0874	BO002	171201	0874_BO002_BF2_171201	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River		57.6
2	ES1730645044	2270642A	0874	BO002	171201	0874_BO002_ML6_171201	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		42.4
2	ES1730645045	2270642A	0874	BO002	171201	0874_BO002_MF6_171201	ES Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		31.9
2	ES1730645046	2270642A	0874	BO002	171201	0874_BO002_BL3_171201	ES Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River		19.9
2	ES1730645047	2270642A	0874	BO002	171201	0874_BO002_BF3_R1_171201	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River		74.9
2	ES1730645048	2270642A	0874	BO002	171201	0874_BO002_BF3_R2_171201	ES Impact	individual	Flesh	1	2	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River		85.3
2	ES1730645049	2270642A	0874	BO002	171201	0874_BO002_FHF3_171201	ES Impact	composite	Flesh	2	1	Fish	Apex predator	Apex predator Flesh	Flathead	<i>Platycephalus fiscus</i>	Platycephalidae	Bohle River	Bohle River		36.4
2	ES1730645050	2270642A	0874	BO002	171201	0874_BO002_FHL3_171201	ES Impact	composite	Liver	2	1	Fish	Apex predator	Apex predator Liver	Flathead	<i>Platycephalus fiscus</i>	Platycephalidae	Bohle River	Bohle River		14.3
2	ES1730645051	2270642A	0874	BO014	171202	0874_BO014_CF1_R1_171202	ES Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		98.3
2	ES1730645052	2270642A	0874	BO014	171202	0874_BO014_CF1_R2_171202	ES Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		71.7
2	ES1730645053	2270642A	0874	BO014	171202	0874_BO014_CO1_171202	ES Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		83.1
2	ES1730645054	2270642A	0874	BO014	171202	0874_BO014_CF2_171202	ES Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		38.1
2	ES1730645055	2270642A	0874	BO014	171202	0874_BO014_CO2_171202	ES Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		47.8
2	ES1730645056	2270642A	0874	BO014	171202	0874_BO014_CF3_171202	ES Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		46.4
2	ES1730645057	2270642A	0874	BO014	171202	0874_BO014_CO3_171202	ES Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		40.2
2	ES1730645058	2270642A	0874	BO014	171202	0874_BO014_CF4_171202	ES Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		47.5
2	ES1730645059	2270642A	0874	BO014	171202	0874_BO014_CO4_171202	ES Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		49.7
2	ES1730645060	2270642A	0874	BO014	171202	0874_BO014_CF5_171202	ES Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		50.4
2	ES1730645061	2270642A	0874	BO014	171202	0874_BO014_CO5_171202	ES Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		39.8
2	ES1730645062	2270642A	0874	BO014	171202	0874_BO014_CF6_171202	ES Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		54.5
2	ES1730645063	2270642A	0874	BO014	171202	0874_BO014_CO6_171202	ES Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		47.4
2	ES1730645064	2270642A	0874	BO014	171202	0874_BO014_CF7_171202	ES Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		58.1
2	ES1730645065	2270642A	0874	BO014	171202	0874_BO014_CO7_171202	ES Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		142
2	ES1730645066	2270642A	0874	BO014	171202	0874_BO014_CF8_171202	ES Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		37
2	ES1730645067	2270642A	0874	BO014	171202	0874_BO014_CO8_171202	ES Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Comparative	Alligator Creek		50.1
2	ES1730645068	2270642A	0874	BO014	171202	0874_BO014_GF1_R1_171202	ES Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Alligator Creek		55.7
2	ES1730645069	2270642A	0874	BO014	171202	0874_BO014_GF1_R2_171202	ES Comparative	individual	Flesh	1	2	Fish	Consumer	Consumer Flesh	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Alligator Creek		50.1
2	ES1730645070	2270642A	0874	BO014	171202	0874_BO014_GL1_171202	ES Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Alligator Creek		17.4
2	ES1730645071	2270642A	0874	BO014	171202	0874_BO014_QF1_R1_171202	ES Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Queenfish	<i>Scomberoides tala</i>	Carangidae	Comparative	Alligator Creek		108
2	ES1730645072	2270642A	0874	BO014	171202	0874_BO014_QF1_R2_171202	ES Comparative	individual	Flesh	1	2	Fish	Apex predator	Apex predator Flesh	Queenfish	<i>Scomberoides tala</i>	Carangidae	Comparative	Alligator Creek		70.8
2	ES1730645073	2270642A	0874	BO014	171202	0874_BO014_QL1_171202	ES Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Queenfish	<i>Scomberoides tala</i>	Carangidae	Comparative	Alligator Creek		28.1
2	ES1730645074	2270642A	0874	BO014	171202	0874_BO014_BL1_171202	ES Comparative	composite	Liver	3	1	Fish	Consumer	Consumer Liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Alligator Creek		15.2
2	ES1730645075	2270642A	0874	BO014	171202	0874_BO014_BF1_171202	ES Comparative	composite	Flesh	3	1	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Alligator Creek		50.8
2	ES1730645078	2270642A	0874	BO014	171202	0874_BO014_GF2_171202	ES Comparative	individual	Flesh	2	1	Fish	Consumer	Consumer Flesh	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Alligator Creek		119
2	ES1730645079	2270642A	0874	BO014	171202	0874_BO014_GL2_171202	ES Comparative	individual	Liver	2	1	Fish	Consumer	Consumer Liver	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Alligator Creek		16.5
2	ES1730645080	2270642A	0874	BO014	171202	0874_BO014_GF3_171202	ES Comparative	composite	Flesh	1											

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared
2	ES1730645096	2270642A	0874	BO002	171203	0874_BO002_CF3_171203	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		59.5
2	ES1730645097	2270642A	0874	BO002	171203	0874_BO002_CO4_171203	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		67.3
2	ES1730645098	2270642A	0874	BO002	171203	0874_BO002_CF4_171203	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		49.5
2	ES1730645099	2270642A	0874	BO002	171203	0874_BO002_ML7_171203	ES Impact	composite	Liver	2	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		15
2	ES1730645100	2270642A	0874	BO002	171203	0874_BO002_MF7_171203	ES Impact	composite	Flesh	2	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		68.3
2	ES1730645101	2270642A	0874	BO002	171203	0874_BO002_ML8_171203	ES Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		14.8
2	ES1730645102	2270642A	0874	BO002	171203	0874_BO002_MF8_171203	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		61.8
2	ES1730645103	2270642A	0874	BO002	171203	0874_BO002_FHF4_171203	ES Impact	composite	Flesh	4	1	Fish	Apex predator	Apex predator Flesh	Flathead	<i>Platycephalus fiscus</i>	Platycephalidae	Bohle River	Bohle River		37.3
2	ES1730645104	2270642A	0874	BO002	171203	0874_BO002_FHL4_171203	ES Impact	composite	Liver	4	1	Fish	Apex predator	Apex predator Liver	Flathead	<i>Platycephalus fiscus</i>	Platycephalidae	Bohle River	Bohle River		13.3
2	ES1730645105	2270642A	0874	BO002	171203	0874_BO002_GF1_171203	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River		28.5
2	ES1730645120	2270642A	0874	BO002	171203	0874_BO002_GL1_171203	ES Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River		0.5
2	ES1730645121	2270642A	0874	BO002	171201	0874_BO002_BL2_171201	ES Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River		2.4
3	ES1732353001	2270642A	0874	BO002	171212	0874_BO002_CO5_171212	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		47.7
3	ES1732353002	2270642A	0874	BO002	171212	0874_BO002_CF5_171212	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		102
3	ES1732353003	2270642A	0874	BO002	171212	0874_BO002_CO6_171212	ES Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		33.3
3	ES1732353004	2270642A	0874	BO002	171212	0874_BO002_CF6_171212	ES Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Crab	<i>Scylla serrata</i>	Portunidae	Bohle River	Bohle River		30.7
3	ES1732353005	2270642A	0874	BO002	171212	0874_BO002_CFF1_171212	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Catfish	<i>Neoarius graffei</i>	Ariidae	Bohle River	Bohle River		31.9
3	ES1732353006	2270642A	0874	BO002	171212	0874_BO002_CFL1_171212	ES Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Catfish	<i>Neoarius graffei</i>	Ariidae	Bohle River	Bohle River		0.6
3	ES1732353007	2270642A	0874	BO002	171212	0874_BO002_MF10_171212	ES Impact	composite	Flesh	4	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		56.1
3	ES1732353008	2270642A	0874	BO002	171212	0874_BO002_ML10_171212	ES Impact	composite	Liver	4	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River		0.5
3	ES1732353009	2270642A	0874	BO002	171212	0874_BO002_PO2_171212	ES Impact	composite	Organ	14	1	Crustacean	Omnivore	Omnivore Organ	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Bohle River	Bohle River		17.1
3	ES1732353010	2270642A	0874	BO002	171212	0874_BO002_PF2_171212	ES Impact	composite	Flesh	14	1	Crustacean	Omnivore	Omnivore Flesh	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Bohle River	Bohle River		17.5
3	ES1732353011	2270642A	0874	BO002	171212	0874_BO002_PO3_171212	ES Impact	composite	Organ	14	1	Crustacean	Omnivore	Omnivore Organ	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Bohle River	Bohle River		13.4
3	ES1732353012	2270642A	0874	BO002	171212	0874_BO002_PF3_171212	ES Impact	composite	Flesh	14	1	Crustacean	Omnivore	Omnivore Flesh	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Bohle River	Bohle River		14.2
3	ES1732353013	2270642A	0874	BO002	171212	0874_BO002_PO4_R1_171212	ES Impact	composite	Organ	15	1	Crustacean	Omnivore	Omnivore Organ	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Bohle River	Bohle River		11.3
3	ES1732353014	2270642A	0874	BO002	171212	0874_BO002_PF4_R1_171212	ES Impact	composite	Flesh	15	1	Crustacean	Omnivore	Omnivore Flesh	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Bohle River	Bohle River		14.7
3	ES1732353015	2270642A	0874	BO012	171213	0874_BO012_PO3_R1_171213	ES Comparative	composite	Organ	13	1	Crustacean	Omnivore	Omnivore Organ	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		21.1
3	ES1732353016	2270642A	0874	BO012	171213	0874_BO012_PO8_171213	ES Comparative	composite	Organ	13	1	Crustacean	Omnivore	Omnivore Organ	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		31
3	ES1732353017	2270642A	0874	BO012	171213	0874_BO012_PF3_R1_171213	ES Comparative	composite	Flesh	13	1	Crustacean	Omnivore	Omnivore Flesh	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		23.4
3	ES1732353018	2270642A	0874	BO012	171213	0874_BO012_PF8_171213	ES Comparative	composite	Flesh	13	1	Crustacean	Omnivore	Omnivore Flesh	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		32.4
3	ES1732353019	2270642A	0874	BO012	171213	0874_BO012_PO4_171213	ES Comparative	composite	Organ	13	1	Crustacean	Omnivore	Omnivore Organ	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		27.7
3	ES1732353020	2270642A	0874	BO012	171213	0874_BO012_PF4_171213	ES Comparative	composite	Flesh	13	1	Crustacean	Omnivore	Omnivore Flesh	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		29.6
3	ES1732353021	2270642A	0874	BO012	171213	0874_BO012_PO5_171213	ES Comparative	composite	Organ	13	1	Crustacean	Omnivore	Omnivore Organ	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		73
3	ES1732353022	2270642A	0874	BO012	171213	0874_BO012_PF5_171213	ES Comparative	composite	Flesh	13	1	Crustacean	Omnivore	Omnivore Flesh	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		23.1
3	ES1732353023	2270642A	0874	BO012	171213	0874_BO012_PO6_171213	ES Comparative	composite	Organ	13	1	Crustacean	Omnivore	Omnivore Organ	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		36.8
3	ES1732353024	2270642A	0874	BO012	171213	0874_BO012_PF6_171213	ES Comparative	composite	Flesh	13	1	Crustacean	Omnivore	Omnivore Flesh	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		30.8
3	ES1732353025	2270642A	0874	BO012	171213	0874_BO012_PO7_171213	ES Comparative	composite	Organ	13	1	Crustacean	Omnivore	Omnivore Organ	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		39.2
3	ES1732353026	2270642A	0874	BO012	171213	0874_BO012_PF7_171213	ES Comparative	composite	Flesh	13	1	Crustacean	Omnivore	Omnivore Flesh	Banana Prawn	<i>Fenneropenaeus sp.</i>	Penaeidae	Comparative	Sandfly Creek		30.9
3	ES1732353027	2270642A	0874	BO012	171213	0874_BO012_MF4_171213	ES Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Sandfly Creek		25.7
3	ES1732353028	2270642A	0874	BO012	171213	0874_BO012_ML4_171213	ES Comparative	composite	Liver	3	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Sandfly Creek		1.4
3	ES1732353029	2270642A	0874	BO012	171213	0874_BO012_MF5_171213	ES Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Sandfly Creek		18.5
3	ES1732353030	2270642A	0874	BO012	171213	0874_BO012_ML5_171213	ES Comparative	composite	Liver	11	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Sandfly Creek		1.9
3	ES1732353031	2270642A	0874	BO012	171213	0874_BO012_MF6_171213	ES Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Sandfly Creek		16
3	ES1732353032	2270642A	0874	BO012	171213	0874_BO012_MF7_171213	ES Comparative	composite	Flesh	5	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Sandfly Creek		24.3
3	ES1732353033	2270642A	0874	BO012	171213	0874_BO012_MF8_171213	ES Comparative	composite	Flesh	6	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Comparative	Sandfly Creek		22
3	ES1732353034	2270642A	0874	BO012	171213	0874_BO012_BF2_R1_171213	ES Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Sandfly Creek		40.8
3	ES1732353035	2270642A	0874	BO012	171213	0874_BO012_BF2_R2_171213	ES Comparative	individual	Flesh	1	2	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Sandfly Creek		42.7
3	ES1732353036	2270642A	0874	BO012	171213	0874_BO012_BL2_R1_171213	ES Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Sandfly Creek		0.9
3	ES1732353037	2270642A	0874	BO012	171213	0874_BO012_BF3_171213	ES Comparative	composite	Flesh	4	1	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Sandfly Creek		35.3
3	ES1732353038	2270642A	0874	BO012	171213	0874_BO012_BL3_171213	ES Comparative	composite	Liver	6	1	Fish	Consumer	Consumer Liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Sandfly Creek		1.9
3	ES1732353039	2270642A	0874	BO012	171213	0874_BO012_BF4_171213	ES Comparative	composite	Flesh	4	1	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Comparative	Sandfly Creek		0.8
3	ES1732353040	2270642A	0874	BO012	171213	0874_BO012_MJF1_R1_171213	ES Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove Jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Comparative	Sandfly Creek		37
3	ES1732353041	2270642A	0874	BO012	171213	0874_BO012_MJF1_R2_171213	ES Comparative	individual	Flesh	1	2	Fish	Apex predator	Apex predator Flesh	Mangrove Jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Comparative	Sandfly Creek		28.4
3	ES1732353042	2270642A	0874	BO012	171213	0874_BO012_MJL1_171213	ES Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove Jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Comparative	Sandfly Creek		0.6
3	ES1732353043	2270642A	0874	BO012	171213	0874_BO012_GF3_171213	ES Comparative	composite	Flesh	3	1	Fish	Consumer	Consumer Flesh	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Sandfly Creek		2.4
3	ES1732353044	2270642A	0874	BO012	171213	0874_BO012_WF1_171213	ES Comparative	composite	Flesh	3	1	Fish	Consumer	Consumer Flesh	Whiting	<i>Sillago ciliata</i>	Sillaginidae	Comparative	Sandfly Creek		9.7
3	ES1732353045	2270642A	0874	BO012	171213	0874_BO012_TSF1_171213	ES Comparative	composite	Flesh	2	1	Fish	Apex predator	Apex predator Flesh	Threadfin Salmon	<i>Eleutheronema tetradactylus</i>	Polynemidae	Comparative	Sandfly Creek		8.3
3	ES1732353046	2270642A	0874	BO012	171213	0874_BO012_QW1_171213	ES Comparative	composite	Whole	1	1	Fish	Apex predator	Apex predator Whole	Queenfish	<i>Scomberoides tala</i>	Carangidae	Comparative	Sandfly Creek		4.2
3	ES1732353047	2270642A	0874	BO012	171213	0874_BO012_AF1_171213	ES Comparative	composite	Flesh	4	1	Fish	Consumer	Consumer Flesh	Anchovy	<i>Engraulis australis</i>	Engraulidae	Comparative	Sandfly Creek		11
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Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared
3	ES1732353064	2270642A	0874	BO007	171214	0874_BO007_CFF2_171214	ES Impact	composite	Flesh	2	1	Fish	Consumer	Consumer Flesh	Catfish	<i>Neoarius graffei</i>	Ariidae	Town Common	Town Common		40.5
3	ES1732353065	2270642A	0874	BO007	171214	0874_BO007_CFL3_171214	ES Impact	composite	Liver	2	1	Fish	Consumer	Consumer Liver	Catfish	<i>Neoarius graffei</i>	Ariidae	Town Common	Town Common		1.2
3	ES1732353066	2270642A	0874	BO007	171214	0874_BO007_CFF3_171214	ES Impact	composite	Flesh	2	1	Fish	Consumer	Consumer Flesh	Catfish	<i>Neoarius graffei</i>	Ariidae	Town Common	Town Common		38.5
3	ES1732353067	2270642A	0874	BO007	171214	0874_BO007_BF2_171214	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Town Common	Town Common		26.2
3	ES1732353068	2270642A	0874	BO007	171214	0874_BO007_BL2_171214	ES Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Town Common	Town Common		1
3	ES1732353069	2270642A	0874	BO007	171214	0874_BO007_BF3_171214	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	<i>Acanthopagrus australis</i>	Sparidae	Town Common	Town Common		23.1
3	ES1732353070	2270642A	0874	BO007	171214	0874_BO007_BL3_171214	ES Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Bream	<i>Acanthopagrus australis</i>	Sparidae	Town Common	Town Common		0.4
3	ES1732353071	2270642A	0874	BO007	171214	0874_BO007_CODF1_R1_171214	ES Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Cod	<i>Epinephelus malabaricus</i>	Serranidae	Town Common	Town Common		30.7
3	ES1732353072	2270642A	0874	BO007	171214	0874_BO007_CODF1_R2_171214	ES Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Cod	<i>Epinephelus malabaricus</i>	Serranidae	Town Common	Town Common		33.3
3	ES1732353073	2270642A	0874	BO007	171214	0874_BO007_CODL1_171214	ES Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Cod	<i>Epinephelus malabaricus</i>	Serranidae	Town Common	Town Common		0.8
3	ES1732353074	2270642A	0874	BO007	171214	0874_BO007_CODF2_171214	ES Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Cod	<i>Epinephelus malabaricus</i>	Serranidae	Town Common	Town Common		41.9
3	ES1732353075	2270642A	0874	BO007	171214	0874_BO007_CODL2_171214	ES Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Cod	<i>Epinephelus malabaricus</i>	Serranidae	Town Common	Town Common		0.7
3	ES1732353076	2270642A	0874	BO007	171214	0874_BO007_GF1_171214	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Town Common	Town Common		15.8
3	ES1732353077	2270642A	0874	BO007	171214	0874_BO007_GL1_171214	ES Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Town Common	Town Common		0.2
3	ES1732353078	2270642A	0874	BO007	171214	0874_BO007_GF2_171214	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Town Common	Town Common		27.2
3	ES1732353079	2270642A	0874	BO007	171214	0874_BO007_GL2_171214	ES Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Grunter	<i>Pomadasys argenteus</i>	Haemulidae	Town Common	Town Common		0.4
3	ES1732353080	2270642A	0874	BO007	171214	0874_BO007_MF1_171214	ES Impact	composite	Flesh	3	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		5
3	ES1732353081	2270642A	0874	BO007	171214	0874_BO007_ML1_171214	ES Impact	composite	Liver	3	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		0.8
3	ES1732353082	2270642A	0874	BO007	171214	0874_BO007_MF2_171214	ES Impact	composite	Flesh	4	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		2
3	ES1732353083	2270642A	0874	BO007	171214	0874_BO007_ML2_171214	ES Impact	composite	Liver	4	1	Fish	Detritivore	Detritivore Liver	Mullet	<i>Mugil cephalus</i>	Mugilidae	Town Common	Town Common		0.7
3	ES1732353084	2270642A	0874	BO010	171215	0874_BO010_MF1_171215	ES Impact	composite	Flesh	3	1	Fish	Detritivore	Detritivore Flesh	Mullet	<i>Mugil cephalus</i>	Mugilidae	Rowes Bay	Rowes Bay		0.6
3	ES1732353085	2270642A	0874	BO010	171215	0874_BO010_CODF1_171215	ES Impact	composite	Flesh	2	1	Fish	Apex predator	Apex predator Flesh	Cod	<i>Epinephelus malabaricus</i>	Serranidae	Rowes Bay	Rowes Bay		27.1
3	ES1732353086	2270642A	0874	BO010	171215	0874_BO010_CODL1_171215	ES Impact	composite	Liver	2	1	Fish	Apex predator	Apex predator Liver	Cod	<i>Epinephelus malabaricus</i>	Serranidae	Rowes Bay	Rowes Bay		0.8
3	ES1732353087	2270642A	0874	BO010	171215	0874_BO010_MJF1_171215	ES Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove Jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Rowes Bay	Rowes Bay		37
3	ES1732353088	2270642A	0874	BO010	171215	0874_BO010_MJL1_171215	ES Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove Jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Rowes Bay	Rowes Bay		0.9
3	ES1732353089	2270642A	0874	BO012	171213	0874_BO012_MANGL1_R1_171213	ES Comparative	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Comparative	Sandfly Creek		21.5
3	ES1732353090	2270642A	0874	BO012	171213	0874_BO012_MANGL1_R2_171213	ES Comparative	composite	leaves	2	2	Plant	primary producer	primary producer leaves	Mangrove	–	–	Comparative	Sandfly Creek		64.5
3	ES1732353091	2270642A	0874	BO012	171213	0874_BO012_MANGL2_171213	ES Comparative	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Comparative	Sandfly Creek		48.6
3	ES1732353092	2270642A	0874	BO012	171213	0874_BO012_MANGL3_171213	ES Comparative	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Comparative	Sandfly Creek		61.9
3	ES1732353093	2270642A	0874	BO012	171213	0874_BO012_MANGL4_171213	ES Comparative	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Comparative	Sandfly Creek		66.4
3	ES1732353094	2270642A	0874	BO012	171213	0874_BO012_MANGD1_171213	ES Comparative	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Comparative	Sandfly Creek		51.5
3	ES1732353095	2270642A	0874	BO012	171213	0874_BO012_MANGD2_R1_171213	ES Comparative	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Comparative	Sandfly Creek		98.8
3	ES1732353096	2270642A	0874	BO012	171213	0874_BO012_MANGD2_R2_171213	ES Comparative	composite	detritus	2	2	Plant	primary producer	primary producer detritus	Mangrove	–	–	Comparative	Sandfly Creek		67.1
3	ES1732353097	2270642A	0874	BO012	171213	0874_BO012_MANG D3_171213	ES Comparative	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Comparative	Sandfly Creek		57.1
3	ES1732353098	2270642A	0874	BO012	171213	0874_BO012_MANG D4_171213	ES Comparative	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Comparative	Sandfly Creek		25.3
3	ES1732353099	2270642A	0874	BO007	171214	0874_BO007_MANG L1_171214	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Town Common	Town Common		51.7
3	ES1732353100	2270642A	0874	BO007	171214	0874_BO007_MANG D1_171214	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Town Common	Town Common		24.7
3	ES1732353101	2270642A	0874	BO007	171214	0874_BO007_MANG L2_171214	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Town Common	Town Common		57.5
3	ES1732353102	2270642A	0874	BO007	171214	0874_BO007_MANG D2_171214	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Town Common	Town Common		22.8
3	ES1732353103	2270642A	0874	BO007	171214	0874_BO007_MANG L3_171214	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Town Common	Town Common		40.1
3	ES1732353104	2270642A	0874	BO007	171214	0874_BO007_MANG D3_171214	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Town Common	Town Common		46.1
3	ES1732353105	2270642A	0874	BO007	171214	0874_BO007_MANG L4_171214	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Town Common	Town Common		34
3	ES1732353106	2270642A	0874	BO007	171214	0874_BO007_MANG D4_171214	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Town Common	Town Common		31.4
3	ES1732353107	2270642A	0874	BO002	171214	0874_BO002_MANG L1_171214	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Bohle River	Bohle River		31.3
3	ES1732353108	2270642A	0874	BO002	171214	0874_BO002_MANG D1_171214	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Bohle River	Bohle River		31.9
3	ES1732353109	2270642A	0874	BO002	171214	0874_BO002_MANG L2_171214	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Bohle River	Bohle River		57.5
3	ES1732353110	2270642A	0874	BO002	171214	0874_BO002_MANG D2_171214	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Bohle River	Bohle River		47.5
3	ES1732353111	2270642A	0874	BO002	171214	0874_BO002_MANG L3_171214	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Bohle River	Bohle River		46.3
3	ES1732353112	2270642A	0874	BO002	171214	0874_BO002_MANG D3_171214	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Bohle River	Bohle River		20.5
3	ES1732353113	2270642A	0874	BO002	171214	0874_BO002_MANG L4_171214	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Bohle River	Bohle River		47
3	ES1732353114	2270642A	0874	BO002	171214	0874_BO002_MANG D4_171214	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Bohle River	Bohle River		24.7
3	ES1732353115	2270642A	0874	BO010	171215	0874_BO010_MANG L1_171215	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Rowes Bay	Rowes Bay		30
3	ES1732353116	2270642A	0874	BO010	171215	0874_BO010_MANG D1_171215	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Rowes Bay	Rowes Bay		23.5
3	ES1732353117	2270642A	0874	BO010	171215	0874_BO010_MANG L2_171215	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	–	–	Rowes Bay	Rowes Bay		31.3
3	ES1732353118	2270642A	0874	BO010	171215	0874_BO010_MANG D2_171215	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	–	–	Rowes Bay	Rowes Bay		19.3

Table 15 - Aquatic Biota Analytical Results - PFAS

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared
3	ES1732353119	2270642A	0874	BO010	171215	0874_BO010_MANG L3_171215	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	-	-	Rowes Bay	Rowes Bay		48.4
3	ES1732353120	2270642A	0874	BO010	171215	0874_BO010_MANG D3_171215	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	-	-	Rowes Bay	Rowes Bay		28.1
3	ES1732353121	2270642A	0874	BO010	171215	0874_BO010_MANG L4_171215	ES Impact	composite	leaves	2	1	Plant	primary producer	primary producer leaves	Mangrove	-	-	Rowes Bay	Rowes Bay		38.8
3	ES1732353122	2270642A	0874	BO010	171215	0874_BO010_MANG D4_171215	ES Impact	composite	detritus	2	1	Plant	primary producer	primary producer detritus	Mangrove	-	-	Rowes Bay	Rowes Bay		34
4	ES1808994001	2270642A	0874	BO018MA	180325	BO018MA_FF1_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flath	<i>Platycephalus endrachtensis</i>	Platycephalidae	Comparative	Althaus Creek Mouth	53	42.9
4	ES1808994002	2270642A	0874	BO018MA	180325	BO018MA_FF2_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flath	<i>Platycephalus endrachtensis</i>	Platycephalidae	Comparative	Althaus Creek Mouth	52	30.7
4	ES1808994003	2270642A	0874	BO018MA	180325	BO018MA_FF3_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flath	<i>Platycephalus endrachtensis</i>	Platycephalidae	Comparative	Althaus Creek Mouth	15	43.4
4	ES1808994004	2270642A	0874	BO018MA	180325	BO018MA_SCF1_180325	MA Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Comparative	Althaus Creek Mouth	14	6
4	ES1808994005	2270642A	0874	BO018MA	180325	BO018MA_SCF2_180325	MA Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Comparative	Althaus Creek Mouth	16	15.4
4	ES1808994006	2270642A	0874	BO018MA	180325	BO018MA_SCF3_180325	MA Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Comparative	Althaus Creek Mouth	15	9.6
4	ES1808994007	2270642A	0874	BO018MA	180325	BO018MA_SCF4_180325	MA Comparative	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Comparative	Althaus Creek Mouth	14.5	5.4
4	ES1808994008	2270642A	0874	BO018MA	180325	BO018MA_SCH1_180325	MA Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Comparative	Althaus Creek Mouth	14	6.9
4	ES1808994009	2270642A	0874	BO018MA	180325	BO018MA_SCH2_180325	MA Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Comparative	Althaus Creek Mouth	16	7.9
4	ES1808994010	2270642A	0874	BO018MA	180325	BO018MA_SCH3_180325	MA Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Comparative	Althaus Creek Mouth	15	5.4
4	ES1808994012	2270642A	0874	BO018MA	180325	BO018MA_BAF5_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	44.5	42.9
4	ES1808994013	2270642A	0874	BO018MA	180325	BO018MA_BAF6_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	42	33.1
4	ES1808994014	2270642A	0874	BO018MA	180325	BO018MA_BAF7_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	42.5	28.5
4	ES1808994015	2270642A	0874	BO018MA	180325	BO018MA_BAF8_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	38	24.7
4	ES1808994016	2270642A	0874	BO018MA	180325	BO018MA_BAL6_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	42	4.5
4	ES1808994017	2270642A	0874	BO018MA	180325	BO018MA_BAL7_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	42.5	6
4	ES1808994018	2270642A	0874	BO018MA	180325	BO018MA_BAL8_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	38	5.7
4	ES1808994019	2270642A	0874	BO018MA	180325	BO018MA_SMF1_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Spanish mackerel	<i>Scomberomorus commerson</i>	Scombridae	Comparative	Althaus Creek Mouth	45	33.8
4	ES1808994020	2270642A	0874	BO018MA	180325	BO018MA_SMF3_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Spanish mackerel	<i>Scomberomorus commerson</i>	Scombridae	Comparative	Althaus Creek Mouth	45	15.2
4	ES1808994021	2270642A	0874	BO018MA	180325	BO018MA_SML1_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Spanish mackerel	<i>Scomberomorus commerson</i>	Scombridae	Comparative	Althaus Creek Mouth	45	2.3
4	ES1808994022	2270642A	0874	BO018MA	180325	BO018MA_FL1_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Northern sand flath	<i>Platycephalus endrachtensis</i>	Platycephalidae	Comparative	Althaus Creek Mouth	53	1.7
4	ES1808994023	2270642A	0874	BO018MA	180325	BO018MA_FL2_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Northern sand flath	<i>Platycephalus endrachtensis</i>	Platycephalidae	Comparative	Althaus Creek Mouth	52	1.5
4	ES1808994024	2270642A	0874	BO018MA	180325	BO018MA_GL2_180325	MA Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Althaus Creek Mouth	34	6.8
4	ES1808994025	2270642A	0874	BO018MA	180325	BO018MA_GL3_180325	MA Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Althaus Creek Mouth	35	4.1
4	ES1808994026	2270642A	0874	BO018MA	180325	BO018MA_GL4_180325	MA Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Althaus Creek Mouth	31.5	3.4
4	ES1808994027	2270642A	0874	BO018MA	180325	BO018MA_BAF1_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	66	29.8
4	ES1808994028	2270642A	0874	BO018MA	180325	BO018MA_BAF2_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	66	39.5
4	ES1808994029	2270642A	0874	BO018MA	180325	BO018MA_BAF3_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	45.5	61.8
4	ES1808994030	2270642A	0874	BO018MA	180325	BO018MA_BAF4_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	45	38.4
4	ES1808994031	2270642A	0874	BO018MA	180325	BO018MA_BAL1_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	66	10.9
4	ES1808994032	2270642A	0874	BO018MA	180325	BO018MA_BAL2_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	66	14.4
4	ES1808994033	2270642A	0874	BO018MA	180325	BO018MA_BAL3_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	45.5	10.3
4	ES1808994034	2270642A	0874	BO018MA	180325	BO018MA_BAL4_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	45	8
4	ES1808994035	2270642A	0874	BO018MA	180325	BO018MA_BAL5_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Comparative	Althaus Creek Mouth	44.5	10.7
4	ES1808994036	2270642A	0874	BO016MA	180324	BO016MA_FML2_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden snapper (fin)	<i>Lutjanus johnii</i>	Lutjanidae	Rowes Bay	Rowes Bay	66	5.9
4	ES1808994037	2270642A	0874	BO016MA	180324	BO016MA_FML1_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden snapper (fin)	<i>Lutjanus johnii</i>	Lutjanidae	Rowes Bay	Rowes Bay	66	6.2
4	ES1808994038	2270642A	0874	BO016MA	180324	BO016MA_FML3_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden snapper (fin)	<i>Lutjanus johnii</i>	Lutjanidae	Rowes Bay	Rowes Bay	66	4.7
4	ES1808994039	2270642A	0874	BO016MA	180324	BO016MA_FMF1_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden snapper (fin)	<i>Lutjanus johnii</i>	Lutjanidae	Rowes Bay	Rowes Bay	66	32.5
4	ES1808994040	2270642A	0874	BO016MA	180324	BO016MA_FMF2_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden snapper (fin)	<i>Lutjanus johnii</i>	Lutjanidae	Rowes Bay	Rowes Bay	66	29.5
4	ES1808994041	2270642A	0874	BO016MA	180324	BO016MA_FMF3_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden snapper (fin)	<i>Lutjanus johnii</i>	Lutjanidae	Rowes Bay	Rowes Bay	66	30.2
4	ES1808994042	2270642A	0874	BO016MA	180324	BO016MA_SMF3_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Spanish mackerel	<i>Scomberomorus commerson</i>	Scombridae	Rowes Bay	Rowes Bay	35	29.9
4	ES1808994043	2270642A	0874	BO018MA	180325	BO018MA_GF1_180325	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Althaus Creek Mouth	35	5
4	ES1808994044	2270642A	0874	BO018MA	180325	BO018MA_GF2_180325	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Althaus Creek Mouth	34	28.1
4	ES1808994045	2270642A	0874	BO018MA	180325	BO018MA_GF3_180325	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Althaus Creek Mouth	35	29.8
4	ES1808994046	2270642A	0874	BO018MA	180325	BO018MA_GF4_180325	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Althaus Creek Mouth	31.5	25.1
4	ES1808994047	2270642A	0874	BO018MA	180325	BO018MA_GL1_180325	MA Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Comparative	Althaus Creek Mouth	35	26.4
4	ES1808994048	2270642A	0874	BO016MA	180324	BO016MA_GF2_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Rowes Bay	Rowes Bay	32.5	30.4
4	ES1808994049	2270642A	0874	BO016MA	180324	BO016MA_PFF1_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Rowes Bay	Rowes Bay	28	53.8
4	ES1808994050	2270642A	0874	BO016MA	180324	BO016MA_PFF2_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Rowes Bay	Rowes Bay	28	67.1
4	ES1808994051	2270642A	0874	BO016MA	180324	BO016MA_PFF3_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Rowes Bay	Rowes Bay	30	61.6
4	ES1808994052	2270642A	0874	BO016MA	180324	BO016MA_PFF4_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Rowes Bay	Rowes Bay	28	51.8
4	ES1808994053	2270642A	0874	BO016MA	180324	BO016MA_PFL1_180324	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Rowes Bay	Rowes Bay	28	3.3
4	ES1808994054	2270642A	0874	BO016MA	180324	BO016MA_PFL3_180324	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Rowes Bay	Rowes Bay	30	2.4
4	ES1808994055	2270642A	0874	BO016MA	180324	BO016MA_PFL4_180324	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Rowes Bay	Rowes Bay	28	2.6
4	ES1808994056	2270642A	0874	BO016MA	180324	BO016MA_PRL2_180324	MA Impact	individual	Liver	1	1</										

Table 15 - Aquatic Biota Analytical Results - PFAS

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared
4	ES1808995006	2270642A	0874	BO016MA	180324	BO016MA_GF3_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Rowes Bay	Rowes Bay	34.5	50.2
4	ES1808995007	2270642A	0874	BO016MA	180324	BO016MA_FF1_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flatfish	<i>Platycephalus endrachtensis</i>	Platycephalidae	Rowes Bay	Rowes Bay	44	59.4
4	ES1808995008	2270642A	0874	BO016MA	180324	BO016MA_FF2_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flatfish	<i>Platycephalus endrachtensis</i>	Platycephalidae	Rowes Bay	Rowes Bay	44	59
4	ES1808995009	2270642A	0874	BO016MA	180324	BO016MA_FF3_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flatfish	<i>Platycephalus endrachtensis</i>	Platycephalidae	Rowes Bay	Rowes Bay	43	45.9
4	ES1808995010	2270642A	0874	BO016MA	180324	BO016MA_TSF1_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Blue Threadfin salm	<i>Eleutheronema tetradactylur</i>	Polynemidae	Rowes Bay	Rowes Bay	47.5	41.3
4	ES1808995011	2270642A	0874	BO016MA	180324	BO016MA_TSF1_180324B	MA Impact	individual	Flesh	1	2	Fish	Apex predator	Apex predator Flesh	Blue Threadfin salm	<i>Eleutheronema tetradactylur</i>	Polynemidae	Rowes Bay	Rowes Bay	47.5	31.6
4	ES1808995012	2270642A	0874	BO016MA	180324	BO016MA_TSF2_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Blue Threadfin salm	<i>Eleutheronema tetradactylur</i>	Polynemidae	Rowes Bay	Rowes Bay	47	45.7
4	ES1808995013	2270642A	0874	BO016MA	180324	BO016MA_TSF3_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Blue Threadfin salm	<i>Eleutheronema tetradactylur</i>	Polynemidae	Rowes Bay	Rowes Bay	40	47.1
4	ES1808995014	2270642A	0874	BO016MA	180324	BO016MA_TSF4_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Blue Threadfin salm	<i>Eleutheronema tetradactylur</i>	Polynemidae	Rowes Bay	Rowes Bay	40	61.7
4	ES1808995015	2270642A	0874	BO016MA	180324	BO016MA_TSL1_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Blue Threadfin salm	<i>Eleutheronema tetradactylur</i>	Polynemidae	Rowes Bay	Rowes Bay	47.5	17.8
4	ES1808995016	2270642A	0874	BO016MA	180324	BO016MA_TSL2_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Blue Threadfin salm	<i>Eleutheronema tetradactylur</i>	Polynemidae	Rowes Bay	Rowes Bay	47	14.7
4	ES1808995017	2270642A	0874	BO016MA	180324	BO016MA_TSL3_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Blue Threadfin salm	<i>Eleutheronema tetradactylur</i>	Polynemidae	Rowes Bay	Rowes Bay	40	6.1
4	ES1808995018	2270642A	0874	BO016MA	180324	BO016MA_TSL4_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Blue Threadfin salm	<i>Eleutheronema tetradactylur</i>	Polynemidae	Rowes Bay	Rowes Bay	40	7.6
4	ES1808995019	2270642A	0874	BO016MA	180324	BO016MA_CFF1_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Blue catfish	<i>Neoarius graffei</i>	Ariidae	Rowes Bay	Rowes Bay	47	31.2
4	ES1808995020	2270642A	0874	BO016MA	180324	BO016MA_CFF2_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Blue catfish	<i>Neoarius graffei</i>	Ariidae	Rowes Bay	Rowes Bay	48	90.2
4	ES1808995021	2270642A	0874	BO016MA	180324	BO016MA_CFF3_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Blue catfish	<i>Neoarius graffei</i>	Ariidae	Rowes Bay	Rowes Bay	49	87
4	ES1808995022	2270642A	0874	BO016MA	180324	BO016MA_CFF4_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Blue catfish	<i>Neoarius graffei</i>	Ariidae	Rowes Bay	Rowes Bay	49	75.5
4	ES1808995023	2270642A	0874	BO016MA	180324	BO016MA_CFL1_180324	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Blue catfish	<i>Neoarius graffei</i>	Ariidae	Rowes Bay	Rowes Bay	47	2.4
4	ES1808995024	2270642A	0874	BO016MA	180324	BO016MA_CFL2_180324	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Blue catfish	<i>Neoarius graffei</i>	Ariidae	Rowes Bay	Rowes Bay	48	6.2
4	ES1808995025	2270642A	0874	BO016MA	180324	BO016MA_CFL3_180324	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Blue catfish	<i>Neoarius graffei</i>	Ariidae	Rowes Bay	Rowes Bay	49	5.6
4	ES1808995026	2270642A	0874	BO016MA	180324	BO016MA_CFL4_180324	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Blue catfish	<i>Neoarius graffei</i>	Ariidae	Rowes Bay	Rowes Bay	49	6.9
4	ES1808995027	2270642A	0874	BO016MA	180324	BO016MA_QFF1_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Rowes Bay	Rowes Bay	65	36.7
4	ES1808995028	2270642A	0874	BO016MA	180324	BO016MA_QFF2_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Rowes Bay	Rowes Bay	44.5	72.9
4	ES1808995030	2270642A	0874	BO016MA	180324	BO016MA_QFF4_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Rowes Bay	Rowes Bay	37	65.6
4	ES1808995031	2270642A	0874	BO015MA	180322	BO015MA_BF1_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Pikey Bream	<i>Acanthopagrus pacificus</i>	Sparidae	Bohle River	Bohle River Mouth	24	26.8
4	ES1808995032	2270642A	0874	BO015MA	180322	BO015MA_BF2_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Pikey Bream	<i>Acanthopagrus pacificus</i>	Sparidae	Bohle River	Bohle River Mouth	24	30.3
4	ES1808995033	2270642A	0874	BO015MA	180322	BO015MA_BF3_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Yellowfin Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River Mouth	23.5	27.6
4	ES1808995034	2270642A	0874	BO015MA	180322	BO015MA_BF4_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Yellowfin Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River Mouth	24.5	34.1
4	ES1808995035	2270642A	0874	BO015MA	180322	BO015MA_BL1_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Pikey Bream	<i>Acanthopagrus pacificus</i>	Sparidae	Bohle River	Bohle River Mouth	24	2.5
4	ES1808995036	2270642A	0874	BO015MA	180322	BO015MA_BL2_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Pikey Bream	<i>Acanthopagrus pacificus</i>	Sparidae	Bohle River	Bohle River Mouth	24	0.9
4	ES1808995037	2270642A	0874	BO015MA	180322	BO015MA_BL3_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Yellowfin Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River Mouth	23.5	1.6
4	ES1808995038	2270642A	0874	BO015MA	180322	BO015MA_BL4_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Yellowfin Bream	<i>Acanthopagrus australis</i>	Sparidae	Bohle River	Bohle River Mouth	24.5	2.7
4	ES1808995039	2270642A	0874	BO015MA	180322	BO015MA_FHF1_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flatfish	<i>Platycephalus endrachtensis</i>	Platycephalidae	Bohle River	Bohle River Mouth	47	41.8
4	ES1808995040	2270642A	0874	BO015MA	180322	BO015MA_FHF2_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flatfish	<i>Platycephalus endrachtensis</i>	Platycephalidae	Bohle River	Bohle River Mouth	47	37.2
4	ES1808995041	2270642A	0874	BO015MA	180322	BO015MA_FHF2_180322B	MA Impact	individual	Flesh	2	1	Fish	Apex predator	Apex predator Flesh	Northern sand flatfish	<i>Platycephalus endrachtensis</i>	Platycephalidae	Bohle River	Bohle River Mouth	47	43.4
4	ES1808995042	2270642A	0874	BO015MA	180322	BO015MA_FHL1_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Northern sand flatfish	<i>Platycephalus endrachtensis</i>	Platycephalidae	Bohle River	Bohle River Mouth	47	3.6
4	ES1808995043	2270642A	0874	BO015MA	180322	BO015MA_BAF2_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	62	44.8
4	ES1808995045	2270642A	0874	BO015MA	180322	BO015MA_GF4_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River Mouth	52	27
4	ES1808995046	2270642A	0874	BO016MA	180324	BO016MA_SCF1_180324	MA Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Rowes Bay	Rowes Bay	17	24.2
4	ES1808995047	2270642A	0874	BO016MA	180324	BO016MA_SCF2_180324	MA Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Rowes Bay	Rowes Bay	16	11.8
4	ES1808995048	2270642A	0874	BO016MA	180324	BO016MA_SCF3_180324	MA Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Rowes Bay	Rowes Bay	15	13
4	ES1808995049	2270642A	0874	BO016MA	180324	BO016MA_SCF4_180324	MA Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Rowes Bay	Rowes Bay	14.5	17
4	ES1808995050	2270642A	0874	BO016MA	180324	BO016MA_SCH1_180324	MA Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Rowes Bay	Rowes Bay	17	15
4	ES1808995051	2270642A	0874	BO016MA	180324	BO016MA_SCH2_180324	MA Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Rowes Bay	Rowes Bay	16	10.6
4	ES1808995052	2270642A	0874	BO016MA	180324	BO016MA_SCH3_180324	MA Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Rowes Bay	Rowes Bay	15	1.6
4	ES1808995053	2270642A	0874	BO016MA	180324	BO016MA_SCH4_180324	MA Impact	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Rowes Bay	Rowes Bay	14.5	6.6
4	ES1808995054	2270642A	0874	BO016MA	180324	BO016MA_FL1_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Northern sand flatfish	<i>Platycephalus endrachtensis</i>	Platycephalidae	Rowes Bay	Rowes Bay	44	4.1
4	ES1808995055	2270642A	0874	BO017MA	180323	BO017MA_GAF1_180323	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Garfish (Snub nose)	<i>Arrhamphus sclerolepis</i>	Hemiramphidae	Magnetic Island	Magnetic Island	17	14.3
4	ES1808995056	2270642A	0874	BO017MA	180323	BO017MA_GAF2_180323	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Garfish (Snub nose)	<i>Arrhamphus sclerolepis</i>	Hemiramphidae	Magnetic Island	Magnetic Island	16.5	13.1
4	ES1808995057	2270642A	0874	BO017MA	180323	BO017MA_GAF3_180323	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Garfish (Snub nose)	<i>Arrhamphus sclerolepis</i>	Hemiramphidae	Magnetic Island	Magnetic Island	13.5	4.4
4	ES1808995058	2270642A	0874	BO017MA	180323	BO017MA_GAF4_180323	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Garfish (Snub nose)	<i>Arrhamphus sclerolepis</i>	Hemiramphidae	Magnetic Island	Magnetic Island	13	5.8
4	ES1808995059	2270642A	0874	BO017MA	180323	BO017MA_GAL1_180323	MA Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Garfish (Snub nose)	<i>Arrhamphus sclerolepis</i>	Hemiramphidae	Magnetic Island	Magnetic Island	17	0.4
4	ES1808995060	2270642A	0874	BO017MA	180321	BO017MA_MF1_180321	MA Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Sea mullet	<i>Mugil cephalus</i>	Mugilidae	Magnetic Island	Magnetic Island	17.5	12.4
4	ES1808995061	2270642A	0874	BO017MA	180321	BO017MA_MF2_180321	MA Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Sea mullet	<i>Mugil cephalus</i>	Mugilidae	Magnetic Island	Magnetic Island	15.5	9.8
4	ES1808995062	2270642A	0874	BO017MA	180321	BO017MA_MF3_180321	MA Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Sea mullet	<i>Mugil cephalus</i>	Mugilidae	Magnetic Island	Magnetic Island	16.5	9.6
4	ES1808995063	2270642A	0874	BO017MA	180321	BO017MA_MF4_180321	MA Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mull	<i>Liza vaigiensis</i>	Mugilidae	Magnetic Island	Magnetic Island	11	6
4	ES1808995064	2270642A	0874	BO015MA	180322	BO015MA_GF3_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River Mouth	57	68
4	ES1808995065	2270642A	0874	BO015MA	180322	BO015MA_GF4_180322B	MA Impact	individual	Flesh	1	2	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River Mouth	52	43.8
4	ES1809001001	2270642A	0874																		

Table 15 - Aquatic Biota Analytical Results - PFAS

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared
4	ES1809001015	2270642A	0874	BO016MA	180324	BO016MA_S4_180324	MA Impact	composite	Whole	–	–	Plant	primary producer	primary producer Whole	Seagrass	<i>Halodule uninervis</i>	Cymodoceaceae	Rowes Bay	Rowes Bay	–	5.7
4	ES1809001016	2270642A	0874	BO017MA	180323	BO017MA_SARG1_180323	MA Comparative	individual	Whole	1	1	Macroalgae	primary producer	primary producer Whole	Sargassum	Sargassum	Sargassaceae	Magnetic Island	Magnetic Island	–	22.6
4	ES1809001017	2270642A	0874	BO017MA	180323	BO017MA_SARG2_180323	MA Comparative	individual	Whole	1	1	Macroalgae	primary producer	primary producer Whole	Sargassum	Sargassum	Sargassaceae	Magnetic Island	Magnetic Island	–	48.9
4	ES1809001018	2270642A	0874	BO017MA	180323	BO017MA_SARG3_180323	MA Comparative	individual	Whole	1	1	Macroalgae	primary producer	primary producer Whole	Sargassum	Sargassum	Sargassaceae	Magnetic Island	Magnetic Island	–	43.2
4	ES1809001019	2270642A	0874	BO016MA	180324	BO016MA_SARG1_180324	MA Impact	individual	Whole	1	1	Macroalgae	primary producer	primary producer Whole	Sargassum	Sargassum	Sargassaceae	Rowes Bay	Rowes Bay	–	4.8
4	ES1809001020	2270642A	0874	BO016MA	180324	BO016MA_SARG2_180324	MA Impact	individual	Whole	1	1	Macroalgae	primary producer	primary producer Whole	Sargassum	Sargassum	Sargassaceae	Rowes Bay	Rowes Bay	–	7.6
4	ES1809001021	2270642A	0874	BO018MA	180325	BO018MA_QFF1_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Comparative	Althaus Creek Mouth	57	42.4
4	ES1809001022	2270642A	0874	BO018MA	180325	BO018MA_QFF2_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Comparative	Althaus Creek Mouth	45	33.8
4	ES1809001023	2270642A	0874	BO018MA	180325	BO018MA_QFF3_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Comparative	Althaus Creek Mouth	38	21.9
4	ES1809001024	2270642A	0874	BO018MA	180325	BO018MA_QFF4_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Comparative	Althaus Creek Mouth	39	29.8
4	ES1809001025	2270642A	0874	BO018MA	180325	BO018MA_QL1_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Comparative	Althaus Creek Mouth	57	10.9
4	ES1809001026	2270642A	0874	BO018MA	180325	BO018MA_QL2_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Comparative	Althaus Creek Mouth	45	3.6
4	ES1809001027	2270642A	0874	BO018MA	180325	BO018MA_QL3_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Comparative	Althaus Creek Mouth	38	2.7
4	ES1809001028	2270642A	0874	BO018MA	180325	BO018MA_QL4_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barred queenfish	<i>Scomberoides tala</i>	Sciaenidae	Comparative	Althaus Creek Mouth	39	3.3
4	ES1809001029	2270642A	0874	BO016MA	180324	BO016MA_SARG3_180324	MA Impact	individual	Whole	1	1	Macroalgae	primary producer	primary producer Whole	Sargassum	Sargassum	Sargassaceae	Rowes Bay	Rowes Bay	–	3
4	ES1809001030	2270642A	0874	BO017MA	180323	BO017MA_S1_180323	MA Comparative	composite	Whole	–	–	Plant	primary producer	primary producer Whole	Seagrass	<i>Zostera sp. Halodule uninerv</i>	Cymodoceaceae	Magnetic Island	Magnetic Island	–	7
4	ES1809001031	2270642A	0874	BO017MA	180323	BO017MA_S2_180323	MA Comparative	composite	Whole	–	–	Plant	primary producer	primary producer Whole	Seagrass	<i>Zostera sp. Halodule uninerv</i>	Cymodoceaceae	Magnetic Island	Magnetic Island	–	14.2
4	ES1809001032	2270642A	0874	BO017MA	180323	BO017MA_S3_180323	MA Comparative	composite	Whole	–	–	Plant	primary producer	primary producer Whole	Seagrass	<i>Zostera sp. Halodule uninerv</i>	Cymodoceaceae	Magnetic Island	Magnetic Island	–	15.5
4	ES1809001033	2270642A	0874	BO017MA	180323	BO017MA_S4_180323	MA Comparative	composite	Whole	–	–	Plant	primary producer	primary producer Whole	Seagrass	<i>Zostera sp. Halodule uninerv</i>	Cymodoceaceae	Magnetic Island	Magnetic Island	–	13.9
4	ES1809001034	2270642A	0874	BO017MA	180323	BO017MA_WF1_180323	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Whiting	<i>Sillago ciliata</i>	Sillaginidae	Magnetic Island	Magnetic Island	14	23.8
4	ES1809001035	2270642A	0874	BO017MA	180323	BO017MA_SARG4_180323	MA Comparative	individual	Whole	1	1	Macroalgae	primary producer	primary producer Whole	Sargassum	Sargassum	Sargassaceae	Magnetic Island	Magnetic Island	–	9.6
4	ES1809001040	2270642A	0874	BO017MA	180322	BO017MA_ML1_180322	MA Comparative	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Sea mullet	<i>Mugil cephalus</i>	Mugilidae	Magnetic Island	Magnetic Island	17.5	1
4	ES1809001041	2270642A	0874	BO018MA	180325	BO018MA_MF1_180325	MA Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mull	<i>Liza vaigiensis</i>	Mugilidae	Comparative	Althaus Creek Mouth	55	36.3
4	ES1809001042	2270642A	0874	BO018MA	180325	BO018MA_MF1_180325B	MA Comparative	individual	Flesh	1	2	Fish	Detritivore	Detritivore Flesh	Diamond scale mull	<i>Liza vaigiensis</i>	Mugilidae	Comparative	Althaus Creek Mouth	55	34.1
4	ES1809001043	2270642A	0874	BO018MA	180325	BO018MA_MF2_180325	MA Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mull	<i>Liza vaigiensis</i>	Mugilidae	Comparative	Althaus Creek Mouth	49	32.8
4	ES1809001044	2270642A	0874	BO018MA	180325	BO018MA_MF3_180325	MA Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mull	<i>Liza vaigiensis</i>	Mugilidae	Comparative	Althaus Creek Mouth	49	38
4	ES1809001045	2270642A	0874	BO018MA	180325	BO018MA_MF4_180325	MA Comparative	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mull	<i>Liza vaigiensis</i>	Mugilidae	Comparative	Althaus Creek Mouth	46	42.4
4	ES1809001046	2270642A	0874	BO018MA	180325	BO018MA_ML1_180325	MA Comparative	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Diamond scale mull	<i>Liza vaigiensis</i>	Mugilidae	Comparative	Althaus Creek Mouth	55	5.7
4	ES1809001047	2270642A	0874	BO018MA	180325	BO018MA_ML2_180325	MA Comparative	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Diamond scale mull	<i>Liza vaigiensis</i>	Mugilidae	Comparative	Althaus Creek Mouth	49	11.9
4	ES1809001048	2270642A	0874	BO015MA	180321	BO015MA_TF1_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden Trevally	<i>Gnathanodon speciosus</i>	Carangidae	Bohle River	Bohle River Mouth	40	59
4	ES1809001049	2270642A	0874	BO015MA	180321	BO015MA_TF2_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden Trevally	<i>Gnathanodon speciosus</i>	Carangidae	Bohle River	Bohle River Mouth	43	64.1
4	ES1809001050	2270642A	0874	BO015MA	180321	BO015MA_TF3_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden Trevally	<i>Gnathanodon speciosus</i>	Carangidae	Bohle River	Bohle River Mouth	39.5	55.2
4	ES1809001051	2270642A	0874	BO015MA	180321	BO015MA_TF4_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden Trevally	<i>Gnathanodon speciosus</i>	Carangidae	Bohle River	Bohle River Mouth	36	51.8
4	ES1809001052	2270642A	0874	BO015MA	180321	BO015MA_TL1_180321	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden Trevally	<i>Gnathanodon speciosus</i>	Carangidae	Bohle River	Bohle River Mouth	40	9.9
4	ES1809001053	2270642A	0874	BO015MA	180321	BO015MA_TL2_180321	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden Trevally	<i>Gnathanodon speciosus</i>	Carangidae	Bohle River	Bohle River Mouth	43	8.7
4	ES1809001054	2270642A	0874	BO015MA	180321	BO015MA_TL3_180321	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden Trevally	<i>Gnathanodon speciosus</i>	Carangidae	Bohle River	Bohle River Mouth	39.5	11
4	ES1809001055	2270642A	0874	BO015MA	180321	BO015MA_TL4_180321	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden Trevally	<i>Gnathanodon speciosus</i>	Carangidae	Bohle River	Bohle River Mouth	36	11
4	ES1809001056	2270642A	0874	BO015MA	180321	BO015MA_ML1_180321	MA Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Sea mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River Mouth	53	14.8
4	ES1809001057	2270642A	0874	BO015MA	180321	BO015MA_ML2_180321	MA Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Sea mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River Mouth	40	11
4	ES1809001058	2270642A	0874	BO015MA	180321	BO015MA_ML3_180321	MA Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Sea mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River Mouth	53	9
4	ES1809001059	2270642A	0874	BO015MA	180321	BO015MA_ML4_180321	MA Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Sea mullet	<i>Mugil cephalus</i>	Mugilidae	Bohle River	Bohle River Mouth	45	8.2
4	ES1809001060	2270642A	0874	BO015MA	180322	BO015MA_MJF1_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Bohle River	Bohle River Mouth	40	72
4	ES1809001061	2270642A	0874	BO015MA	180322	BO015MA_MJF2_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Bohle River	Bohle River Mouth	32	28.1
4	ES1809001062	2270642A	0874	BO015MA	180322	BO015MA_MJF3_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Bohle River	Bohle River Mouth	31.5	56.1
4	ES1809001063	2270642A	0874	BO015MA	180322	BO015MA_MJF4_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Bohle River	Bohle River Mouth	28	49.5
4	ES1809001064	2270642A	0874	BO015MA	180322	BO015MA_ML1_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Bohle River	Bohle River Mouth	40	8.6
4	ES1809001065	2270642A	0874	BO015MA	180322	BO015MA_MJL2_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Bohle River	Bohle River Mouth	32	5.2
4	ES1809001066	2270642A	0874	BO015MA	180322	BO015MA_MJL3_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Bohle River	Bohle River Mouth	31.5	1.8
4	ES1809001067	2270642A	0874	BO015MA	180322	BO015MA_MJL4_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove jack	<i>Lutjanus argentimaculatus</i>	Lutjanidae	Bohle River	Bohle River Mouth	28	1.7
4	ES1809001068	2270642A	0874	BO015MA	180322	BO015MA_SQ4_180322	MA Impact	composite	Whole		1	Plant	primary producer	primary producer Whole	Seagrass	<i>Halodule uninervis & Haloph</i>	Cymodoceaceae	Bohle River	Bohle River Mouth	–	10.5
4	ES1809001069	2270642A	0874	BO015MA	180322	BO015MA_GF2_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River Mouth	52	33.8
4	ES1809001070	2270642A	0874	BO015MA	180322	BO015MA_GL2_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River Mouth	52	6
4	ES1809004001	2270642A	0874	BO015MA	180322	BO015MA_BAL2_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	62	9
4	ES1809004002	2270642A	0874	BO015MA	180322	BO015MA_BAL1_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	62	8.8
4	ES1809004003	2270642A	0874	BO015MA	180322	BO015MA_GF3_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River Mouth	57	36.4
4	ES1809004004	2270642A	0874	BO015MA	180322	BO015MA_SCF1_180322	MA Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Bohle River	Bohle River Mouth	15	24.5
4	ES1809004005	2270642A	0874	BO015MA	180322	BO015MA_SCF2_180322	MA Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Bohle River	Bohle River Mouth	14	16.1
4	ES1809004006	2270642A	0874	BO015MA	180322	BO015MA_SCF3_180322	MA Impact	individual	Flesh	1	1	Crustacean	Omnivore	Omnivore Flesh	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Bohle River	Bohle River Mouth	14	11.7
4	ES1809004007	2270642A	0874	BO015MA	180322	BO015MA_SCF4_180322	MA Impact	individual	Flesh	1											

Table 15 - Aquatic Biota Analytical Results - PFAS

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared
4	ES1809004013	2270642A	0874	BO015MA	180322	BO015MA_BAF1_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	62	46.8
4	ES1809004015	2270642A	0874	BO015MA	180322	BO015MA_BAF3_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	77	71.2
4	ES1809004016	2270642A	0874	BO015MA	180322	BO015MA_BAF4_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	76	50.3
4	ES1809004017	2270642A	0874	BO015MA	180322	BO015MA_BAF5_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	66	42.6
4	ES1809004018	2270642A	0874	BO015MA	180322	BO015MA_BAF6_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	49.5	42.8
4	ES1809004019	2270642A	0874	BO015MA	180322	BO015MA_BAF7_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	42	41.5
4	ES1809004020	2270642A	0874	BO015MA	180322	BO015MA_BAF8_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	38.5	31.1
4	ES1809004021	2270642A	0874	BO015MA	180322	BO015MA_BAL3_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	77	5.3
4	ES1809004022	2270642A	0874	BO015MA	180322	BO015MA_BAL3_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	77	4.5
4	ES1809004023	2270642A	0874	BO015MA	180322	BO015MA_BAF9_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	34	64.6
4	ES1809004024	2270642A	0874	BO015MA	180322	BO015MA_BAF10_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	33	41.8
4	ES1809004025	2270642A	0874	BO015MA	180322	BO015MA_BAL6_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	49.5	10.8
4	ES1809004026	2270642A	0874	BO015MA	180322	BO015MA_BAL7_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	42	7.5
4	ES1809004027	2270642A	0874	BO015MA	180322	BO015MA_BAL5_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	66	22.4
4	ES1809004028	2270642A	0874	BO015MA	180322	BO015MA_BAL8_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	38.5	4
4	ES1809004029	2270642A	0874	BO015MA	180322	BO015MA_BAL9_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	34	2.8
4	ES1809004030	2270642A	0874	BO015MA	180322	BO015MA_BAL10_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	33	4.1
4	ES1809004031	2270642A	0874	BO015MA	180322	BO015MA_GF1_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Barred javelin (grunt)	<i>Pomadasys kakaan</i>	Haemulidae	Bohle River	Bohle River Mouth	57	49.1
4	ES1809004032	2270642A	0874	BO015MA	180322	BO015MA_GL1_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Barred javelin (grunt)	<i>Pomadasys kakaan</i>	Haemulidae	Bohle River	Bohle River Mouth	57	6.2
4	ES1809004033	2270642A	0874	BO015MA	180322	BO015MA_GL3_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River Mouth	57	2.8
4	ES1809004035	2270642A	0874	BO015MA	180322	BO015MA_BAL4_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	76	4.6
4	ES1809004036	2270642A	0874	BO015MA	180322	BO015MA_BAF3_180322C	MA Impact	individual	Flesh	1	2	Fish	Apex predator	Apex predator Flesh	Barramundi	<i>Lates calcarifer</i>	Centropomidae	Bohle River	Bohle River Mouth	77	74.6
4	ES1809004037	2270642A	0874	BO017MA	180326	BO017MA_N1_180326	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Saddletail snapper (Lutjanus malabaricus)	<i>Lutjanus malabaricus</i>	Lutjanidae	Magnetic Island	Magnetic Island	36.5	51.6
4	ES1809004038	2270642A	0874	BO017MA	180326	BO017MA_N2_180326	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Saddletail snapper (Lutjanus malabaricus)	<i>Lutjanus malabaricus</i>	Lutjanidae	Magnetic Island	Magnetic Island	33	26.2
4	ES1809004039	2270642A	0874	BO017MA	180326	BO017MA_N3_180326	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Crimson snapper (Sparipomacentrus erythropterus)	<i>Lutjanus erythropterus</i>	Lutjanidae	Magnetic Island	Magnetic Island	30.5	33.8
4	ES1809004040	2270642A	0874	BO017MA	180326	BO017MA_N4_180326	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Crimson snapper (Sparipomacentrus erythropterus)	<i>Lutjanus erythropterus</i>	Lutjanidae	Magnetic Island	Magnetic Island	31.5	30.6
4	ES1809004041	2270642A	0874	BO017MA	180326	BO017MA_N5_180326	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Crimson snapper (Sparipomacentrus erythropterus)	<i>Lutjanus erythropterus</i>	Lutjanidae	Magnetic Island	Magnetic Island	29	20.2
4	ES1809004042	2270642A	0874	BO017MA	180326	BO017MA_NL1_180326	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Saddletail snapper (Lutjanus malabaricus)	<i>Lutjanus malabaricus</i>	Lutjanidae	Magnetic Island	Magnetic Island	36.5	2.6
4	ES1809004043	2270642A	0874	BO017MA	180326	BO017MA_NL2_180326	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Saddletail snapper (Lutjanus malabaricus)	<i>Lutjanus malabaricus</i>	Lutjanidae	Magnetic Island	Magnetic Island	33	1.6
4	ES1809004044	2270642A	0874	BO017MA	180326	BO017MA_NL3_180326	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Crimson snapper (Sparipomacentrus erythropterus)	<i>Lutjanus erythropterus</i>	Lutjanidae	Magnetic Island	Magnetic Island	30.5	1.2
4	ES1809004045	2270642A	0874	BO017MA	180326	BO017MA_NL4_180326	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Crimson snapper (Sparipomacentrus erythropterus)	<i>Lutjanus erythropterus</i>	Lutjanidae	Magnetic Island	Magnetic Island	31.5	0.9
4	ES1809004046	2270642A	0874	BO017MA	180326	BO017MA_NL5_180326	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Crimson snapper (Sparipomacentrus erythropterus)	<i>Lutjanus erythropterus</i>	Lutjanidae	Magnetic Island	Magnetic Island	29	2
4	ES1809004059	2270642A	0874	BO018MA	180325	BO018MA_BF1_180325	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Pikey Bream	<i>Acanthopagrus pacificus</i>	Sparidae	Comparative	Althaus Creek Mouth	30.5	12.5
4	ES1809004060	2270642A	0874	BO018MA	180325	BO018MA_BF2_180325	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Pikey Bream	<i>Acanthopagrus pacificus</i>	Sparidae	Comparative	Althaus Creek Mouth	30	9.2
4	ES1809004061	2270642A	0874	BO018MA	180325	BO018MA_BF3_180325	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Pikey Bream	<i>Acanthopagrus pacificus</i>	Sparidae	Comparative	Althaus Creek Mouth	30.5	10.2
4	ES1809004062	2270642A	0874	BO018MA	180325	BO018MA_BL1_180325	MA Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Pikey Bream	<i>Acanthopagrus pacificus</i>	Sparidae	Comparative	Althaus Creek Mouth	30.5	3.8
4	ES1809004063	2270642A	0874	BO018MA	180325	BO018MA_PFF2_180325	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Comparative	Althaus Creek Mouth	29	23
4	ES1809004064	2270642A	0874	BO018MA	180325	BO018MA_PFF1_180325	MA Comparative	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Comparative	Althaus Creek Mouth	29	22.3
4	ES1809004065	2270642A	0874	BO018MA	180325	BO018MA_PFL1_180325	MA Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Comparative	Althaus Creek Mouth	29.5	0.6
4	ES1809004066	2270642A	0874	BO018MA	180325	BO018MA_PFL2_180325	MA Comparative	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Spotted scat	<i>Scatophagus cf. argus</i>	Scatophagidae	Comparative	Althaus Creek Mouth	28	0.2
4	ES1809004067	2270642A	0874	BO018MA	180325	BO018MA_SML2_180325	MA Comparative	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Spanish mackerel	<i>Scomberomorus commerson</i>	Scombridae	Comparative	Althaus Creek Mouth	45	1.3
4	ES1809004068	2270642A	0874	BO015MA	180321	BO015MA_MF1_180321	MA Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mullie	<i>Liza vaigiensis</i>	Mugilidae	Bohle River	Bohle River Mouth	54	68.3
4	ES1809004069	2270642A	0874	BO015MA	180321	BO015MA_MF2_180321	MA Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mullie	<i>Liza vaigiensis</i>	Mugilidae	Bohle River	Bohle River Mouth	50	66
4	ES1809004070	2270642A	0874	BO015MA	180321	BO015MA_MF3_180321	MA Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mullie	<i>Liza vaigiensis</i>	Mugilidae	Bohle River	Bohle River Mouth	46	50.6
4	ES1809004071	2270642A	0874	BO015MA	180321	BO015MA_MF4_180321	MA Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mullie	<i>Liza vaigiensis</i>	Mugilidae	Bohle River	Bohle River Mouth	46	46.6
4	ES1809004072	2270642A	0874	BO016MA	180324	BO016MA_SML1_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Spanish mackerel	<i>Scomberomorus commerson</i>	Scombridae	Rowes Bay	Rowes Bay	35	1.2
4	ES1809004073	2270642A	0874	BO018MA	180325	BO018MA_ML3_180325	MA Comparative	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Diamond scale mullie	<i>Liza vaigiensis</i>	Mugilidae	Comparative	Althaus Creek Mouth	49	9.3
4	ES1809004074	2270642A	0874	BO018MA	180325	BO018MA_ML4_180325	MA Comparative	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Diamond scale mullie	<i>Liza vaigiensis</i>	Mugilidae	Comparative	Althaus Creek Mouth	46	3.8
4	ES1809004075	2270642A	0874	BO018MA	180325	BO018MA_SMF2_180325	MA Comparative	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Spanish mackerel	<i>Scomberomorus commerson</i>	Scombridae	Comparative	Althaus Creek Mouth	45	12.8
4	ES1809004076	2270642A	0874	BO018MA	180325	BO018MA_SCH4_180325	MA Comparative	individual	Organ	1	1	Crustacean	Omnivore	Omnivore Organ	Blue swimmer crab	<i>Portunus armatus</i>	Portunidae	Rowes Bay	Rowes Bay	14.5	4.2
4	ES1809004077	2270642A	0874	BO015MA	180322	BO015MA_GL3_180322B	MA Impact	individual	Liver	1	2	Fish	Consumer	Consumer Liver	Silver javelin (grunt)	<i>Pomadasys argenteus</i>	Haemulidae	Bohle River	Bohle River Mouth	57	6.4

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS) - Linear	Perfluorooctane sulfonic acid (PFOS) - Branched	Perfluorooctane sulfonic acid (PFOS)	PFHxS + PFOS	Perfluorooctanoic acid (PFOA)	Perfluorobutane sulfonic acid	Perfluoropentane sulfonic acid	Perfluoroheptane sulfonic acid	Perfluorodecane sulfonic acid (PFDA)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTDA)	
1	ES1717792001	2270642A	0874	BO001	170717	0874_BO001_GFC_170717	FW Impact	composite	Whole	35	1	Fish	<1	11.4	2.6	14	14	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1
1	ES1717792002	2270642A	0874	BO001	170717	0874_BO001_RFC_170717	FW Impact	composite	Whole	12	1	Fish	<1	14.2	2.8	17	17	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	5	1	4	<1
1	ES1717792003	2270642A	0874	BO002	170716	0874_BO002_M1F_170716	ES Impact	individual	Flesh	1	1	Fish	<1	7.9	1.1	9	9	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1
1	ES1717792004	2270642A	0874	BO002	170716	0874_BO002_M1L_170716	ES Impact	individual	Liver	1	1	Fish	2	35.1	9.9	45	47	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	1	<1	<1	<1	
1	ES1717792005	2270642A	0874	BO002	170716	0874_BO002_M2_170716	ES Impact	individual	Whole	1	1	Fish	<1	52.3	7.7	60	60	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	1	<1	<1	<1	
1	ES1717792006	2270642A	0874	BO002	170716	0874_BO002_M3_170716	ES Impact	individual	Whole	1	1	Fish	<1	39.9	7.1	47	47	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792007	2270642A	0874	BO002	170716	0874_BO002_M4_170716	ES Impact	individual	Whole	1	1	Fish	<1	72.4	7.6	83	83	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792008	2270642A	0874	BO002	170716	0874_BO002_M5_170716	ES Impact	individual	Whole	1	1	Fish	<1	27	2	29	29	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792009	2270642A	0874	BO002	170716	0874_BO002_B1_170716	ES Impact	individual	Whole	1	1	Fish	<1	9.8	0.2	10	10	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792010	2270642A	0874	BO002	170716	0874_BO002_B2_170716	ES Impact	individual	Whole	1	1	Fish	<1	21.3	2.7	24	24	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792011	2270642A	0874	BO002	170716	0874_BO002_RC_170716	ES Impact	composite	Whole	2	1	Fish	2	137	15	152	154	1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792012	2270642A	0874	BO002	170716	0874_BO002_UF1_170716	ES Impact	individual	Whole	1	1	Fish	<1	5.9	1.1	7	7	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792013	2270642A	0874	BO002	170716	0874_BO002_BS1_170716	ES Impact	individual	Whole	1	1	Fish	<1	33.4	2.6	36	36	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792014	2270642A	0874	BO002	170716	0874_BO002_GFC_170716	ES Impact	composite	Whole	5	1	Fish	5	86.9	9.1	96	101	<1	<1	<1	1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792015	2270642A	0874	BO002	170716	0874_BO002_PFC_170716	ES Impact	composite	Whole	18	1	Fish	<1	63.2	4.8	68	68	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792016	2270642A	0874	BO002	170716	0874_BO002_PC_170716	ES Impact	composite	Whole	6	1	Crustacean	6	54.6	4.4	59	65	<1	<1	<1	1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792017	2270642A	0874	BO002	170716	0874_BO002_C1_170716	ES Impact	individual	Flesh	1	1	Crustacean	1	2.9	0.1	3	4	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792018	2270642A	0874	BO003	170714	0874_BO003_C1_170714	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792019	2270642A	0874	BO003	170714	0874_BO003_C2_170714	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792020	2270642A	0874	BO003	170714	0874_BO003_C3_170714	ES Impact	individual	Flesh	1	1	Crustacean	1	2.4	0.6	3	4	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792021	2270642A	0874	BO003	170714	0874_BO003_SAM_170714	ES Impact	composite	plant	1	1	Plant	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792022	2270642A	0874	BO004	170714	0874_BO004_C1_170714	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792023	2270642A	0874	BO004	170714	0874_BO004_C2_170714	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792024	2270642A	0874	BO004	170714	0874_BO004_C3_170714	ES Impact	individual	Flesh	1	1	Crustacean	1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792025	2270642A	0874	BO004	170714	0874_BO004_OCF_170714	ES Impact	composite	Flesh	6	1	Bivalve	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792026	2270642A	0874	BO004	170714	0874_BO004_OCS_170714	ES Impact	composite	shell	6	1	Bivalve	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792027	2270642A	0874	BO005	170715	0874_BO005_M1_170715	ES Impact	individual	Whole	1	1	Fish	2	110	13	123	125	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	3	<1	<1	<1	
1	ES1717792028	2270642A	0874	BO005	170715	0874_BO005_UFC_170715	ES Impact	composite	Whole	4	1	Fish	1	54	5	59	60	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792029	2270642A	0874	BO005	170715	0874_BO005_PFC_170715	ES Impact	composite	Whole	3	1	Fish	2	145	15	160	162	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792030	2270642A	0874	BO005	170715	0874_BO005_C1_170715	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792031	2270642A	0874	BO005	170715	0874_BO005_C2_170715	ES Impact	individual	Flesh	1	1	Crustacean	<1	0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792032	2270642A	0874	BO005	170715	0874_BO005_C3_170715	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792033	2270642A	0874	BO005	170715	0874_BO005_BARNF_170715	ES Impact	composite	Flesh	10	1	Crustacean	1	45.9	8.1	54	55	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792034	2270642A	0874	BO005	170715	0874_BO005_SAM_170715	ES Impact	composite	plant	1	1	Plant	<1	0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792035	2270642A	0874	BO006	170715	0874_BO006_B1L_170715	ES Impact	individual	Liver	1	1	Fish	1	70.6	7.4	78	79	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792036	2270642A	0874	BO006	170715	0874_BO006_B1F_170715	ES Impact	individual	Flesh	1	1	Fish	<1	2	<0.5	2	2	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792037	2270642A	0874	BO006	170715	0874_BO006_C1_170715	ES Impact	individual	Flesh	1	1	Crustacean	<1	1	<0.5	1	1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792038	2270642A	0874	BO006	170715	0874_BO006_C2_170715	ES Impact	individual	Flesh	1	1	Crustacean	<1	0.7	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792039	2270642A	0874	BO006	170715	0874_BO006_C3_170715	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792040	2270642A	0874	BO006	170715	0874_BO006_C4_170715	ES Impact	individual	Flesh	1	1	Crustacean	1	3.6	0.4	4	5	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792041	2270642A	0874	BO007	170716	0874_BO007_B1F_170716	ES Impact	individual	Flesh	1	1	Fish	<1	1.5	<0.5	2	2	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792042	2270642A	0874	BO007	170716	0874_BO007_B2_170716	ES Impact	individual	Whole	1	1	Fish	<1	9.7	2.4	12	12	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	
1	ES1717792043	2270642A	0874	BO007																												

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Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS) - Linear	Perfluorooctane sulfonic acid (PFOS) - Branched	Perfluorooctane sulfonic acid (PFOS)	PFHxS + PFOS	Perfluorooctanoic acid (PFOA)	Perfluorobutane sulfonic acid	Perfluoropentane sulfonic acid	Perfluoroheptane sulfonic acid	Perfluorodecane sulfonic acid	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTDA)
2	ES1730645018	2270642A	0874	BO002	171130	0874_BO002_ML3_171130	ES Impact	individual	Liver	1	1	Fish	<1	7.5	0.5	8	8	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645019	2270642A	0874	BO002	171130	0874_BO002_MF4_171130	ES Impact	individual	Flesh	1	1	Fish	<1	2.2	0.8	3	3	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645020	2270642A	0874	BO002	171130	0874_BO002_ML4_171130	ES Impact	individual	Liver	1	1	Fish	<1	13.9	1.1	15	15	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645021	2270642A	0874	BO002	171130	0874_BO002_MF5_171130	ES Impact	individual	Flesh	1	1	Fish	<1	0.8	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645022	2270642A	0874	BO002	171130	0874_BO002_ML5_171130	ES Impact	individual	Liver	1	1	Fish	<1	11.4	0.6	12	12	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645023	2270642A	0874	BO007	171201	0874_BO007_BF1_171201	ES Impact	individual	Flesh	1	1	Fish	<1	0.6	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645024	2270642A	0874	BO007	171201	0874_BO007_BL1_171201	ES Impact	individual	Liver	1	1	Fish	3	26.6	<4.0	30	33	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2	<2
2	ES1730645025	2270642A	0874	BO007	171201	0874_BO007_CO1_171201	ES Impact	individual	Organ	1	1	Crustacean	20	24.8	<4.0	27	47	12	<2	21	<2	<2	<5	<2	16	5	<2	<2	<2	<2	<2
2	ES1730645026	2270642A	0874	BO007	171201	0874_BO007_CF1_171201	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645027	2270642A	0874	BO007	171201	0874_BO007_CO2_171201	ES Impact	individual	Organ	1	1	Crustacean	56	42.6	4.4	47	103	15	<2	3	<2	<2	<5	<2	4	<2	<2	<2	<2	<2	<2
2	ES1730645028	2270642A	0874	BO007	171201	0874_BO007_CF2_171201	ES Impact	individual	Flesh	1	1	Crustacean	3	5	<0.5	5	8	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645029	2270642A	0874	BO007	171201	0874_BO007_CO3_171201	ES Impact	individual	Organ	1	1	Crustacean	21	40.8	5.2	46	67	19	<2	17	2	<2	<5	<2	26	7	<2	<2	<2	<2	
2	ES1730645030	2270642A	0874	BO007	171201	0874_BO007_CF3_171201	ES Impact	individual	Flesh	1	1	Crustacean	1	2.5	0.5	3	4	1	<1	2	<1	<1	<5	<1	3	<1	<1	<1	<1	<1	<1
2	ES1730645031	2270642A	0874	BO007	171201	0874_BO007_CO4_171201	ES Impact	individual	Organ	1	1	Crustacean	16	12.8	1.2	14	30	4	<1	2	<1	<1	<5	<1	3	<1	<1	<1	<1	<1	<1
2	ES1730645032	2270642A	0874	BO007	171201	0874_BO007_CF4_171201	ES Impact	individual	Flesh	1	1	Crustacean	4	<0.5	2	2	6	<1	<1	2	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645033	2270642A	0874	BO007	171201	0874_BO007_CO5_171201	ES Impact	individual	Organ	1	1	Crustacean	44	27.8	<4.0	30	74	5	<2	16	<2	<2	<5	<2	4	<2	<2	<2	<2	<2	<2
2	ES1730645034	2270642A	0874	BO007	171201	0874_BO007_CF5_171201	ES Impact	individual	Flesh	1	1	Crustacean	2	0.9	1.1	2	4	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645035	2270642A	0874	BO007	171201	0874_BO007_CO6_171201	ES Impact	individual	Organ	1	1	Crustacean	35	12.7	4.3	17	52	4	<1	2	2	<1	<5	<1	5	2	<1	<1	<1	<1	<1
2	ES1730645036	2270642A	0874	BO007	171201	0874_BO007_CF6_171201	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645037	2270642A	0874	BO007	171201	0874_BO007_CO7_171201	ES Impact	individual	Organ	1	1	Crustacean	7	17.5	0.5	18	25	7	<1	<1	<1	<1	<5	<1	4	2	<1	1	<1	<1	<1
2	ES1730645038	2270642A	0874	BO007	171201	0874_BO007_CF7_171201	ES Impact	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645039	2270642A	0874	BO007	171201	0874_BO007_CO8_171201	ES Impact	individual	Organ	1	1	Crustacean	26	11.7	1.3	13	39	6	<1	2	<1	<1	<5	<1	3	1	<1	<1	<1	<1	<1
2	ES1730645040	2270642A	0874	BO007	171201	0874_BO007_CF8_R1_171201	ES Impact	individual	Flesh	1	1	Crustacean	2	1.5	0.5	2	4	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645041	2270642A	0874	BO007	171201	0874_BO007_CF8_R2_171201	ES Impact	individual	Flesh	1	2	Crustacean	2	0.6	<0.5	1	3	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645042	2270642A	0874	BO002	171201	0874_BO002_BF2_171201	ES Impact	individual	Flesh	1	1	Fish	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645044	2270642A	0874	BO002	171201	0874_BO002_ML6_171201	ES Impact	individual	Flesh	1	1	Fish	<1	1	1	2	2	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645045	2270642A	0874	BO002	171201	0874_BO002_MF6_171201	ES Impact	individual	Liver	1	1	Fish	<1	1.8	1.2	3	3	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645046	2270642A	0874	BO002	171201	0874_BO002_BF3_171201	ES Impact	individual	Liver	1	1	Fish	<2	<2.5	<2.5	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2	<2
2	ES1730645047	2270642A	0874	BO002	171201	0874_BO002_BF3_R1_171201	ES Impact	individual	Flesh	1	1	Fish	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645048	2270642A	0874	BO002	171201	0874_BO002_BF3_R2_171201	ES Impact	individual	Flesh	1	2	Fish	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645049	2270642A	0874	BO002	171201	0874_BO002_FHF3_171201	ES Impact	composite	Flesh	2	1	Fish	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645050	2270642A	0874	BO002	171201	0874_BO002_FHL3_171201	ES Impact	composite	Liver	2	1	Fish	<1	11.6	12.4	24	24	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645051	2270642A	0874	BO014	171202	0874_BO014_CF1_R1_171202	ES Comparative	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645052	2270642A	0874	BO014	171202	0874_BO014_CF1_R2_171202	ES Comparative	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645053	2270642A	0874	BO014	171202	0874_BO014_CO1_171202	ES Comparative	individual	Organ	1	1	Crustacean	<2	<2.5	<2.5	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2	<2	<2
2	ES1730645054	2270642A	0874	BO014	171202	0874_BO014_CF2_171202	ES Comparative	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645055	2270642A	0874	BO014	171202	0874_BO014_CO2_171202	ES Comparative	individual	Organ	1	1	Crustacean	<2	<2.5	<2.5	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2	<2	<2
2	ES1730645056	2270642A	0874	BO014	171202	0874_BO014_CF3_171202	ES Comparative	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645057	2270642A	0874	BO014	171202	0874_BO014_CO3_171202	ES Comparative	individual	Organ	1	1	Crustacean	<2	<2.5	<2.5	<2	<2	<2	<2	6	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2	<2
2	ES1730645058	2270642A	0874	BO014	171202	0874_BO014_CF4_171202	ES Comparative	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645059	2270642A	0874	BO014	171202	0874_BO014_CO4_171202	ES Comparative	individual	Organ	1	1	Crustacean	5	<2.5	<2.5	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2	<2
2	ES1730645060	2270642A	0874	BO014	171202	0874_BO014_CF5_171202	ES Comparative	individual	Flesh	1	1	Crustacean	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
2	ES1730645061	2270642A	0874	BO																											

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APPENDIX C

TECHNICAL REPORTS



APPENDIX C-1 AQUATIC BIOTA SAMPLING AND ANALYSIS (JULY 2018A)

RAAF Base Townsville - PFAS Investigation

Aquatic Biota Sampling and Analysis



Prepared for: WSP Australia Pty Ltd (on behalf of the Department of Defence)

Prepared by Ecological Service Professionals Pty Ltd

July 2018

Document Control

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Executive Summary

This report has been prepared by Ecological Service Professionals (ESP) for WSP Australia Pty Ltd (WSP), and presents the results of the literature review / desktop study, and a preliminary assessment of the uptake of the group of chemicals known as Per- and Poly-FluoroAlkyl Substances (PFAS) in aquatic biota. This assessment contributes to WSP's *Royal Australian Air Force (RAAF) Base Townsville: Comprehensive Investigation of PFAS* being completed on behalf of the Department of Defence. Perfluorooctane sulfonate (PFOS), perfluorohexanesulfonate (PFHxS), and perfluorooctanoic acid (PFOA) are man-made substances belonging to the PFAS group of chemicals, which currently have sufficient toxicological information to assess human health and ecological protection guidelines. PFAS are known to be persistent in the environment and can bioaccumulate in higher trophic level animals, which can result in dispersal of the toxicants from an original point source.

The Investigation Area (IA) for this assessment includes the aquatic environments within the Townsville Town Common and the Bohle River, which are located immediately north-west (and downstream) of the Townsville RAAF Base and Townsville Airport. A variety of aquatic habitats including freshwater and estuarine wetlands and waterways occur within the Town Common and Bohle River, and support a diverse community of aquatic biota, including the threatened estuarine / salt water crocodile and several species of commercial and recreational fisheries of importance (e.g. mud crabs, prawns, barramundi, mangrove jack, etc.). The Town Common and adjacent waters are recognised as being of local, State and Commonwealth environmental significance under state and federal legislation.

Aquatic biota were sampled from 12 to 18 July 2017 in the aquatic environment downstream of the RAAF Base within the IA (the Town Common, Bohle River and drainages of Rowes Bay) and in three comparative locations (Althaus Creek, Alligator Creek and Gordon Creek), for the analysis of PFAS in tissues. The biota survey design considered the trophic level of each target biota type. The samples collected comprised:

- primary producers (plants)
- primary consumers (rock oysters and barnacles)
- detritivores (mullet) and omnivores (estuarine and freshwater prawns and mud crabs)
- a range of estuarine and freshwater secondary and tertiary consumer fish species (bream, herring, shads, glassfish, rainbowfish), and
- a single estuarine apex predatory species (queenfish).

Of the suite of PFAS components analysed, PFOS and PFHxS were the most widespread, detected (i.e. concentrations were above the laboratory limit of reporting (LOR)) in most samples from the IA. PFOS and PFHxS were also found in some biota samples from comparative sites, although the concentrations were much lower. PFOA was only detected in one sample from the Bohle River at a low concentration.

PFOS/PFHxS was detected in most trophic levels in the IA. Lower concentrations occurred in primary producers at the base of the food chain and increased in biota (fish and crustaceans) occupying higher trophic levels. In fish, lower trophic levels such as mullet (detritivores) had higher concentrations of PFOS/PFHxS than secondary consumers or predators.



The concentrations of PFOS/PFHxS in crustacean samples were higher in the IA than at the comparative sites, and higher in prawn samples compared to mud crab samples. The differences between both types of crustacean samples may be due to the sample type e.g. flesh only for crabs versus whole organism for prawns.

The concentrations of PFOS/PFHxS in primary producers (samphire) and primary consumers (barnacles) from the Town Common were low, but confirmed their presence in lower trophic levels. Concentrations of PFOS/PFHxS were below the laboratory LOR in all oyster samples and in samphire samples from the Bohle River and comparative sites.

In summary, PFOS/PFHxS was detected in biota across all trophic levels sampled from the Town Common and most trophic levels sampled from the Bohle River. It should be noted that while large predatory fish were targeted, only one predatory fish was caught during the July 2017 survey (the lack of success in capturing larger predatory species may be related to the timing of the survey). The presence of PFOS/PFHxS in detritivores such as mullet (commonly consumed by larger predatory species) indicates that PFOS/PFHxS is available to higher-level consumers (a range of secondary and tertiary consumers) and apex predators. Further assessment of predatory species, including species important to recreational fisheries, is necessary to determine the extent to which PFOS/PFHxS is bioaccumulating in higher trophic levels in the IA, or potentially being transported out of the area into nearby systems.



1 Introduction

This report has been prepared by Ecological Service Professionals (ESP) for WSP Australia Pty Ltd (WSP). It contributes to the *Royal Australian Air Force (RAAF) Base Townsville: Comprehensive Investigation of PFAS*, being prepared by WSP, on behalf of the Department of Defence. It presents the results of the literature review / desktop study and preliminary assessment of the uptake of Per- and Poly-FluoroAlkyl Substances (PFAS) in aquatic biota in the Investigation Area (IA) (the Townsville Town Common, the Bohle River and drainages to Rowes Bay) and at comparative locations outside of the IA.

1.1 Scope of Works

The aim of the preliminary assessment was to investigate the uptake of PFAS in local aquatic biota of importance to commercial and recreational fisheries, and the extent of occurrence of PFAS uptake in aquatic biota in the broader region.

Specifically, the scope of works for this investigation were:

- A desktop study focused on the types of aquatic species present in the Town Common, Bohle River and nearby receiving coastal waters and their status under relevant state and federal conservation legislation, drawing on information from database searches, review of existing scientific literature (where available) and other available information, e.g. government websites, ecological studies, environmental impact statements (EIS), or similar.
- Initial sampling of a range of freshwater and estuarine biota targeted from different trophic levels (primary producers / consumers and secondary, tertiary or higher consumers), within the IA and three comparative creeks (Althaus Creek, Alligator Creek and Gordon Creek), for the analysis of PFAS in these biota, by a National Association of Testing Authorities (NATA) accredited laboratory.
- Reporting on the findings of the analysis of PFAS in biota samples from the IA and comparative sites.



2 Desktop Study / Literature Review

2.1 Project Area

The wetlands and waterways of the Town Common and Bohle River are the major aquatic habitats within the IA, and are located north-west of the Townsville RAAF Base and Townsville Airport (Attachment A, Map 1). They are within the Bohle River drainage sub-basin of the Ross River drainage basin. Under the *Queensland Wetlands Mapping Program*, the Town Common and Bohle River are mapped as estuarine wetlands in the lower reaches (Map 1; DEHP 2017a). The Bohle River is mapped as a riverine (freshwater) wetland in the upper reaches (Attachment A, Map 2; DEHP 2017a).

The Town Common and the estuarine reaches of the Bohle River are part of the Bohle River Fish Habitat Area (FHA-027), which is designated Management Level B for its importance to recreational, traditional and commercial fisheries (NPSR 2012). The Bohle River Fish Habitat Area extends into Halifax Bay and ends at Cape Pallarenda, north-east of the Town Common (Attachment A, Map 3). The estuarine reaches of the Town Common and Bohle River are mapped as having very high and high aquatic conservation values, respectively under the Queensland Aquatic Conservation Assessment (AquaBAAM) mapping (DEHP 2017a). The freshwater wetlands are mapped as high ecological significance and matters of state environmental significance (MSES) under the State Planning Policy (SPP) (DILGP 2017). A review of previous ecological assessments (AECOM 2015, BMT WBM 2012, Chenoweth 2011) and database records demonstrates that the Town Common and Bohle River support a diverse community of commonly occurring aquatic biota and variety of aquatic habitats including freshwater wetlands and waterways, and estuarine wetlands and waterways (supporting mangroves, saltmarsh and claypans).

The Town Common and Bohle River drain into the southern extent of Halifax Bay, which is a conservation park zone of the Great Barrier Reef Marine Park (GBRMP) (Attachment A, Map 4) and listed under the directory of important wetlands in Australia (DIWA) (DoTEE 2017). Three Mile Creek, Mundy Creek and the unnamed wetland that flows into Mundy Creek drain east into Rows Bay, to the east of the RAAF Base. Halifax, Rows and Cleveland bays are within the non-reefal bioregion of the GBRMP (GBRMPA 2017a). The benthic substrates and aquatic habitat within Cleveland and Halifax bays are dominated by sand silt and gravels, with less than 50% mud (ERIN 2002) and seagrass beds (Seagrass Watch 2017). Seagrass beds and sandy beach habitats occur along the foreshore of Cleveland and Rows Bay. The Bowling Green Bay Ramsar site (a wetland of international significance) is located within Cleveland Bay, approximately 15 km south-east of the Town Common (RAMSAR 2017).

Magnetic Island is approximately 5 km offshore from Cape Pallarenda and the Town Common. The waters surrounding this island are part of the GBRMP and include general use, habitat protection, marine national park and conservation park zones (Attachment A, Map 4; GBRMPA 2017b). Coral reef flats and fringing coral reef occur around Magnetic Island (GBRMPA 2017b) (Attachment A, Map 5). Benthic habitats beyond the reef flats around Magnetic Island are dominated by sand silt and gravels, with less than 50% mud (ERIN 2002) and some isolated seagrass beds (Seagrass Watch 2017).



2.1.1 Water Quality

Natural waters in Queensland are protected under the Environmental Protection (Water) Policy 2009 (EPP Water) (DEHP 2013a). The EPP Water achieves the object of the *Environmental Protection Act 1994* (EP Act) to protect Queensland's waters while supporting ecologically sustainable development. Queensland waters include water in rivers, streams, wetlands, lakes, aquifers, estuaries and coastal areas. Environmental values (EVs) and water quality objectives (WQOs) are assigned under Schedule 1 of the EPP Water for the Initial Investigation Area and surrounds. Under the EPP Water, the environmental values of the estuarine reaches of the Town Common and Bohle River are listed as: aquatic ecosystems; human consumption; secondary (Bohle River only) and visual recreation; and cultural and spiritual values. The lower estuarine waters of the Town Common and the lower and mid estuarine waters of the Bohle River are mapped as moderately-disturbed aquatic ecosystems, and the open coastal waters of Halifax, Rows and Cleveland bays are mapped as slightly to moderately-disturbed aquatic ecosystems (DEHP 2013a – Plan WQ1181).

2.1.2 Aquatic Flora

Aquatic flora communities of the estuarine reaches of local creeks, including the Town Common and Bohle River, are dominated by mangroves and saltmarsh (DEHP 2017b). Mangrove and saltmarsh communities generally have high conservation values as they are often highly productive areas, providing food and shelter resources for a range of invertebrates, birds and fish (Nagelkerken et al 2008). Many of the fish species that associate with mangrove forests and saltmarsh communities have recreational and commercial fisheries values (Rönnbäck 1999). Seagrass communities tend to occur in Halifax and Cleveland Bay and are generally absent or very limited in their distribution in the estuarine reaches of the Town Common or Bohle River (BMT WBM 2012) (Attachment A, Map 5). The main seagrass species that occur in the shallow coastal waters around Townsville are *Halophila ovalis*, *Halodule uninervis*, *Zostera muelleri* *subsp. capricorni*, and *Cymodocea serrulata*. *Thalassia hemprichii* can also be found on the reef flats of Magnetic Island (Seagrass Watch 2017).

2.1.3 Aquatic Fauna

The inshore and offshore waters of the region (including Halifax Bay, Rows Bay and Cleveland Bay) are considered marginal or non-key production areas for commercial mud crab (DEEDI 2010a), spanner crab (DEEDI 2010b) and blue swimmer crab (DEEDI 2010c) fisheries, but produce regionally important catches for the East Coast Otter Trawl (DEEDI 2010d) and East Coast Spanish Mackerel (*Scomberomorus commerson*) fisheries (DEEDI 2011). A locally important commercial net fishery focusing on barramundi (*Lates calcarifer*), threadfin salmon (*Eleutheronema tetradactylum* and *Polydactylus macrochir*) and grey mackerel (*Scomberomorus semifasciatus*) also operates in the region (DEEDI 2009).

Halifax, Rows and Cleveland bays (including the Town Common and Bohle River) are valued as recreational fisheries, with a number of estuarine, inshore, reef and pelagic fish species occurring there, e.g. barramundi (*L. calcarifer*), mangrove jack (*Lutjanus argentimaculatus*), mullet (*Mugil* sp.), whiting (*Sillago* sp.), bream (*Acanthopagrus* sp.), flathead (*Platycephalus* sp.), estuary cod (*Epinephelus* sp.), grunters (*Pomadasys* sp.), mud



crabs (*Scylla serrata*) and prawns (*Penaeus* spp.) in inshore areas; and reef fish such as coral trout (*Plectropomus* spp.), tropical snapper / emperor (*Lutjanus* spp.), sweetlip (*Lethrinus* spp.) and trevally (*Caranx* spp.) further from shore (NPSR 2012; Ludescher 1997).

A search of Queensland's wildlife online database (DEHP 2017c) (within 10 km of the centre of the Town Common) indicated the following aquatic species have been recorded previously in the search area ¹ (Attachment B):

- thirty-seven species, from 19 families, of non-threatened freshwater and estuarine fish. Of these 37 species, four species are exotic and two species are listed as noxious under Queensland's *Biosecurity Act 2014*
- five species of freshwater turtle (Attachment B, Table 6.1) and one species of marine turtle (*Chelonia mydas*)
- the saltwater / estuarine crocodile (*Crocodylus porosus*)
- the white-spotted eagle ray (*Aetobatus ocellatus*), and
- the sperm whale (*Physeter macrocephalus*).

A search of matters of national environmental significance using the *Environment Protection and Biodiversity Conservation Act* (EPBC Act) protected matters search tool (DoTEE 2015) (with 10 km of the centre of the Town Common) indicated that the following species may be present in the region (Attachment B):

- six species of marine turtle, which are all listed as either endangered or vulnerable under the EPBC Act and the Queensland Nature Conservation (Wildlife) Regulation 2006 (NCWR), as well as migratory under the EPBC Act (Attachment B, Table 6.2)
- the saltwater / estuarine crocodile (*Crocodylus porosus*), which is listed as vulnerable under the NCWR and migratory under the EPBC Act
- eight species of shark and ray (four of which are listed as vulnerable under the EPBC Act), with all species listed as migratory (Attachment B, Table 6.2), and
- seven species of marine mammal (six species of whale, three species of dolphin, and dugong), including one endangered and one vulnerable whale species. All mammal species are listed as migratory (Attachment B, Table 6.2).

In summary, the IA provides habitat for a number of estuarine fish and crustacean species with recreational and commercial fisheries values, such as crustaceans (mud crabs and prawns) and a range of fish species (barramundi, mangrove jack, threadfin salmon, etc.). However, none of these species are listed as threatened under State or Commonwealth legislation.

The threatened saltwater crocodile is known to occur in the IA. While a number of threatened marine and migratory species (including marine turtles, dugong, dolphins and whales) are known from or are likely to occur in nearshore or offshore waters in the region, they are unlikely to frequent the estuarine waters of the Town Common and Bohle River.

¹ Note that the wildlife online database only included records that are held within the State's WildNet database – if a species isn't on the list, it doesn't necessarily mean that it is not present.



2.2 Food Webs

Estuarine creeks provide important habitats for micro-organisms e.g. microscopic plankton (bacteria, yeasts, algae, protozoa) to larger benthic and pelagic organisms e.g. bivalves, crabs, fish, birds and larger predators such as crocodiles or dolphins (NSW DPI 2017). Estuarine vegetation (mangroves, saltmarsh and seagrass) trap nutrients and sediment, and provide large amounts of organic matter, which forms the basis of the food webs in an estuary (Hagy & Kemp 2013). Estuarine biota can be characterized in a variety of ways including by:

- morphological or genetic groups (plants, crustaceans, bivalves and fish)
- trophic level (primary producers, primary / secondary / tertiary / apex consumers and decomposers). Trophic group was determined based on primary food sources and standard classifications (Elliott et al. 2007), and
- feeding guild (benthic feeders, filter feeders, omnivores and predators) (Hagy & Kemp 2013).

Feeding guilds are an integrative way to organize interactions among a diverse range of biota types and functional groups, which create food webs (DEHP 2017d). A conceptual diagram of an estuarine food web shows the flow of matter and energy through these important ecosystems (Figure 2.1). The individual steps in a food web (relating to feeding and nutrition) from primary producers through to apex predators are commonly referred to as trophic levels (OEH 2017). It should be noted that some species, particularly detritivores, can occupy and interact with more than one trophic level, which is where the term food web becomes most suitable. Examples of the biota that typically occupy the range of trophic levels in estuaries like the Town Common / Bohle River are provided in Table 2.1.

Table 2.1 Trophic level types and examples of typical estuarine biota.

Trophic Level	Typical Examples of Estuarine Biota
Apex Predators	barramundi, mangrove jack, flathead, queenfish
Secondary / Tertiary Consumers	crabs, mullet, bream, whiting, small predatory fish (glassfish, flathead, etc.), smaller fish species (herring, shad, etc.) and apex predators in earlier life history stages
Primary Consumers	zooplankton, polychaetes, isopods, oysters, whelks, prawns, crabs, smaller species of fish
Primary Producers	phytoplankton, benthic microalgae, epiphytic algae, vegetation (saltmarsh, mangroves, seagrass)

Food webs and trophic levels in riverine ecosystems are like those in estuarine ecosystems and comprise phytoplankton, zooplankton, microalgae, macroalgae, a range of aquatic plants, crustaceans and fish (Blanchette et al. 2014).



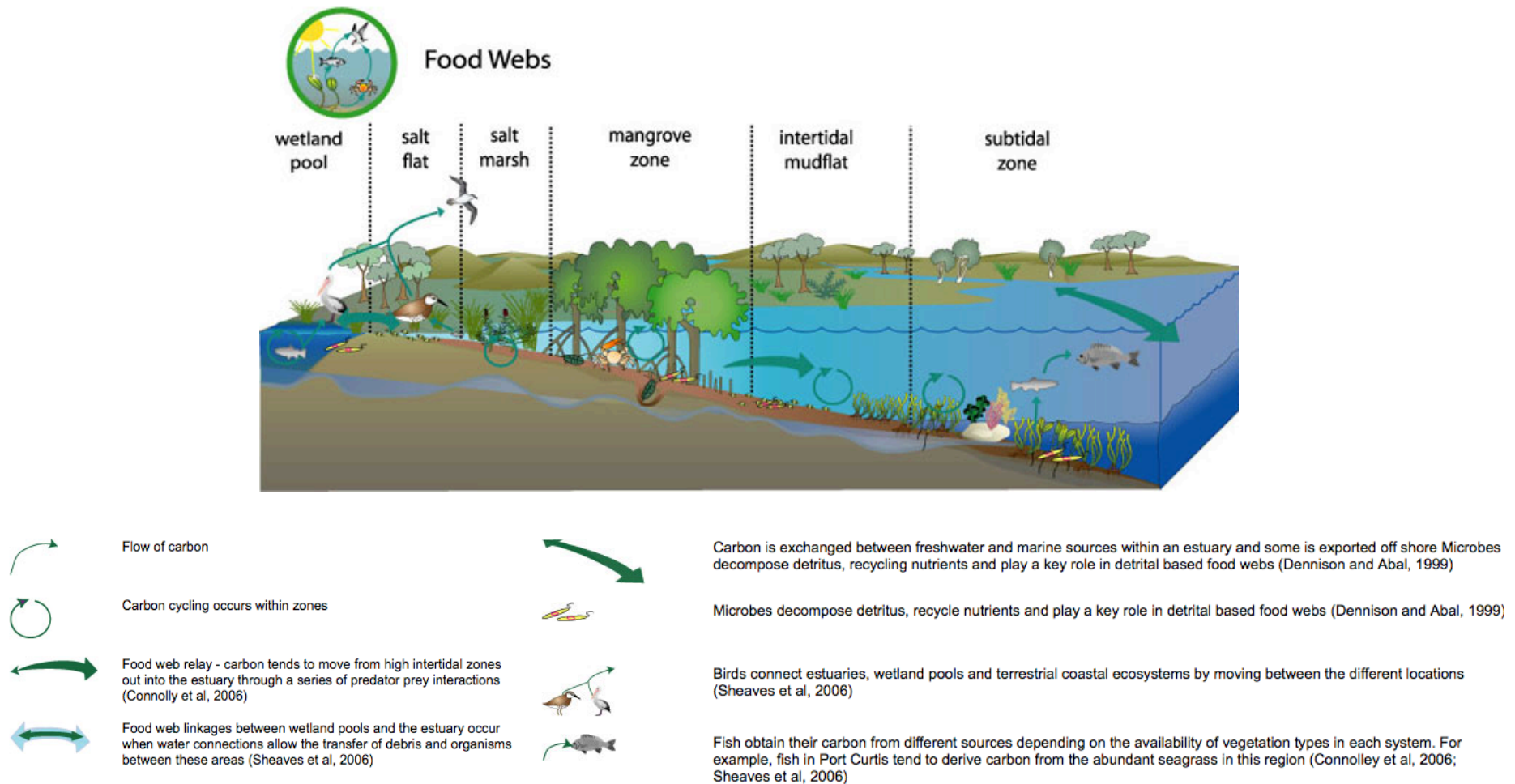


Figure 2.1 Conceptual diagram of a typical mangrove / estuarine food web showing interactions between biota (source: OzCoasts 2017).



2.3 PFAS and its Potential for Bioaccumulation

Per- and Poly-Fluoroalkyl Substances (PFAS) were developed in the United States of America, in the 1940s by the 3M Company (WRA 2016). The man-made chemicals perfluorohexane sulfonate (PFHxS), perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) belong to the PFAS group of chemicals, and are of concern to the Australian Department of Health (DoTEE 2016) as they have the potential to persist for long periods in the environment without breaking down. The first commercial use of PFAS in America was in 1956 and it has been used in Australia since the 1960s (SA EPA 2017). The heat stability, and the water and oil repellence characteristics of PFAS made them useful for a wide range of applications (e.g. non-stick coatings on cookware, stain resistant and water proofing treatments on fabrics, additives in cleaning products and floor polish, grease resistant packaging for some food items, additives to hydraulic fluids and lubricants, emulsifiers and wetting agents) across several industries. PFAS were also used in herbicide and pesticide production and as an active ingredient in firefighting foams designed for suppressing fuel fires (WRA 2016). The PFOS and PFHxS components of PFAS have been recognised as chemicals that should not be used by the Stockholm Convention. The potential effects of the PFOA component are still being investigated.

PFAS are known to be persistent, bioaccumulative, and (due to their persistence in the environment) can be transported from a source (Scheringer 2009). Concerns over the potential for adverse effects on humans and the environment were raised after the detection of PFAS in human plasma samples from blood donors, during an assessment of the impact of water fluoridation on fluoride levels in humans (WRA 2016). PFAS have been detected in fish and fish-eating birds; however, PFOS is the only component shown to accumulate to levels of concern in fish tissue (US EPA 2014). Due to bioaccumulation, PFAS concentrations are generally higher in upper trophic level animals such as apex predators (AHPPC 2016). PFAS typically does not accumulate preferentially in adipose (fatty) tissues, instead binding with blood proteins and accumulating in the liver of exposed organisms (Jones et al. 2003), with much higher concentrations of PFAS reported in fish liver than tissue samples (SA EPA 2017). PFOS contributed the greatest proportion of the PFAS group of chemicals detected in all fish individuals and species from all sampling locations (SA EPA 2017).

PFOS and PFOA are moderately water-soluble and have surface water half-lives of 41 years and 92 years, respectively (DER 2016). PFOS adsorbs to soils and sediments and does not desorb easily; however, PFOA does not display the same sorption properties and is unlikely to be found in sediments in the same concentrations as PFOS (Jensen et al. 2012). PFOS was listed on the Stockholm Convention for Persistent Organic Pollutants in 2009 and as such is internationally recognised as being persistent and bioaccumulative, with potential for dispersal through movements of affected animals, resulting in or potentially having adverse effects on human health and the environment (DoTEE 2016).



3 Field Survey Methods

3.1 Survey Design and Timing

3.1.1 Survey Design

The aquatic biota survey is part of a wider investigation into the occurrence of PFAS within and around the Townsville RAAF Base and Townsville Airport. The survey design was developed based on knowledge of the known and potentially occurring aquatic biota of the Townsville region, in conjunction with WSP. The biota sampling was one component of a broader *Sampling and Quality Plan (SAQP) – Version 1* (WSP 2017), prepared by WSP as the lead consultant for the investigation. The survey design was refined after a site visit and feedback from relevant government agencies. The site visit completed on May 15 and 16, 2017, confirmed:

- the biota types that were likely to be present at selected locations
- the suitability of Alligator, Althaus and Gordon Creeks as comparative creeks
- the limited availability of easily accessible freshwater habitats
- the tidal ranges and physical obstructions to upstream passage in the Town Common and the Bohle River, and
- general land access constraints, if any.

The survey design focussed on the drainages of the Town Common, the Bohle River (within the IA) and three comparative locations in Althaus Creek, Alligator Creek and Gordon Creek. The survey design considered the trophic level of each target biota type and the likely occurrence or availability of each biota type in each location. Examples of the intended target biota, their trophic level and the scale at which they were sampled is presented in Table 3.1.

The biota and their associated trophic level selected for estuarine habitat within the IA were as follows:

- Primary producers (plants): shrubby samphire (*Halosarcia spp.*) was included as it is a potential uptake pathway of PFAS from the environment, and the local population is known to harvest it for direct consumption.
- Detritivores and omnivores: including crustaceans (mud crabs and prawns); fish (mullet). This lower trophic level has consumers, primary producers and benthic infauna living in sediment, and provides a potential pathway for the uptake of PFAS from the environment and are consumed directly.
- Suspension / filter feeders (rock oysters or barnacles) were included for their widespread use in contaminant bioaccumulation studies, including uptake of PFAS from the water column and potential as a pathway for bioaccumulation as food items for species like bream.
- Piscivores such as large bodied predatory fish species (barramundi, mangrove jack and flathead) were included to assess bioaccumulation in higher trophic levels, they also are valuable to the local recreational fishery.



The biota and their associated trophic level selected for assessment in freshwater habitats within the IA were as follows:

- Detritivores and omnivores: including crustaceans (freshwater prawns, shrimp or yabbies) and fish (rainbowfish and cichlids were observed in the upper reaches of Alligator Creek and Bohle River).
- Piscivores such as larger bodied predatory fish species (some members of the observed non-native Cichlidae family).

Thirteen sites were sampled for the current survey (Figure 3.1) with all site names, types (estuarine or freshwater), GPS coordinates and the biota sampled at each site recorded (Table 3.2). Each biota type varied spatially in its availability, so the scale of sampling varied accordingly. For example, sessile biota such as oysters, barnacles and saltmarsh plants were sampled at the site scale, while more mobile species e.g. fish, were sampled at sites but the results were analysed at a drainage scale (including freshwater samples where applicable), due to their mobile nature and patchiness at the smaller site scale. Despite substantial survey effort, not all intended target species were caught, as per the original survey design, due to the temporal and spatial patchiness in the presence of some species.



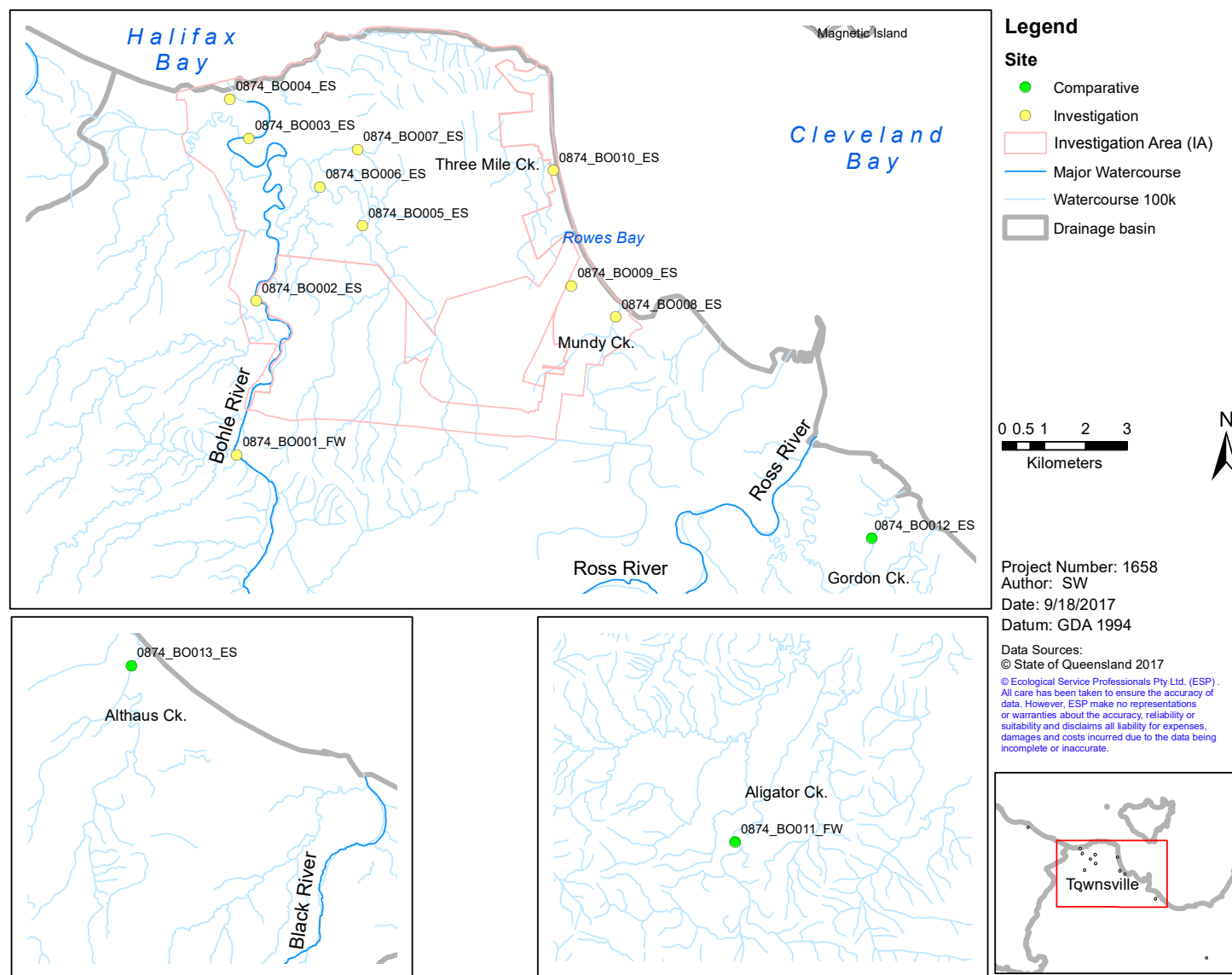


Figure 3.1 Location of sites surveyed for aquatic biota in July 2017.



Table 3.1 Sample design for planned collection of aquatic biota based on likely occurrence and availability.

Habitat	Biota	Trophic level	Sampling scale / location	Min. - max. number of individuals per location	Expected No. Sites where present (max.)	Sample type for analysis per location	Total sample number planned (max.)
Estuarine	mullet	detritivore	whole of estuary	5–10	3	flesh / individual	30
	bream	consumer		5–10	3	flesh / individual	30
	flathead	piscivore (predator)		1-3	3	flesh and liver / individual	18
	barramundi	piscivore (predator)		1-3	3	flesh and liver / individual	18
	mangrove jack	piscivore (predator)		1-3	3	flesh and liver / individual	18
	mud crab	scavenging omnivore	site	5-10	4	flesh only / individual	40
	rock oyster / barnacle	filter feeder (primary consumer)		5-10	4	flesh only / composite	4
	scrubby samphire	primary producer		100–200 g	5	composite	5
Freshwater	rainbowfish	omnivore (consumer)	site / creek	2-5	2	composite	2
	cichlid*	omnivore / piscivore (consumer / predator, species dependent)		2-5	2	composite or separate flesh and liver (size dependent)	20

* up to three members of the Cichlidae family have been previously recorded in the area.

Source: WSP 2017.



Table 3.2 Sites codes (where FW = freshwater and ES = estuarine), types, locations and the biota type(s) sampled at each site.

Site Type	Site Code	Location / Drainage	Easting	Northing	Biota			
					Crustaceans	Fish	Bivalves	Samphire
Investigation Area (IA)	0874_BO001_FW	Bohle River	-19.2729	146.7028	Yes	Yes	No	No
	0874_BO002_ES	Bohle River	-19.2394	146.7073	Yes	Yes	No	No
	0874_BO003_ES	Bohle River	-19.2041	146.7057	Yes	Yes	No	Yes
	0874_BO004_ES	Bohle River	-19.1956	146.7014	Yes	Yes	Yes	No
	0874_BO005_ES	Town Common	-19.2232	146.7316	Yes	Yes	Yes	Yes
	0874_BO006_ES	Town Common	-19.2148	146.7219	Yes	Yes	No	No
	0874_BO007_ES	Town Common	-19.2066	146.7305	Yes	Yes	No	No
	0874_BO008_ES	Mundy Creek*	-19.2430	146.7896	Yes	Yes	No	Yes
	0874_BO009_ES	Mundy Creek wetland*	-19.2363	146.7794	No	Yes	No	Yes
	0874_BO010_ES	Three Mile Creek*	-19.2112	146.7754	Yes	Yes	No	Yes
Comparative	0874_BO011_FW	Alligator Creek	-19.3982	146.9499	Yes	Yes	No	No
	0874_BO012_ES	Gordon Creek	-19.2912	146.8481	Yes	Yes	Yes	Yes
	0874_BO013_ES	Althaus Creek	-19.1558	146.5992	Yes	Yes	Yes	Yes

* drains from the Base into Rowes Bay



3.1.2 Timing

The field survey was completed from 12th to 18th July 2017. The weather during the survey was mostly sunny and daytime temperatures were above average ranging from 25–27°C. Rainfall at the Townsville Airport (BOM Station 032040) was below average for nine out of the ten months prior to the survey; May 2017 was the exception (BOM 2017) (Figure 3.2). The lower than average recorded monthly rainfall in the wet season prior to the survey may have influenced the distribution of various species in the region.

Neap tides dominated the tidal cycle around Townsville during the survey and ranged between approximately 1.3 m (low) and 2.4 m (high). The low tide occurred in the morning and the high tide occurred in the afternoon (Willy Weather 2017) (Table 3.3). Boat-based surveys of estuaries were completed during the incoming tide each day to gain access to the upper reaches of the Town Common and the Bohle River.

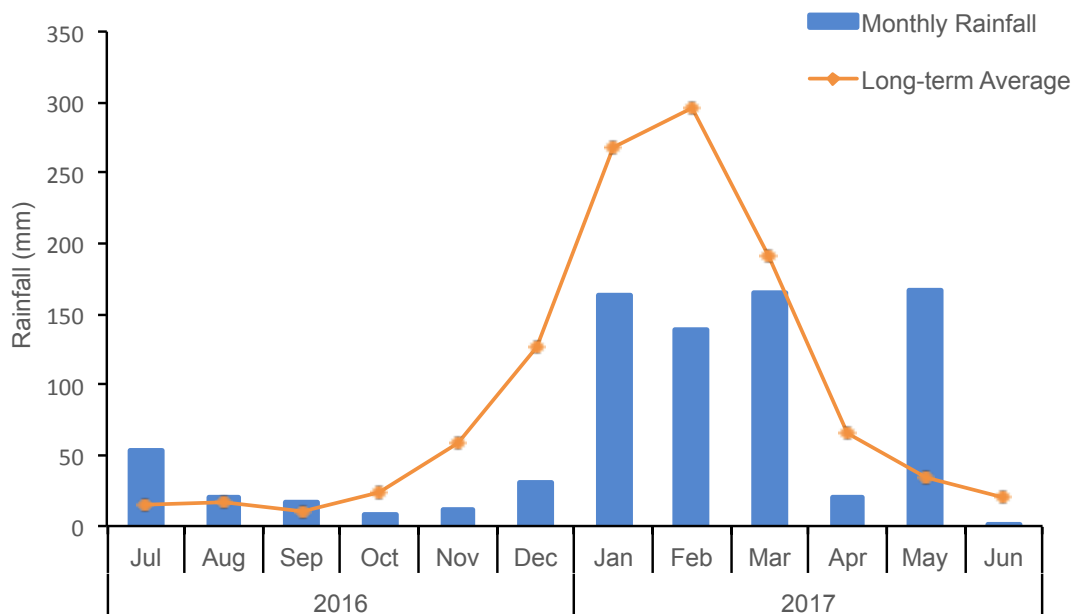


Figure 3.2 Monthly rainfall (mm) recorded at Townsville Airport in the 12 months prior to the survey, compared with the long-term average rainfall for each month (BOM 2017).

Table 3.3 Tidal cycle dates, times (24 hr) and approximate water heights (m) (Willy Weather 2017).

Tide	Date						
	12/07	13/07	14/07	15/07	16/07	17/07	18/07
Low	5.39 (1.46 m)	6.33 (1.48 m)	–	–	–	–	12.17 (1.37 m)
High	10.32 (2.27 m)	11.29 (2.19 m)	12.04 (2.86 m)	12.54 (2.73 m)	2.01 (2.61 m)	3.25 (2.57 m)	5.29 (2.67 m)
Low	16.19 (1.01 m)	17.01 (1.18 m)	7.37 (1.46 m)	8.48 (1.37 m)	9.52 (1.22 m)	10.47 (1.03 m)	12.19 (0.63 m)
High	23.22 (2.98 m)	–	12.35 (2.13 m)	13.57 (2.13 m)	15.38 (2.28 m)	16.54 (2.54 m)	18.38 (3.18 m)
Low	–	–	18.02 (1.38 m)	19.40 (1.56 m)	21.27 (1.63 m)	23.07 (1.54 m)	–



3.2 Biota Sampling

Aquatic biota were sampled using a variety of methods, depending on the biota type, in accordance with the *Queensland Monitoring and Sampling Manual* (DEHP 2013b). All biota sampling was completed in accordance with ESP's DAF Animal Ethics Committee approval (#CA 2017/06/1072), DAF General Fisheries Permit (#173341), Department of National Parks, Sport and Racing – Queensland Parks and Wildlife Service Permit (#WITK18589217) and Department of Environment and Heritage Protection - Scientific Purposes Permit (#WISP14986614).

The gear types used for biota surveys included:

- dual wing fyke nets (6 mm and 17 mm mesh) for freshwater fish
- box traps (4 mm mesh) baited with dry dog food for freshwater fish and crustaceans
- four entry point, collapsible, 50 mm mesh crab traps, baited with fresh, store bought whole mullet, and
- 2.4 m radius cast nets with 25 mm mesh for estuarine fish.

The gear type and survey effort is presented in Table 3.4 and Table 3.5. Biota were sampled in comparative creeks first, to avoid potential contamination between the IA and comparative creeks / sites. The biota types sampled in comparative sites, particularly fish species, guided which additional species were retained for analysis, other than the preliminary target species listed in Table 3.2.

Due to the low abundances of fish caught, most individuals were retained for analysis; however, after five individuals of any fish species were caught, excess fish were released back into the water unharmed. All biota taken for samples were euthanised in accordance with the requirements of ESP's animal ethics permit. Where samples could not be prepared at a site (due to tidal access restrictions), samples were prepared at the nearest boat ramp in accordance with strict sample preparation and quality assurance / quality control (QA/QC) protocols (see Section 3.3.5). The biota retained for analysis at each site and the sample numbers and type(s) are shown in Table 3.6 and photographs of each species retained are presented in Attachment C.



Table 3.4 Gear type and survey effort (hours) at estuarine and freshwater sites.

Site	Gear Type	Number	Date	Time in	Date	Time Out	Effort (hrs)
0874_BO001_FW	fyke net	2	18/07/17	8.15	18/07/17	15.30	14.50
	box trap	10	18/07/17	8.30	18/07/17	15.45	72.50
0874_BO002_ES	crab trap	5	15/07/17	12.15	15/07/17	15.30	16.25
0874_BO003_ES	crab trap	10	14/07/17	10.30	14/07/17	15.00	45.00
0874_BO004_ES	crab trap	10	14/07/17	10.45	14/07/17	15.15	45.00
0874_BO005_ES	crab trap	5	15/07/17	10.00	15/07/17	13.00	15.00
0874_BO006_ES	crab trap	5	15/07/17	09.15	15/07/17	12.15	15.00
0874_BO007_ES	crab trap	5	15/07/17	11.00	15/07/17	14.00	15.00
0874_BO008_ES	crab trap	5	17/07/17	09.15	17/07/17	12.15	15.00
0874_BO010_ES	crab trap	5	17/07/17	09.15	18/07/17	08.45	57.50
0874_BO011_FW	fyke net	2	13/07/17	14.00	14/07/17	09.00	38.00
	box trap	10	13/07/17	14.15	14/07/17	09.15	190.00
0874_BO012_ES	crab trap	7	13/07/17	09.00	13/07/17	15.00	42.00
	crab trap	3	13/07/17	09.30	14/07/17	07.30	66.00
0874_BO013_ES	crab trap	10	12/07/17	11.10	12/07/17	14.00	28.30

Table 3.5 Total number of cast net shots at estuarine sites.

Site	Date	Number of Shots
0874_BO002_ES	16/07/17	18
0874_BO005_ES	16/07/17	10
0874_BO006_ES	16/07/17	10
0874_BO007_ES	16/07/17	16
0874_BO008_ES	17/07/17	10
0874_BO009_ES	17/07/17	3
0874_BO010_ES	17/07/17	30
0874_BO010_ES	18/07/17	30
0874_BO012_ES	13/07/17	80
0874_BO013_ES	12/07/17	30



Table 3.6 The number of samples taken of each taxon and sample type per site (parentheses indicate number of individuals comprising each composite sample).

Drainage	Sample Type		Individual														Composite														Total Sum of Samples per Site	
	Taxon	Tissue Type	Bream	Gizzard Shad	Estuarine Glassfish	Moses Perch	Mullet	Silver Biddy	Silver Javelin	Crab	Bream	Queenfish	Whiting	Mullet	Mullet	Bream	Gulf Banana Prawn	Freshwater Prawn	Freshwater Glassfish	Gizzard Shad	Estuarine Glassfish	Ponyfish	Rainbowfish	Silver Biddy	Silver Javelin	Southern Herring	Oyster	Oyster	Barnacle	Samphire		
Site	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Flesh	Flesh	Flesh	Flesh	Flesh	Flesh	Liver	Liver	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Whole Organism	Flesh	Shell	Flesh	New Growth Leaves and Stem			
Bohle River	0874_BO001_FW	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1(35)	–	–	–	1(12)	–	–	–	–	–	–	–	2	
	0874_BO002_ES	2	1	–	–	4	–	1	1	–	–	–	1	1	–	–	1(6)	–	–	–	–	1(5)	1(18)	–	1(2)	–	–	–	–	–	15	
	0874_BO003_ES	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	4	
	0874_BO004_ES	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1(6)	1(6)	–	–	5	
Town Common	0874_BO005_ES	–	–	–	–	1	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	1(3)	–	–	1(4)	–	–	–	1(10)	1	8	
	0874_BO006_ES	–	–	–	–	–	–	–	4	1	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6	
	0874_BO007_ES	2	–	–	–	5	1	1	3	1	1	1	–	–	–	–	1(3)	–	–	1(5)	1(4)	1(9)	–	–	–	–	–	–	–	–	19	
Rowes Bay	0874_BO008_ES	–	–	–	–	4	1	–	2	–	–	–	1	1	–	–	1(6)	–	–	–	–	1(8)	1(7)	–	–	1(3)	–	–	–	–	1	14
	0874_BO009_ES	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	
	0874_BO010_ES	–	–	1	–	1	–	1	3	–	–	–	–	–	–	–	–	–	–	–	–	–	1(2)	–	1(2)	–	–	–	–	–	1	9
Comparative	0874_BO011_FW	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1(13)	1(10)	–	–	–	1(12)	–	–	–	–	–	–	–	–	3
	0874_BO012_ES	–	–	–	1	3	–	1	3	–	–	–	2	2	–	–	1(6)	–	–	1(6)	1(2)	1(6)	–	1(2)	–	–	1(7)	–	–	1	19	
	0874_BO013_ES	1	–	–	2	2	–	1	10	1	–	–	2	2	1	–	–	–	–	1(5)	–	1(4)	–	–	–	1(5)	1(7)	1(7)	–	1	28	
Total Sample Number		5	1	1	3	20	2	5	35	3	1	1	6	6	2		4	1	2	3	4	7	2	3	2	1	3	2	1	7	133	



3.2.1 Crustaceans

Mud crabs (*Scylla serrata*) were collected from all 10 estuarine sites using crab pots (Table 3.6). The mud crabs were kept in nally bins until the target number of individuals had been caught at each estuarine site, then all tissue samples were prepared. Where a crab dropped a claw during removal from the trap or general handing, the claw was retained for a tissue sample and the crab returned to the water at each site, alive. Insufficient tissue was retrieved using this method for three of the 35 mud crabs caught, so in these cases the crabs were euthanised and muscle tissue was collected from both claws and the body.

Banana prawns (*Fenneropenaeus merguensis*) were collected from four estuarine sites using a cast net (Table 3.6). All prawns were euthanised, identified and counted. Up to six individuals were pooled into a single composite sample from each of the estuarine sites where prawns were collected.

Freshwater prawns (*Macrobrachium* spp.) were sampled using fyke nets and box traps at freshwater sites (Table 3.6). Freshwater prawns were only caught at a single freshwater site and all thirteen individuals were pooled into a composite sample.

3.2.2 Fish

Fish (various species) were sampled at all sites. Fyke nets and box traps were used at freshwater sites and cast nets were used at estuarine sites. Fish caught in crab traps at estuarine sites were also retained.

Each fish was identified, counted and a representative of each species photographed. Fish were euthanised and kept cool on ice until tissue sample preparation.

A total of 227 fish, representing 22 species from 19 families, were caught at 12 sites (Table 3.6). Fourteen species were estuarine and eight were freshwater species. No fish species listed under the EPBC Act or the NCWR were recorded and no noxious (*Gambusia holbrooki* or *Oreochromis mossambicus*) or exotic (other members of the Cichlid family) were recorded. Most fish species were sampled in both the IA and from the comparative drainages; however, the following species were sampled in only one area, as indicated:

- southern herring (*Herklotsichthys castelnaui*), sampled at comparative site BO0013_ES
- moses perch (*Lutjanus russelli*), sampled at comparative sites BO011_ES and BO013_ES, and
- whiting (*Sillago* sp.) and queenfish (*Scomberoides* sp.), sampled at IA site BO007_ES.

Eleven estuarine and 2 freshwater species of fish were retained for analysis based on their known or likely status as prey items for larger predatory fish and the numbers required, particularly in smaller fish species, for a composite sample (Table 3.6). The nine species that were not retained for analysis were either:

- not caught in both the IA and comparative creeks
- only caught as single individuals, or
- not caught in sufficient numbers to make a composite sample.



3.2.3 Filter Feeders

Oysters (*Saccostrea* sp.) were sampled at estuarine sites BO004_ES on the Bohle River, and at each estuarine comparative site (BO012_ES and BO013_ES). As oysters were not present at estuarine site BO005_ES in the Town Common, barnacles were sampled from this location to represent filter feeders. Oysters and barnacles were removed from the roots and branches of mangrove trees in the Bohle River and Town Common sites, and oysters were removed from concrete structures (boat ramp and water pipeline supports) within the intertidal zone at comparative sites.

A total of 20 oysters were collected at three estuarine sites and 10 barnacles were collected at one estuarine site (Table 3.6), with all tissue pooled into a single composite sample at each site. Oyster shell samples were also composited together at the locations (IA and comparative) where they were sampled.

3.2.4 Saltmarsh Flora (Samphire)

Samphire (*Halosarcia* spp.) was collected at a total of seven sites where present, including: site BO003_ES on the Bohle River, site BO005_ES in the Town Common, site BO008_ES on Mundy Creek, site BO009_ES on the Mundy Creek wetland and at both comparative estuarine sites (BO012_ES and BO013_ES) (Table 3.6).

At each site, several individual branches of new growth were removed from mature plants using stainless steel scissors. The samples were collected from mature plants within a 3 x 3 m quadrat and pooled into a composite sample at each site.

3.3 Sample Preparation

A total of 133 biota samples from crustaceans, fish, bivalve and samphire were submitted to the laboratory for analysis. The species, sample type (individual or composite) and tissue type (liver, flesh or whole organism, plant material) collected per site are presented in Table 3.6. Each biota type was rinsed prior to sample preparation in accordance with the *Queensland Monitoring and Sampling Manual* (DEHP 2013b; as described in Section 3.3.5). The total number of samples for each biota type submitted to the laboratory for analysis were:

- 40 crustacean samples (comprising 35 individual mud crab tissue samples, four composite (whole) prawn samples, and one composite (whole) freshwater prawn sample)
- 80 fish samples (comprising 11 flesh, eight liver, 37 whole individuals and 24 composite (whole fish) samples)
- six filter feeder samples (comprising three composite oyster flesh samples, two composite oyster shell samples and one composite barnacle flesh sample), and
- seven composite samphire samples.

Images of species retained for analysis are displayed in Attachment C, Table 6.3.



3.3.1 Crustaceans

Mud crab tissue samples were taken from the dropped claws of crabs, or from the claws and body tissue of three individuals where only a small amount of flesh was removed from their claws.

Due to the small size of freshwater and banana prawns, the whole organisms were used and pooled into a composite sample at each site to provide a sufficient amount of tissue for analysis.

3.3.2 Fish

All fish were rinsed prior to sample preparation in accordance with the *Queensland Monitoring and Sampling Manual* (DEHP 2013b). Larger fish specimens (>200 mm total length) were carefully dissected using stainless steel scissors or scalpel and forceps to obtain separate samples of either muscle (flesh) or liver (where there was sufficient total weight of liver for analysis). For medium sized fish (75 mm – 200 mm total length), either flesh only was removed or the whole fish was kept as a single sample. For smaller fish (<75 mm total length), composite samples of all whole fish collected from a site were taken.

3.3.3 Filter Feeders

Oyster and barnacle shells were carefully opened and flesh was removed using clean stainless steel forceps or scalpel. All tissue was rinsed then retained as a composite sample from each site and taxon. One composite sample of oyster shells was retained from one site in the IA and one comparative creek.

3.3.4 Saltmarsh Flora (Samphire)

Individual branches and leaves were removed from areas of new growth on mature samphire plants. All plant material collected at a site was rinsed then retained to provide a single composite sample.

3.3.5 QA/QC

Prior to use and sample preparation, all equipment and each organism type was rinsed separately in a PFAS free rinsate. All equipment was cleaned at the beginning of each day, between sites and between tissue sample preparation for each biota type to limit the potential for contamination from external sources and / or cross-contamination between sites and organisms. Other QA/QC procedures, as outlined in the *Queensland Monitoring and Sampling Manual* (DEHP 2013b) were followed such as wearing new powder-free nitrile gloves for preparation of each sample. Equipment was dipped in Liquinox (a PFAS-free industrial strength cleaner), potable / tap water, then in de-ionised water before every use. All trays used were stainless steel and new stainless steel scissors, forceps and scalpels were used at each site. Scalpel blades were changed between biota types at each site.

For quality control and assurance purposes and to determine whether there was contamination introduced from the sampling equipment, biota or procedure, the following gear and biota rinsate samples were collected:

- the ice used to keep samples cool



- the ice slurry used to euthanise fish and prawns
- a sample of the rinsate from equipment (scalpels, forceps, trays) preparation, and
- a random sample of the biota rinsate collected at a single random site, each day.

3.4 Laboratory and Data Analysis

Biota and QA/QC rinsate samples were analysed by a NATA-accredited laboratory (ALS Environmental) for the full suite of components of PFAS (Laboratory Certificates of Analysis are presented in Attachment D).

The laboratory results were summarised as follows:

- The total concentrations of PFOS and PFHxS were summed for each sample, to provide a value for comparison between locations and biota types.
- Where more than one sample of any biota type for each trophic level was collected, the mean, standard error and range of PFOS/PFHxS concentrations were calculated for each trophic level (primary producer and consumer, detritivore, omnivore, consumer and apex predator (where available), pooled among sites in each drainage (sites and drainages as per Table 3.6), and tabulated or graphed.
- Where only a single sample was collected at a site (due to low numbers of individuals or composite samples) (e.g. samphire and prawns), only the total concentrations of PFOS/PFHxS were tabulated and graphed.

3.5 Limitations

This report presents the results of a single preliminary survey completed in July 2017, with no seasonal replication. The survey was aimed at collecting a range of commonly occurring aquatic biota from the Town Common, Bohle River and Althaus, Alligator and Gordon creeks for the analysis of PFAS in tissue samples. As per the Sampling and Quality Plan, large predatory / recreationally important fish species were intended to be sampled; however, the timing of the survey (outside peak seasonal fishing times) resulted in a lack of these species being caught. Anecdotal information from local fishing reports and individuals at the time of the survey suggested that recreational fishers were also not catching these target species in any creek. For health and safety reasons, the survey methods used for estuarine biota were limited to those that could be completed safely from a boat, as sampling was in known crocodile habitat.



4 Results

Of the suite of PFAS components, PFOS and PFHxS were the most widespread, detected (i.e. concentrations were above the laboratory limit of reporting (LOR)) in most samples from the IA. The following were also detected at sites within the IA, though in far fewer samples:

- Perfluoroheptane sulfonic acid (PFHpS)
- Perfluorodecane sulfonic acid (PFDS)
- Perfluorodecanoic acid (PFDA)
- Perfluoroundecanoic acid (PFUnDA)
- Perfluorododecanoic acid (PFDoDA)
- Perfluorooctane sulfonamide (FOSA), and
- Perfluorooctanoic acid (PFOA), which was only detected (1 µg/kg) in a single composite sample of whole fish (silver biddy) from site BO002_ES in the Bohle River.

At comparative sites, PFOS/PFHxS was less widespread, detected in approximately 20% of samples and at lower concentrations than in the IA (Table 4.1; Figure 4.1). PFDA was also detected at comparative site BO012_ES only, while the concentrations of all other PFAS components were below the laboratory LOR at comparative sites.

4.1 Concentration of PFOS / PFHxS in Biota

PFOS/PFHxS was detected in a range of biota types within the IA and comparative drainages (refer to Attachment D for full laboratory results). The proportion of samples in which PFOS/PFHxS concentrations were detected, i.e. above the LOR, was higher in drainages in the IA than comparative sites (Table 4.1).

PFOS/PFHxS was detected in almost all samples from the Town Common (Table 4.1). No PFOS/PFHxS was detected in plant or filter feeder samples from the Bohle River Bohle River and comparative sites. No PFOS/PFHxS was detected in fish flesh from the comparative sites. Note that in some instances, only one sample was collected per drainage, and further sampling is required to confirm these results.

PFOS/PFHxS was consistently detected in samples from detritivores (whole, liver and flesh), crustacean samples (mud crab and prawn) and secondary / tertiary consumer samples (all fish species) (Figure 4.1). The concentrations of PFOS/PFHxS in each biota type are discussed in further detail in Sections 0 – 4.1.4 below.



Table 4.1 Proportion of biota samples with PFOS/PFHxS concentrations above the laboratory LOR.

Drainage	Biota Type	Total Number of Samples	Number of Samples Equal to or Above LOR	Proportion (%) of Samples Equal to or Above LOR
Bohle River	filter feeders	2	0	0
	crustaceans	8	4	50
	fish whole	13	13	100
	fish flesh	1	1	100
	fish liver	1	1	100
	plant	1	0	0
Town Common	filter feeders	1	1	100
	crustaceans	11	7	63.6
	fish whole	15	15	100
	fish flesh	4	4	100
	fish liver	1	1	100
	plant	1	1	100
Rowes Bay	crustaceans	6	3	50
	fish whole	13	13	100
	fish flesh	1	1	1
	fish liver	1	1	1
	plant	3	0	0
Comparative	filter feeders	3	0	0
	crustaceans	15	2	13.3
	fish whole	20	5	25
	fish flesh	5	0	0
	fish liver	5	4	80
	plant	2	0	0



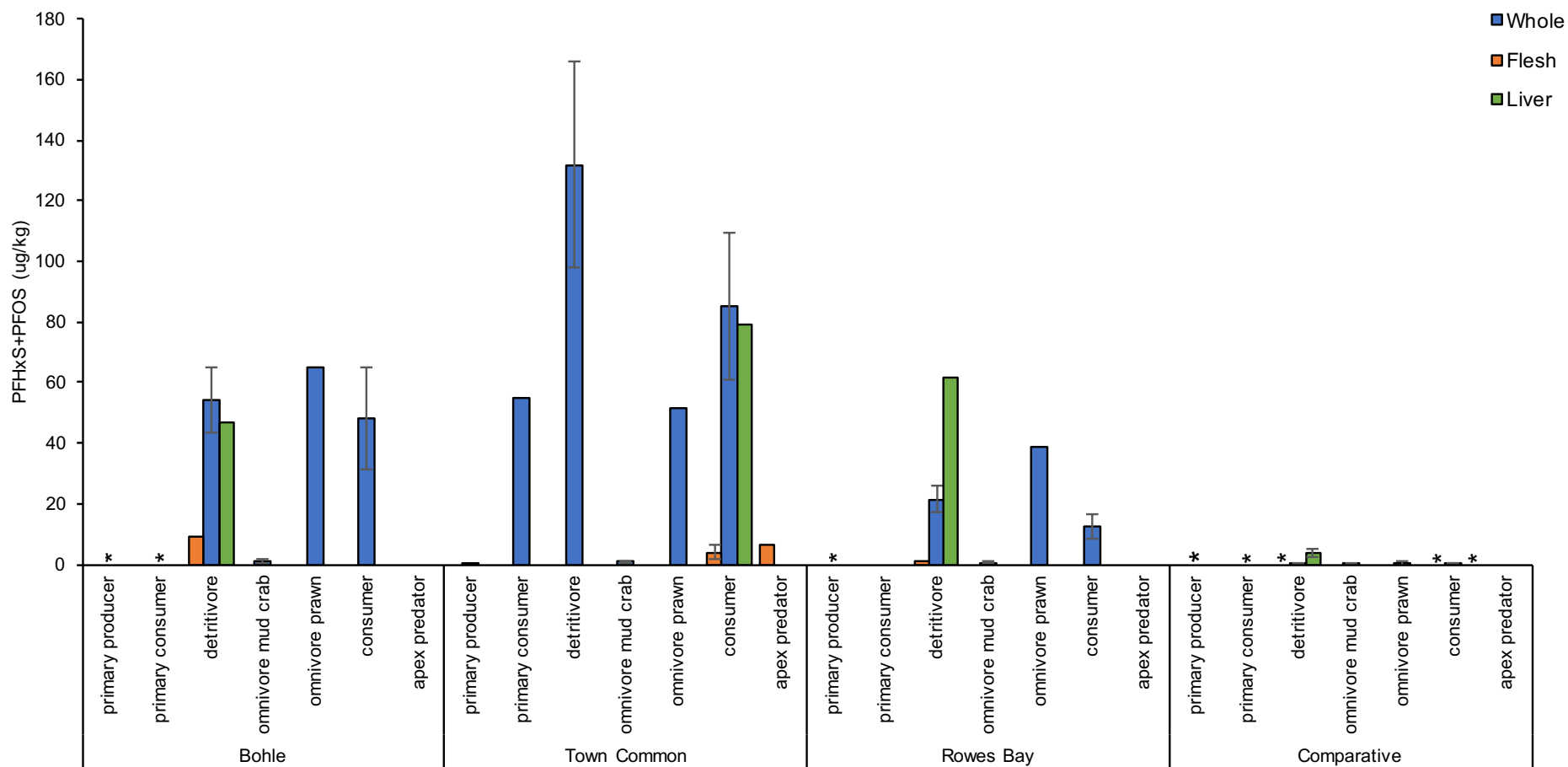


Figure 4.1 PFOS/PFHxS concentrations in the range of biota types and trophic levels from the Bohle River, Town Common, Rowes Bay and comparative (Althaus, Mundy and Three Mile) creeks (asterisk indicates samples with concentrations below the LOR).



4.1.1 Crustaceans

The average concentration of PFOS/PFHxS in mud crab flesh was an order of magnitude higher in samples from the IA (mean concentration 0.74 – 1.28 µg/kg) than in samples from the comparative drainages (0.1 µg/kg; Figure 4.2). However, concentrations of PFOS/PFHxS in mud crab flesh at all sites were relatively low compared to prawn samples from sites in the IA, which ranged from 39 to 65 µg/kg. Average concentrations of PFOS/PFHxS were very low in crab and prawn samples from the comparative sites (0.65 µg/kg).

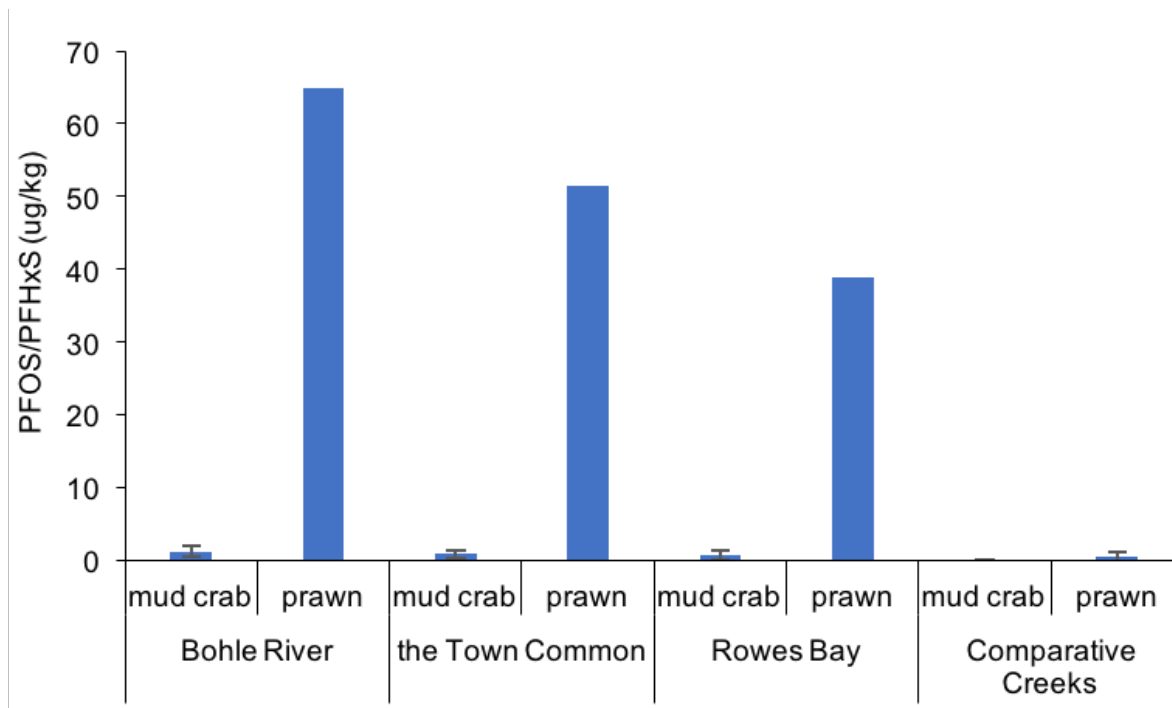


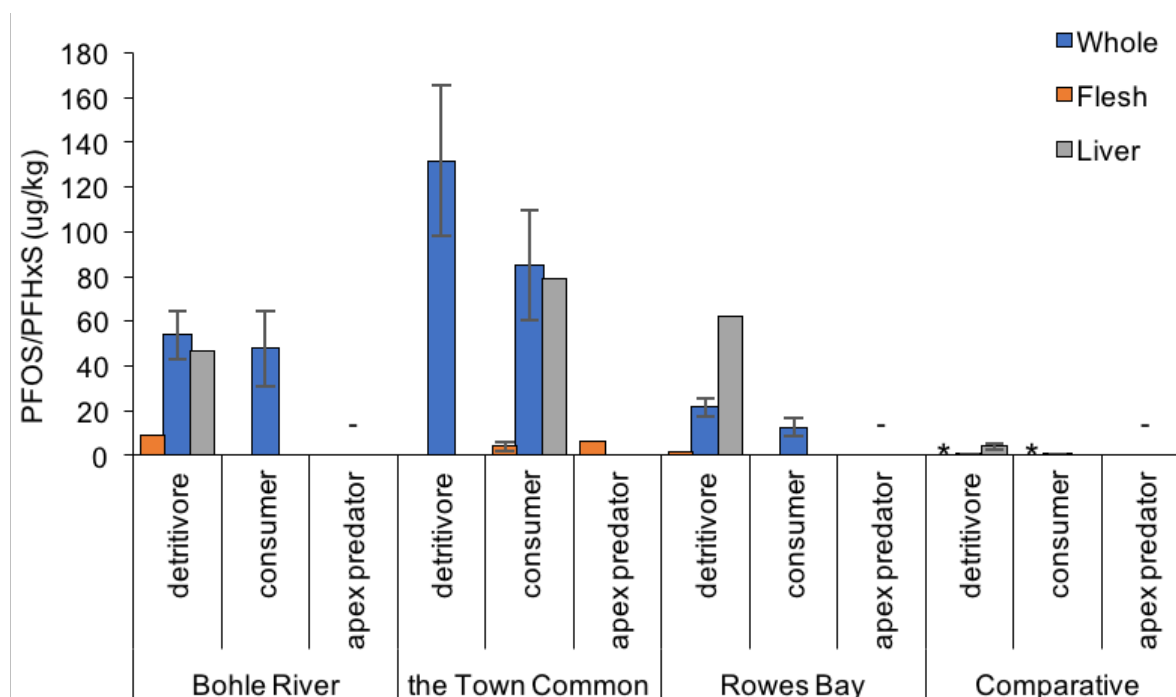
Figure 4.2 Concentrations of PFOS/PFHxS (mean ± SE) in crustaceans pooled among sites in each drainage area.

4.1.2 Fish

The concentration of PFOS/PFHxS was greatest in fish liver and whole fish samples (Figure 4.3 & Table 4.2). The highest concentrations of PFOS/PFHxS were recorded in detritivore whole (131.9 µg/kg) and consumer whole (85.22 µg/kg) samples from the Town Common. The highest concentration of PFOS/PFHxS in fish liver samples was also detected in the Town Common (consumer, 62 µg/kg). The highest concentration of PFOS/PFHxS in fish flesh tissue (9 µg/kg) came from a single detritivore sample from the Bohle River.

Generally, detritivore samples appeared to have higher PFOS/PFHxS concentrations than consumers and apex predators, respectively (although only one apex predator was caught in the survey) (Figure 4.3). Further, samples from the IA had generally a higher concentration of PFOS/PFHxS than samples from the comparative sites, which were below the LOR for detritivore and consumer flesh (Figure 4.3).





- not sampled

Figure 4.3 Concentrations of PFOS/PFHxS ($\pm$ SE) in whole fish from all sites and liver samples where available (asterisk indicates samples with concentrations below the LOR).

4.1.3 Filter Feeders

The concentration of PFOS/PFHxS in oysters was below the LOR in flesh and shell samples from the Bohle River and the comparative sites. PFOS/PFHxS was detected in barnacle flesh (55 μ g/kg; Table 4.2), which was sampled from the Town Common only (site BO007_ES).

4.1.4 Samphire

The concentration of PFOS/PFHxS in samphire was below the LOR in samples from the Bohle River, Rowes Bay and comparative sites; however, PFOS/PFHxS was present (0.5 μ g/kg) in the sample from the Town Common (Table 4.2).



Table 4.2 The number of samples (n), total or mean, minimum, maximum and standard error ($\pm$ S.E.) of PFOS/PFHxS concentrations in biota from the different trophic levels sampled from each drainage.

Drainage	Biota Type	Trophic Level / Tissue	n	Mean ($\mu\text{g/kg}$)	Total ($\mu\text{g/kg}$)	Minimum ($\mu\text{g/kg}$)	Maximum ($\mu\text{g/kg}$)	($\pm$ S.E.)
Bohle River	samphire	primary producer	1	–	<LOR ^c	–	–	–
	filter feeder	primary consumer	2	<LOR ^c	–	–	–	–
	crustacean	omnivore mud crab	7	1.28	–	<LOR	4	0.71
		omnivore prawn	1	–	65 ^c	–	–	–
	fish	detritivore whole	4	54	–	29	80	10.75
		detritivore flesh	1	–	9	–	–	–
		detritivore liver	1	–	47	–	–	–
		consumer whole	9	47.89 ^d	–	7	154	16.83
Town Common	samphire	primary producer	1	–	0.5 ^c	–	–	–
	filter feeder	primary consumer	1	–	55 ^c	–	–	–
	crustacean	omnivore mud crab	10	0.91	–	<LOR	5	0.47
		omnivore prawn	1	–	51.5 ^c	–	–	–
	fish	detritivore whole	6	131.9	–	38.5	267.1	33.8
		consumer whole	9	85.22 ^d	–	12.1	199.2	24.55
		consumer flesh	3	3.97	–	1.5	8.4	2.22
		consumer liver	1	–	79	–	–	–
		apex predator flesh	1	–	6.2	–	–	–
Rowes Bay ^a	samphire	primary producer	3	<LOR ^c	–	–	–	–
	crustacean	omnivore mud crab	5	0.74	–	<LOR	3	0.58
		omnivore prawn	1	–	39	–	–	–



Drainage	Biota Type	Trophic Level / Tissue	n	Mean (µg/kg)	Total (µg/kg)	Minimum (µg/kg)	Maximum (µg/kg)	(± S.E.)
Rowes Bay ^a	fish	detritivore whole	5	21.6	–	12	36	4.08
		detritivore flesh	1	–	1.3	–	–	–
		detritivore liver	1	–	62	–	–	–
		consumer whole	8	12.5 ^d	–	2	38	4.03
Comparative ^b	plant	primary producer	2	<LOR ^c	–	–	–	–
	filter feeder	primary consumer	3	<LOR ^c	–	–	–	–
	crustacean	omnivore mud crab	13	0.1	–	<LOR	1.0	0.1
		omnivore prawn	2	0.65	–	<LOR	1.3	0.65
	fish	detritivore whole	5	0.3	–	<LOR	1.5	0.3
		detritivore flesh	4	<LOR	–	–	–	–
		detritivore liver	4	4	–	2	7.9	1.34
		consumer whole	15	0.24 ^d	–	<LOR	1.7	0.12
		consumer flesh	1	–	<LOR	–	–	–
		consumer liver	1	–	<LOR	–	–	–

* Whole fish samples contain livers which can have high concentrations of PFOS/PFHxS.

a Includes Three Mile Creek, Mundy Creek and the saltmarsh area that drains into Mundy Creek.

b Comparative drainage include all sites (freshwater and estuarine) from Althaus, Alligator and Gordon creeks.

c Composite sample.

d Includes individual and composite samples.

Standard Error not calculated for results of single sample or where all results were <LOR.

Detritivore flesh and liver from mullet samples.

Consumer flesh and liver from bream samples.



4.1.5 QA/QC

The analysed QA/QC rinsate samples confirmed (Table 4.3):

- The ice used to keep samples cool after processing was free of PFOS/PFHxS.
- PFOS/PFHxS was detected in the ice slurry used to euthanise fauna at site BO002_ES and comparative site BO013_ES; however, the water used in the slurry was taken from the creek water at each sample site. This suggests PFOS/PFHxS is present in creek water at these sites, or on the biota there. The crab rinsate from BO013_ES had the highest concentration of PFOS/PFHxS in any biota rinsate sample (0.045 µg/L); while the other detected concentrations in rinsate samples from BO013_ES (oyster and fish) were 0.002 µg/L and 0.006 µg/L, respectively.
- PFOS/PFHxS was detected in low concentrations (<0.005 µg/L) in the equipment rinsate at sites BO002_ES, BO003_ES and BO010_ES and was below the LOR in equipment rinsate samples taken at the Town Common and comparative estuarine sites, suggesting the potential for contamination of biota samples from equipment is low.
- PFOS/PFHxS was detected in biota rinsate samples at most sites prior to sample preparation. While generally in lower concentrations than in ice slurry samples (except site BO007_ES), the concentration of PFOS/PFHxS was higher than the equipment rinsate samples. This suggests that PFOS/PFHxS was present on the surface of biota prior to sample preparation.

While PFOS/PFHxS was detected at most QA/QC procedural points, it is considered likely that the source of the PFOS/PFHxS was the environment, such as site water or the surface of biota (particularly sediment on the surface of benthic species), and the rinsing procedures likely removed most or all of this contamination prior to sample preparation. There were no consistent trends to suggest that contamination of the biota samples from sampling equipment or sample handling had occurred.

Table 4.3 Concentrations of PFOS/PFHxS in QA/QC rinsate samples.

Rinsate Type	Drainage	Site	PFOS/PFHxS (µg/L)
ice^	n/a	n/a	<LOR
ice slurry*	BO002_ES	Bohle River	0.145
	BO007_ES	Town Common	0.164
	BO008_ES	Rowes Bay	0.061
	BO010_ES	Rowes Bay	0.014
	BO011_FW	Comparative	<LOR
	BO012_ES	Comparative	0.003



Rinsate Type	Drainage	Site	PFOS/PFHxS (µg/L)
	BO013_ES	Comparative	0.011
equipment	BO002_ES	Bohle River	0.003
	BO003_ES	Bohle River	0.002
	BO007_ES	Town Common	<LOR
	BO010_ES	Rowes Bay	0.004
	BO012_ES	Comparative	<LOR
	BO013_ES	Comparative	<LOR
biota prior to sample preparation	BO002_ES (fish)	Bohle River	0.029
	BO003_ES (mud crab)	Bohle River	0.023
	BO007_ES (fish)	Town Common	1.01
	BO008_ES (prawn)	Town Common	0.016
	BO010_ES (mud crab)	Rowes Bay	0.01
	BO011_FW (fish)	Comparative	<LOR
	BO012_ES (mud crab)	Comparative	<LOR
	BO012_ES (oyster)	Comparative	<LOR
	BO012_ES (fish)	Comparative	0.003
	BO012_ES (prawn)	Comparative	<LOR
	BO013_ES (mud crab)	Comparative	0.045
	BO013_ES (oyster)	Comparative	0.002
	BO013_ES (fish)	Comparative	0.006

^ ice used to keep samples (in appropriate sample containers) cool

* ice slurry used to euthanise fauna, containing ambient site water



5 Conclusions

Of the three primary PFAS chemicals that have sufficient toxicological information to derive ecological protection guidelines, the initial investigation confirmed the presence of PFOS and PFHxS in most biota types, from most trophic levels, within the IA and in some biota types at comparative sites. The third chemical, PFOA, was only detected in one sample from the Bohle River at a low concentration. Other components of PFAS that were detected in the samples included PFHpS, PFDS, PFDA, PFUnDA, PFDoDA and FOSA; however, these were detected in relatively few samples, mostly from the IA, and at lower concentrations than for PFOS/PFHxS. There is currently insufficient information for these additional components to derive protection guidelines so further assessment was not possible.

There were higher concentrations of PFOS/PFHxS in biota within the IA compared with much lower concentrations at the comparative sites. The results indicate that the high concentrations of PFOS/PFHxS in biota did not extend a substantial distance to the north and south of the IA, as the estuarine comparative sites were within 10 km of the mouth of the Bohle River.

PFOS/PFHxS was found at higher concentrations in whole and liver samples than fish flesh samples. Since the whole samples included organs including the liver, these results suggest accumulation of PFOS/PFHxS in liver tissue rather than fish flesh, which is consistent with other studies (e.g. SA EPA 2017, Faxneld et al. 2014).

Concentrations of PFOS/PFHxS were higher in mud crab flesh from the IA than from the comparative creeks. Further sampling of mud crabs, including other organs (e.g. digestive tract, organs) as well as flesh, would assist in confirming the extent of accumulation in this species.

The concentration of PFOS/PFHxS was much higher in prawns than mud crabs from the same drainage, particularly from the IA. This may be due to sediment in the hind gut or concentration of chemicals in the digestive glands, rather than specific increased concentration in muscle tissue. Since whole prawns were analysed (including the organs), and only mud crab flesh, further assessment may be necessary to determine the concentration of PFOS/PFHxS in flesh alone compared with concentrations in the digestive system.

Additional assessments in stationary organisms e.g. oysters in Rows Bay drainages may be necessary to determine the extent of PFOS/PFHxS in this location. Additional samphire sampling could assist in determining the extent of PFOS/PFHxS uptake in this species in the Town Common.

PFOS/PFHxS was detected at all trophic levels within the Town Common and most trophic levels sampled from the Bohle River. Concentrations were lowest in biota that were primary producers at the base of the food chain and increased in biota occupying higher trophic levels. In fish, lower trophic levels such as detritivores (e.g. mullet) had higher concentrations of PFOS/PFHxS than secondary consumers or predators. It should be noted that while large predatory fish were not surveyed, the presence of PFOS/PFHxS in mullet (a key food resource for large predatory species) indicates that PFOS/PFHxS is available to higher level consumers (a range of secondary and tertiary consumers) and apex predators. A more detailed assessment of predatory species, including recreationally important species such as



barramundi and flathead, is necessary to determine the extent to which PFOS/PFHxS is bioaccumulating in higher trophic levels in the IA or potentially being exported from these systems by these species.



6 References

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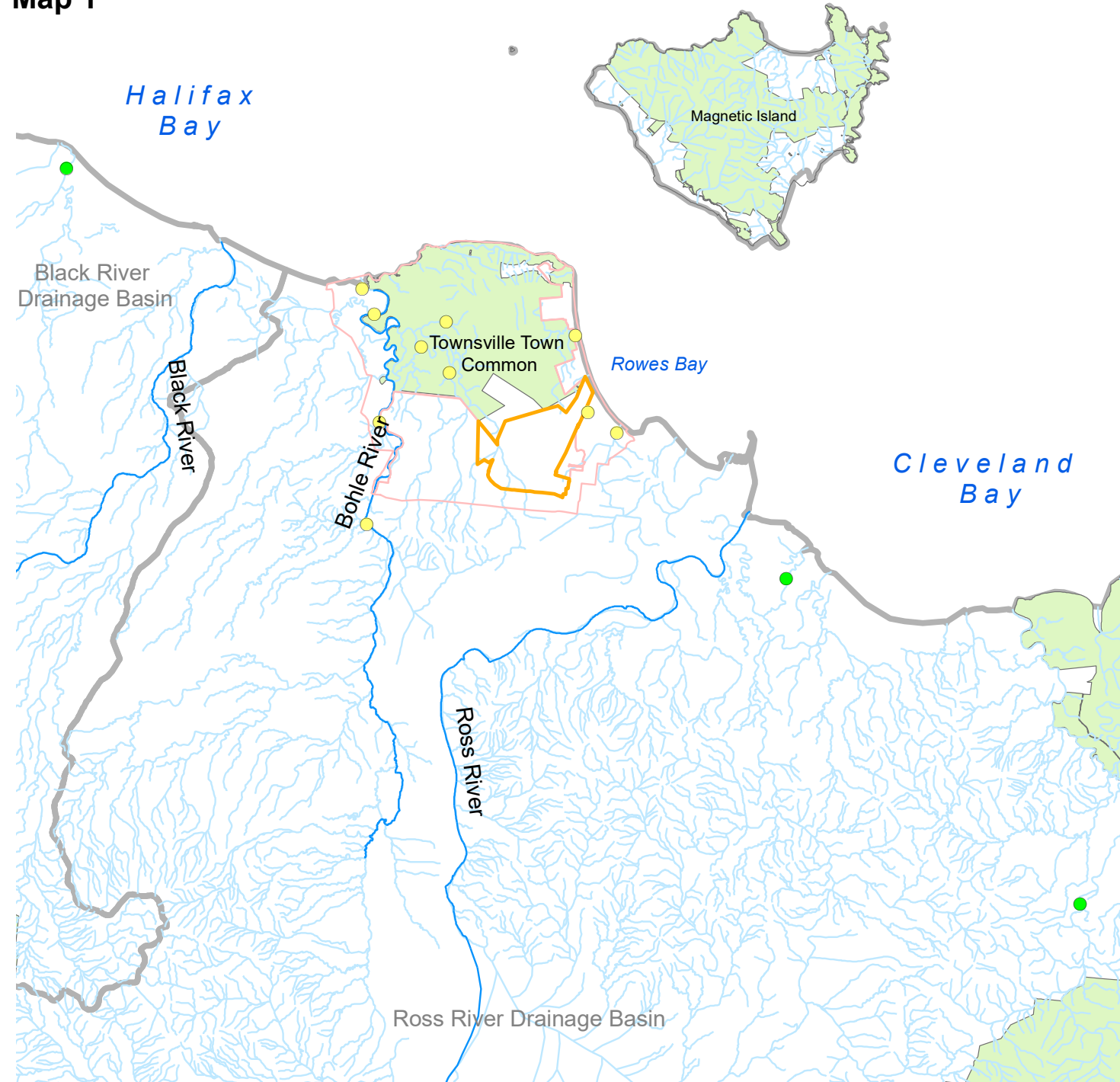
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Attachment A Maps



Map 1



Legend

Survey Sites

- Comparative
- Investigation
- Townsville Airport
- Investigation Area (IA)
- Major_watercourse_lines
- Watercourse 100k
- QPWS Protected Areas
- Drainage basin

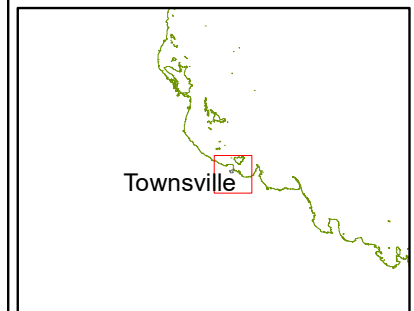
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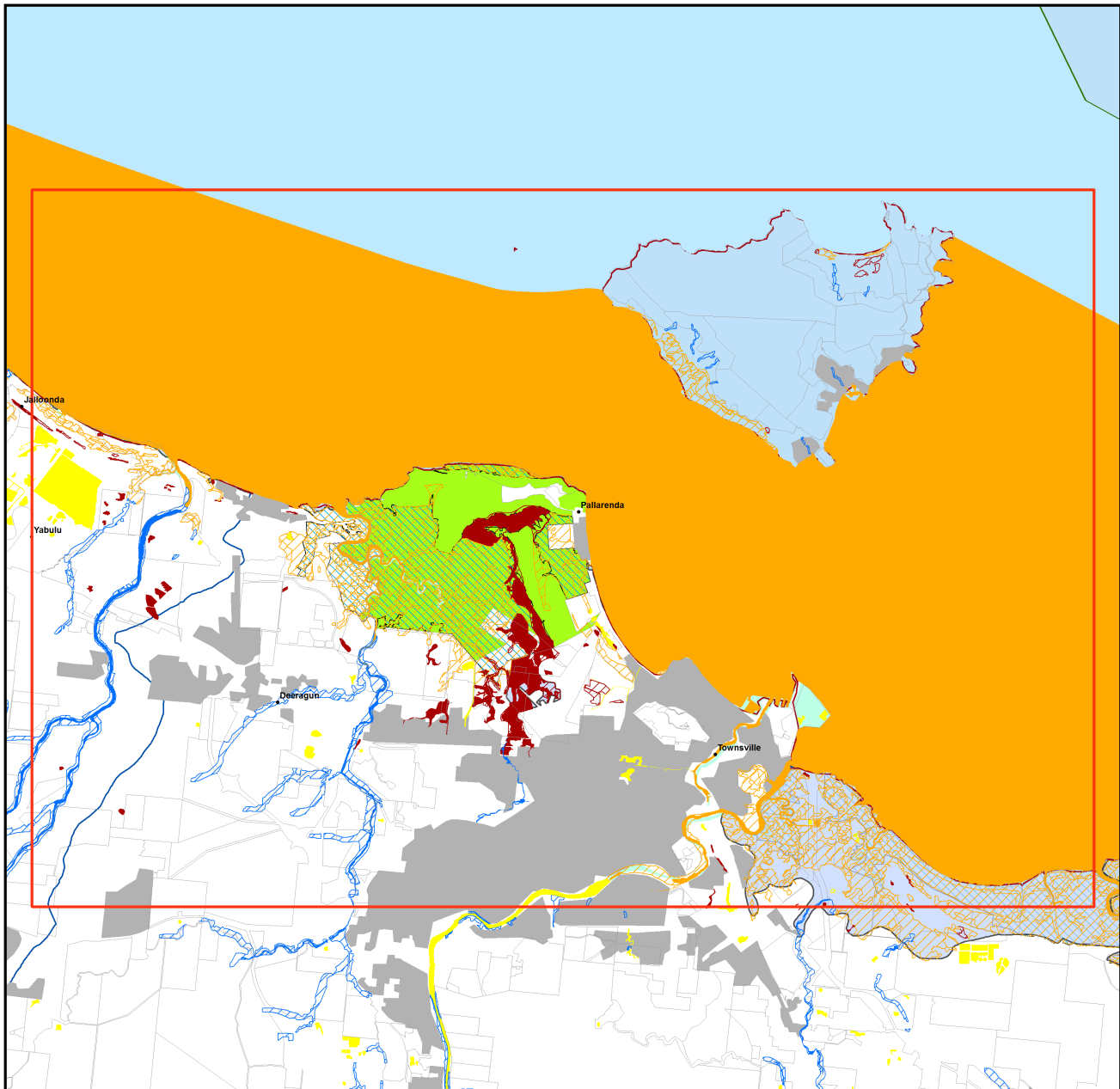
Project Number: 1658
Author: SW
Date: 9/18/2017
Datum: GDA 1994

Data Sources:
© State of Queensland 2017

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Map 2



Legend

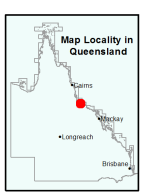
WB	RE	
		Marine System (e.g. open ocean)
		Estuarine System (e.g. mangroves, salt flats and estuaries)
		Riverine System (e.g. river and creek channels)
		Lacustrine System (e.g. lakes)
		Palustrine System (e.g. vegetated swamps)
		Springs
		Riverine System Drainage Lines
		Remnant Regional Ecosystem 51-80% Wetland (mosaic units)
		Nominated Area of Interest

For the purposes of mapping and classification, are:
"Areas of permanent or periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6m. To be a wetland the area must have one or more of the following attributes:
i. at least periodically the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or
ii. the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or
iii. the substratum is not soil and is saturated with water, the substratum is or covered by water at some time."

Other features

- Towns
- Cadastral boundaries
- Roads
- Major Roads
- Built-up areas of QLD
- Ocean Areas

Queensland Wetland Map



Further information on wetland mapping (including methodology and digital data) is available from: www.wetlandinfo.ehp.qld.gov.au

Accuracy Information

The positional accuracy of wetland data mapped at a scale of 1:100 000 is +/- 100m with a minimum polygon size of 5ha or 75m wide for linear features, except for areas along the east coast which are mapped at the 1:50 000 scale with a positional accuracy of +/- 50m, with a minimum polygon size of 1ha or 35m wide for linear features. Wetlands smaller than 1ha are not delineated on the wetland data. Consideration of the effects of mapped scale is necessary when interpreting data at a larger scale, eg. 1:25,000. For property assessment, digital line work should be used as a guide only.
The extent of wetlands depicted on this map is based on rectified 2009 Landsat ETM+ imagery supplied by Statewide Landcover and Trees Study (SLATS), Department of Science, Information Technology, Innovation and the Arts (DSITIA). The extent of water bodies is based on the maximum extent of inundation derived from available Landsat imagery up to and including the 2009 imagery.

Data Sources

Water body mapping derived from satellite imagery, DSITIA; Regional Ecosystem mapping, DSITIA; drainage mapping, Geoscience Australia (GA), Department of Defence, DNRM; towns and built up areas GA, 2003; coastline, GA, 2004; Queensland 3NM Limit, Australian Maritime Boundaries Information System (AMBIS), GA, 2001; Digital Cadastral Database (DCDB) DNRM, July 2011; springs database, Queensland Herbarium, 2011; SRTM 90m DEM USGS/NASA, 2006. Landsat ETM+ imagery supplied by the Australian Centre for Remote Sensing (ACRES), Australian Surveying and Land Information Group (AUSLIG), Canberra. The satellite imagery used in this product has been pre-processed by SLATS, DSITIA.

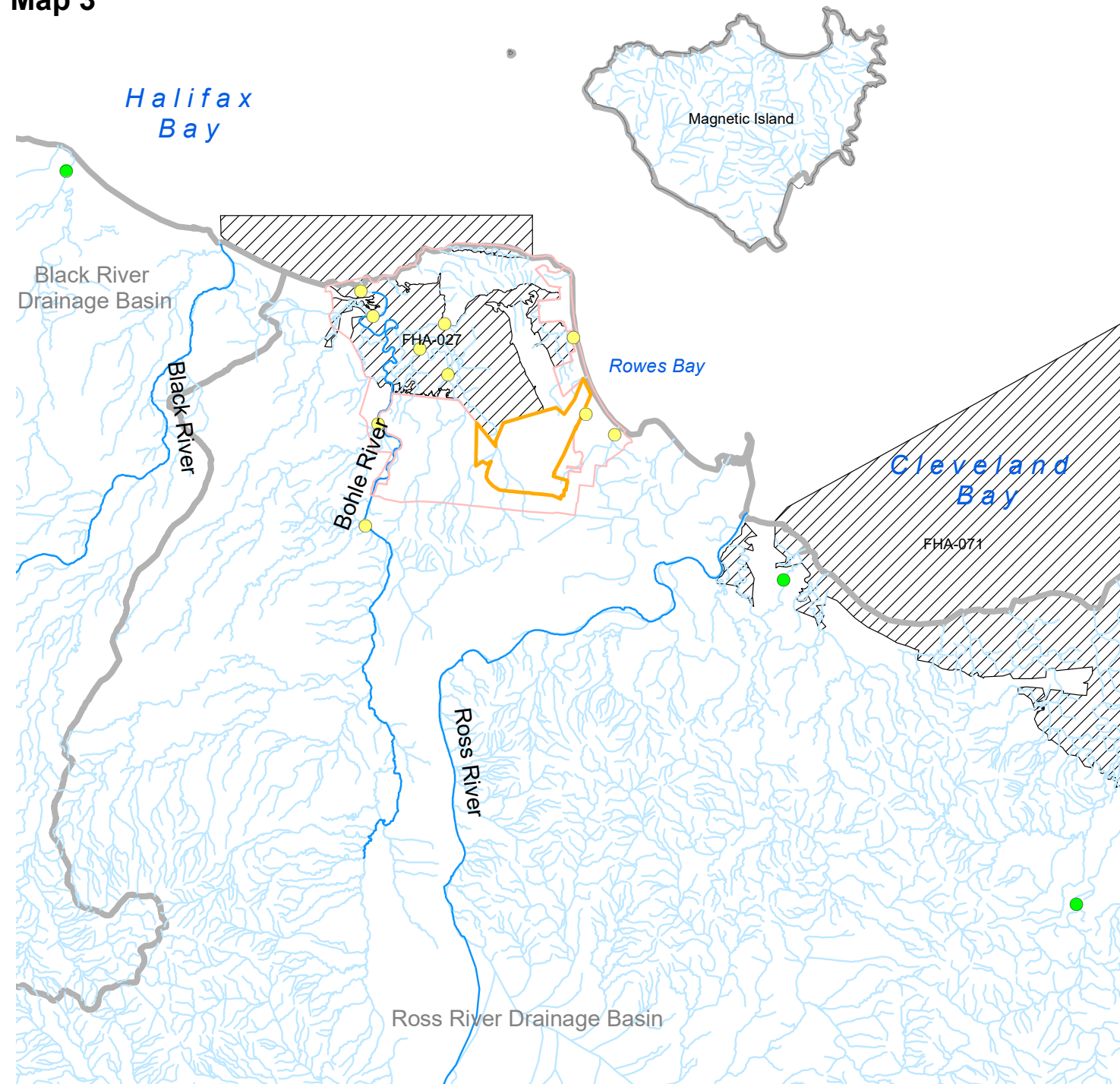
Disclaimer

While every care is taken to ensure the accuracy of this product, the Queensland Government and Australian Government make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a consequence of reliance on the product, or as a result of the product being inaccurate or incomplete in any way and for any reason.

Based on data from November 2011 © The State of Queensland 2017

Horizontal Datum: Geographic Datum of Australia 1994 (GDA94)

Map 3



Legend

SurveySites

- Comparative
- Investigation
- Townsville Airport
- Investigation Area (IA)
- Major_watercourse_lines
- Watercourse 100k
- Drainage basin
- Fish Habitat Areas

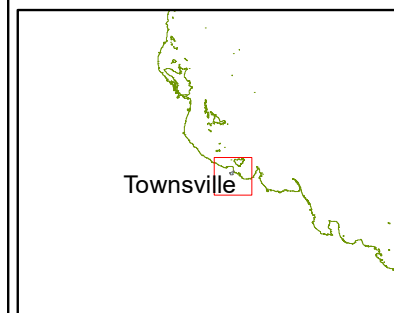
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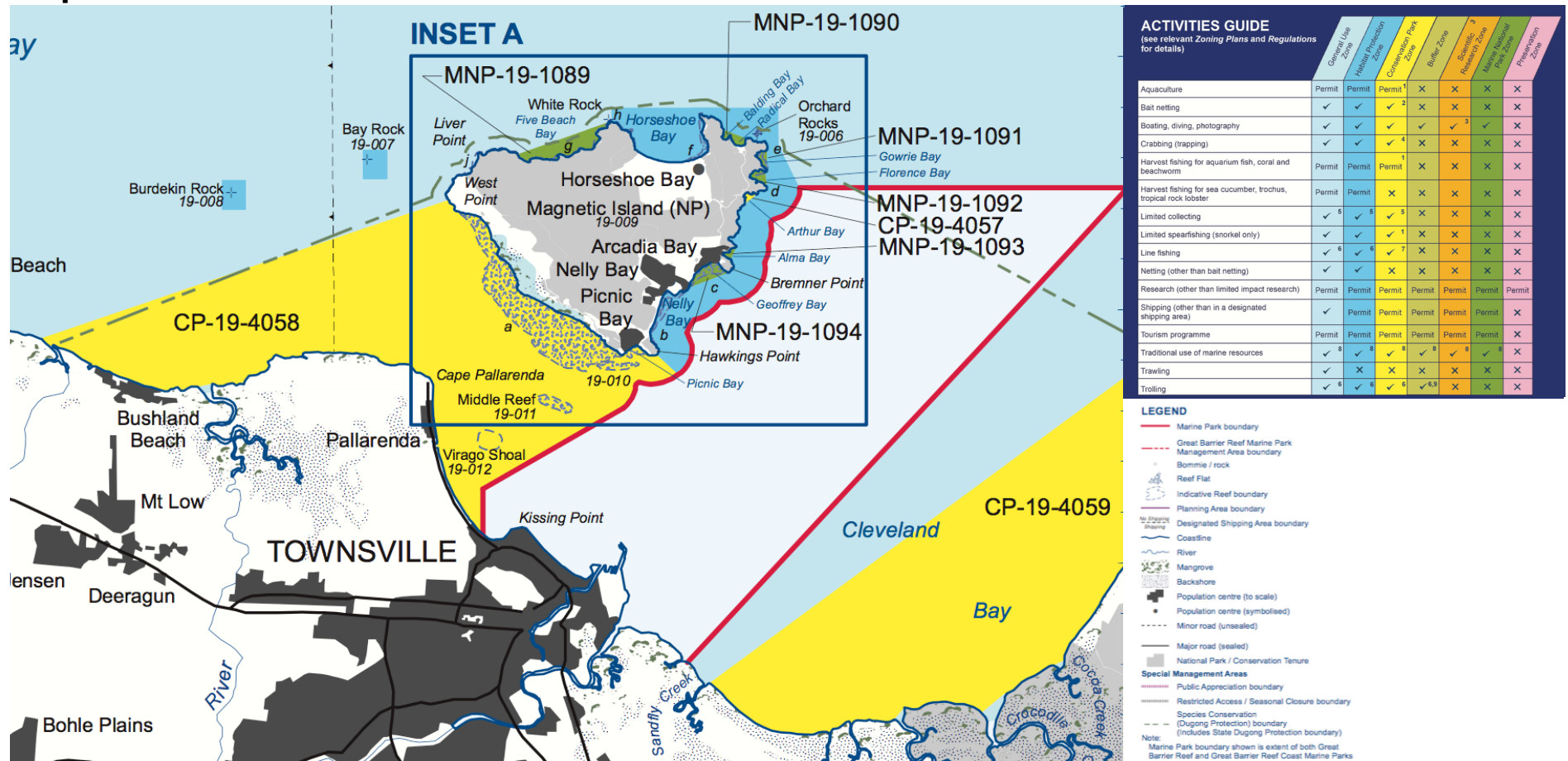
Project Number: 1658
Author: SW
Date: 9/18/2017
Datum: GDA 1994

Data Sources:
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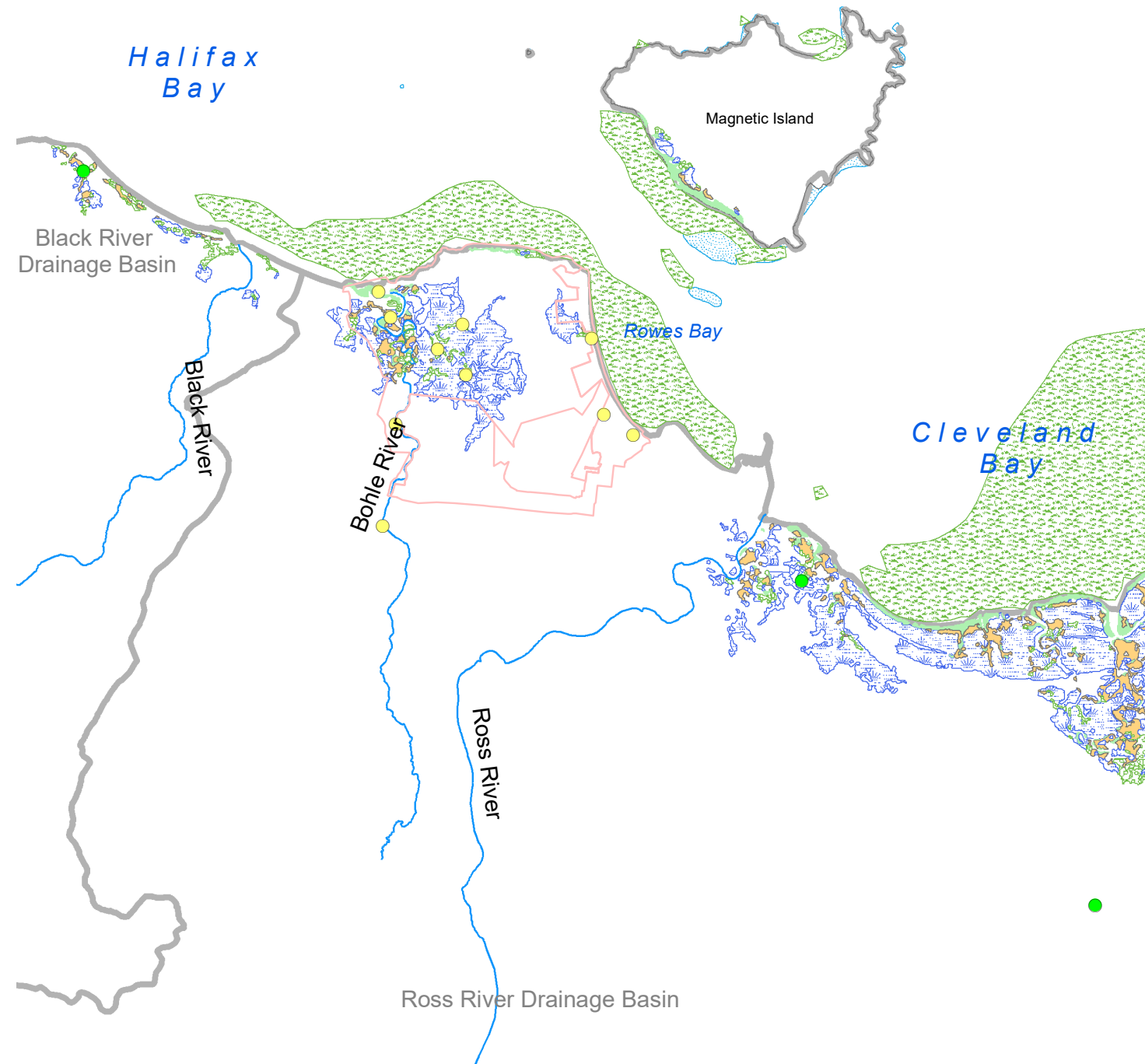


Map 4



Extracted from GBRMPA Zoning Map 7 - Townsville

Map 5



Legend

Survey Sites

- Comparative
- Investigation

Investigation Area (IA)

Marine Plants

- Closed Bruguiera
- Closed Ceriops
- Closed Mixed
- Closed Rhizophora
- Saltpan
- Inshore Seagrass1985_2007
- Reef and shoals
- Major Watercourse Lines
- ▭ Drainage basin

0 1 2 4 6
Kilometers



Project Number: 1658

Author: SW

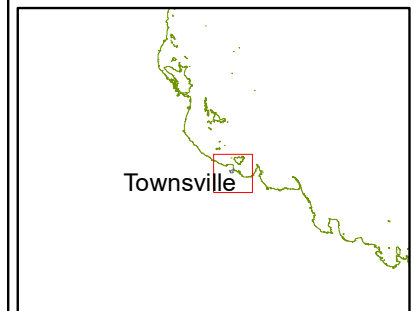
Date: 9/18/2017

Datum: GDA 1994

Data Sources:

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Attachment B Occurrence and Conservation Status of Fauna Present in the IA and Region



Table 6.1 Common fish species previously recorded in the search area (Wildlife Online database) and during this survey, and their likelihood of occurrence in the IA (Town Common Conservation Park / Bohle River) and offshore waters (Halifax / Cleveland / Rowes Bay).

Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in:	
				The Town Common Conservation Park / Bohle River	Halifax / Cleveland / Rowes Bay
FISH					
Ambassidae	<i>Ambassis agrammus</i>	sailfin glassfish	d, e	Confirmed in the freshwater reaches of the Bohle River.	Does not occur (freshwater species).
	<i>Ambassis macleayi</i>	Macleay's glassfish	d	May occur in the freshwater reaches of the Bohle River / Town Common.	Does not occur (freshwater species).
	<i>Ambassis nalua</i>	scalloped glassfish	d, e	Confirmed in the estuarine reaches of The Common and Bohle River.	May occur near creek / river mouths.
Anguillidae	<i>Anguilla reinhardtii</i>	longfin eel	d, e	Confirmed in Alligator Ck freshwaters. Likely to occur in the freshwater reaches of the Bohle River and the freshwater wetlands of The Common.	May occur only during spawning migration and when juveniles are moving into freshwater habitats.
Apogonidae	<i>Glossamia aprion</i>	mouth almighty	d, e	Confirmed in Alligator Creek freshwaters. May occur in the freshwater reaches of the Bohle River and the freshwater wetlands of The Common.	Does not occur (freshwater species).



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in: The Town Common Conservation Park / Bohle River	Halifax / Cleveland / Rows Bay
Ariidae	<i>Arius graffei</i>	salmon / blue catfish	e	Confirmed in the Town Common.	Although can tolerate estuarine conditions, highly unlikely to occur in open coastal waters.
Atherinidae	<i>Craterocephalus stercusmuscarum</i>	flyspecked hardyhead	d, e	Confirmed in freshwater habitat of Bohle River. May occur in freshwater habitats of the Town Common.	Does not occur (freshwater species).
Belonidae	<i>Strongylura krefftii</i>	freshwater longtom	d	May occur in the freshwater reaches of the Bohle River.	Does not occur (freshwater species).
Carangidae	<i>Scomberoides tol</i>	queenfish	e	Confirmed in estuarine reaches of the Town Common and likely to frequent the estuarine reaches of the Bohle River. Recreationally important species for sport fishers.	Likely to occur and recreationally important species for sport fishers.
Centropomidae	<i>Lates calcarifer</i>	barramundi	d	Known to occur and of recreational and commercial importance.	Known to occur and of recreational and commercial importance.
Cichlidae	<i>Oreochromis mossambicus</i>	Mozambique mouthbrooder ^a	d	Known to occur in freshwater habitats of the Bohle River. May occur in freshwater habitats of the Town Common.	Does not occur in open coastal waters (freshwater / brackish species).



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in:	
				The Town Common Conservation Park / Bohle River	Halifax / Cleveland / Rows Bay
	<i>Tilapia mariae</i>	spotted tilapia ^a	d	Known to occur in freshwater habitats of the Bohle River. May occur in freshwater habitats of the Town Common.	Does not occur in open coastal waters (freshwater / brackish species).
	<i>Amatitlania nigrofasciata</i>	convict cichlid ^b	d	Known to occur in freshwater habitats of the Bohle River. May occur in freshwater habitats of the Town Common.	Does not occur in open coastal waters (freshwater / brackish species).
	<i>Amphilophus labiatus</i>	red devil ^b	d	Known to occur in freshwater habitats of the Bohle River. May occur in freshwater habitats of the Town Common.	Does not occur in open coastal waters (freshwater / brackish species).
Clupeidae	<i>Anodontostoma chacunda</i>	gizzard shad	e	Confirmed in the estuarine reaches of the Town Common and Bohle River.	May occur in nearshore coastal waters.
	<i>Herklotsichthys castelnaui</i>	southern herring	e	Confirmed in Althaus Creek but likely to occur in the estuarine reaches of the Town Common and Bohle River.	May occur in nearshore coastal waters.
	<i>Nematalosa erebi</i>	bony bream	d	Known to occur in freshwater habitats of the Bohle River.	Does not occur (freshwater species).



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in: The Town Common Conservation Park / Bohle River	Halifax / Cleveland / Rows Bay
Eleotridae	<i>Giurus margaritacea</i>	snakehead gudgeon	d	Known to occur in the freshwater habitats of the Bohle River. May occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
	<i>Hypseleotris compressa</i>	empire gudgeon	d, e	Confirmed in freshwater habitats of Alligator Creek and the Bohle River.	Does not occur (freshwater species).
	<i>Hypseleotris galii</i>	firetail gudgeon	d	Known to occur in the freshwater habitats of the Bohle River. May occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
	<i>Hypseleotris species 1</i>	Midgley's carp gudgeon	d	Known to occur in the freshwater habitats of the Bohle River. May occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
	<i>Mogurnda adspersa</i>	southern purple-spotted gudgeon	d	Known to occur in the freshwater habitats of the Bohle River. May occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
	<i>Mogurnda mogurnda</i>	northern purple-spotted gudgeon	d	Known to occur in the freshwater habitats of the Bohle River. May	Does not occur (freshwater species).



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in: The Town Common Conservation Park / Bohle River	Halifax / Cleveland / Rows Bay
				occur in the freshwater habitats of the Town Common.	
	<i>Oxyeleotris lineolata</i>	sleepy cod	d	Known to occur in the freshwater habitats of the Bohle River. May occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
	<i>Ophiocara porocephala</i>	spangled gudgeon	d	Known to occur in the freshwater habitats of the Bohle River. May occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
Gerreidae	<i>Gerres filamentosus</i>	threadfin silver biddy	e	Confirmed in the estuarine reaches of the Town Common and Bohle River.	May occur in nearshore coastal waters.
Gobiidae	<i>Redigobius bikolanus</i>	speckled goby	d	Known to occur in the freshwater reaches of the Bohle River.	Does not occur (freshwater species).
	<i>Glossogobius illimis</i>	false celebes goby	d	Known to occur in the freshwater reaches of the Bohle River.	Does not occur (freshwater species).
Haemulidae	<i>Pomadasys argenteus</i>	silver javelin	e	Confirmed in the estuarine reaches of the Town Common and Bohle River.	May occur in nearshore coastal waters.



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in: The Town Common Conservation Park / Bohle River Halifax / Cleveland / Rowes Bay	
Leiognathidae	<i>Leiognathus equulus</i>	ponyfish	e	Confirmed in the estuarine reaches of the Town Common and Bohle River.	May occur in nearshore coastal waters.
Lutjanidae	<i>Lutjanus argentimaculatus</i>	mangrove jack ^c	d	Known to occur in estuarine reaches of the Town Common and Bohle River.	Known to occur.
	<i>Lutjanus russelli</i>	moses perch	e	Confirmed in the estuarine reaches of the Town Common and Bohle River.	Known to occur.
Megalopidae	<i>Megalops cyprinoides</i>	oxeye herring	d	Known to occur in the estuarine reaches of the Town Common and Bohle River.	Likely to occur in open coastal waters.
Melanotaeniidae	<i>Melanotaenia splendida splendida</i>	eastern rainbowfish	d, e	Confirmed at freshwater habitats of the Bohle River and Alligator Creek.	Does not occur (freshwater species).
Mugilidae	<i>Mugil cephalus</i>	mullet ^c	e	Known to occur in estuarine reaches of the Town Common and Bohle River.	Known to occur in open coastal waters.
Percichthyidae	<i>Macquaria novemaculeata</i>	Australian bass ^c	d	Known to occur in the freshwater habitats of the Bohle River. May occur in the freshwater habitats of	Does not occur (freshwater species).



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in: The Town Common Conservation Park / Bohle River Halifax / Cleveland / Rows Bay	
				the Town Common. May occur in estuarine reaches of the Bohle River and Town Common – spawn in brackish estuarine waters.	
Plotosidae	<i>Neosilurus ater</i>	black catfish	d	Known to occur	Does not occur in open coastal waters (freshwater / brackish species).
	<i>Porochilus rendahli</i>	Rendahli's catfish	d	Known to occur	Does not occur (freshwater species).
Poeciliidae	<i>Gambusia holbrooki</i>	mosquitofish ^a	d	Known to occur	Does not occur (freshwater species).
	<i>Poecilia reticulata</i>	guppy	d	Known to occur	Does not occur (freshwater species).
Pseudomugilidae	<i>Pseudomugil signifer</i>	Pacific blue eye	d, e	Known to occur	Does not occur (freshwater species).
Serranidae	<i>Epinephelus malabaricus</i>	blackspotted rock cod	e	Confirmed at most estuarine sites	May occur in nearshore coastal waters.
Sillaginidae	<i>Sillago sihama</i>	northern whiting _c	e	Confirmed at one estuarine site	Likely to occur in open coastal waters.



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in: The Town Common Conservation Park / Bohle River Halifax / Cleveland / Rows Bay	
Sparidae	<i>Acanthopagrus australis</i>	yellowfin bream ^c	e	Confirmed in the Town Common and Bohle River.	Known to occur in open coastal waters.
Sphyrnidae	<i>Sphyrna lewini</i>	scalloped hammerhead	d	Known to occur	Known to occur in open coastal waters.
Terapontidae	<i>Amniataba percooides</i>	barred grunter	d	Known to occur	Does not occur (freshwater species).
	<i>Leiopotherapon unicolor</i>	spangled perch	d	Known to occur	Does not occur (freshwater species).
Toxotidae	<i>Toxotes chatareus</i>	sevenspot archerfish	a, b	Confirmed in estuarine reaches of the Town Common and Bohle River.	May occur in nearshore coastal waters.
	<i>Toxotes jaculatrix</i>	banded archerfish	d, e	Confirmed in estuarine reaches of the Town Common and Bohle River.	May occur in nearshore coastal waters.
CRUSTACEANS					
Portunidae	<i>Scylla serrata</i>	mud crab ^c	e	Confirmed in estuarine reaches of the Town Common and Bohle River.	May occur in nearshore coastal waters.



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in: The Town Common Conservation Park / Bohle River Halifax / Cleveland / Rows Bay	
Penaeidae	<i>Fenneropenaeus merguensis</i>	gulf banana prawn ^c	e	Confirmed in estuarine reaches of the Town Common and Bohle River.	May occur in nearshore coastal waters.
Palaemonidae	<i>Macrobrachium sp.</i>	freshwater prawn	e	Confirmed in freshwater habitats of Alligator Creek. May occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
REPTILES					
Chelidae	<i>Chelodina canni</i>	Cann's longneck turtle	d	Known to occur in the freshwater habitats of the Bohle River and may occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
	<i>Elseya irwini</i>	Irwin's turtle	d	Known to occur in the freshwater habitats of the Bohle River and may occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
	<i>Wollumbinia latisternum</i>	saw-shelled turtle	d	Known to occur in the freshwater habitats of the Bohle River and may occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in: The Town Common Conservation Park / Bohle River	Halifax / Cleveland / Rowes Bay
	<i>Emydura macquarii macquarii</i>	Murray turtle	d	Known to occur in the freshwater habitats of the Bohle River and may occur in the freshwater habitats of the Town Common.	Does not occur (freshwater species).
	<i>Emydura macquarii krefftii</i>	Krefft's river turtle	d, e	Confirmed in Alligator Creek and may to occur in freshwater habitats of the Town Common.	Does not occur (freshwater species).
	<i>Chelonia mydas</i>	green turtle	d	May infrequently occur in estuarine reaches of the Town Common and Bohle River.	Likely to occur in nearshore coastal waters.
SHARKS / RAYS					
Aetobatidae	<i>Aetobatus ocellatus</i>	white-spotted eagle ray	d	May infrequently occur in the estuarine habitats of the Bohle River and the Town Common.	Likely to occur in nearshore and open coastal waters.
Sphyrnidae	<i>Sphyrna lewini</i>	scalloped hammerhead	d	May infrequently occur infrequently in the estuarine reaches of the Town Common or Bohle River.	Likely to occur in nearshore and open coastal waters.
MAMMALS					



Family	Species	Common Name	Townsville Town Common (within 10 km buffer)	Likelihood of Occurrence in:	
				The Town Common Conservation Park / Bohle River	Halifax / Cleveland / Rowes Bay
Physeteridae	<i>Physeter macrocephalus</i>	sperm whale	d	Not likely to occur in the estuarine reaches of the Town Common or Bohle River.	May occur in open coastal waters.

- a species listed as noxious under the *Biosecurity Act 2014*. d recorded in the area previously – extracted from Wildlife Online (DEHP 2017).
- b exotic species e caught by ESP during the PFAS Investigation in July 2017.
- c species of importance to commercial or recreational fisheries



Table 6.2 Threatened aquatic reptile, shark / ray and mammal species potentially occurring in the region based on the EPBC Act Protected Matters Search Tool, and their likelihood of occurrence in the Town Common / Bohle River and Halifax / Cleveland / Rows Bay.

Family	Species	Common Name	Conservation Status under the EPBC Act ^a	Conservation Status under the NC Act ^b	Likelihood of Occurrence in ^c :	
					The Town Common / Bohle River	Halifax / Cleveland / Rows Bay
REPTILES						
Cheloniidae	<i>Caretta caretta</i>	loggerhead turtle	E, M	E	Unlikely to occur (no records, lack of key habitat)	Likely to occur (suitable habitat and records nearby)
	<i>Chelonia mydas</i>	green turtle	V, M	V	Unlikely to occur (no records, lack of key habitat)	Known to occur
	<i>Eretmochelys imbricata</i>	hawksbill turtle	V, M	E	Unlikely to occur (no records, lack of key habitat)	Known to occur
	<i>Lepidochelys olivacea</i>	olive / Pacific Ridley turtle	E, M	E	Unlikely to occur (no records, lack of key habitat)	May occur (records in north Queensland region)
	<i>Natator depressus</i>	flatback turtle	V, M	V	Unlikely to occur (no records, lack of key habitat)	Known to occur
Dermochelyidae	<i>Dermochelys coriacea</i>	leatherback / leathery turtle	E, M	E	Unlikely to occur (no records, lack of key habitat)	Known to occur
Crocodylidae	<i>Crocodylus porosus</i>	saltwater / estuarine crocodile	M	V	Known to occur (key habitat for this species)	Known to occur



Family	Species	Common Name	Conservation Status under the EPBC Act ^a	Conservation Status under the NC Act ^b	Likelihood of Occurrence in ^c :	
					The Town Common / Bohle River	Halifax / Cleveland / Rowes Bay
SHARKS / RAYS						
Lamnidae	<i>Carcharodon carcharius</i>	great white shark	V, M	—	Unlikely to occur (no records, lack of key habitat)	May occur seasonally (records in north Queensland region)
	<i>Lamna nasus</i>	mackerel shark	M	—	Unlikely to occur (no records, lack of key habitat)	Unlikely to occur (records in north Queensland region for offshore waters only)
Mobulidae	<i>Manta alfredi</i>	reef manta ray	M	—	Unlikely to occur (no records, lack of key habitat)	Known to occur
	<i>Manta birostris</i>	giant manta ray	M	—	Unlikely to occur (no records, lack of key habitat)	May occur (records in north Queensland region)
Pristidae	<i>Anoxypristis cuspidata</i>	narrow / knifetooth sawfish	M	—	May occur (suitable habitat, record nearby)	May occur (suitable habitat, record nearby)
	<i>Pristis pristis</i>	freshwater sawfish	V, M	—	May occur (suitable habitat, record nearby)	May occur (suitable habitat, record nearby)
	<i>Pristis zijsron</i>	green sawfish	V, M	—	May occur (suitable habitat, record nearby)	May occur (suitable habitat, record nearby)



Family	Species	Common Name	Conservation Status under the EPBC Act ^a	Conservation Status under the NC Act ^b	Likelihood of Occurrence in ^c :	
					The Town Common / Bohle River	Halifax / Cleveland / Rowes Bay
Rhincodontidae	<i>Rhincodon typus</i>	whale shark	V, M	–	Unlikely to occur (no records, lack of key habitat)	May occur (suitable habitat, record nearby)
MAMMALS						
Balaenopteridae	<i>Balaenoptera edeni</i>	Bryde's whale	M, C	–	Unlikely to occur (no records, lack of key habitat)	Unlikely to occur (no records in Townsville region)
	<i>Balaenoptera musculus</i>	blue whale	E, M, C	–	Unlikely to occur (no records, lack of key habitat)	Unlikely to occur (no records in Townsville region, likely to occur further offshore)
	<i>Megaptera novaeangliae</i>	humpback whale	V, M, C	V	Unlikely to occur (no records, lack of key habitat)	Known to occur
Delphinidae	<i>Orcaella heinsohni</i> ^d	Australian snubfin dolphin	M, C	V	May occur (suitable habitat near mouth, records nearby)	Known to occur
	<i>Orcinus orca</i>	killer whale	M, C	–	Unlikely to occur (no records, lack of key habitat)	Unlikely to occur (no records in Townsville region, likely to occur further offshore)



Family	Species	Common Name	Conservation Status under the EPBC Act ^a	Conservation Status under the NC Act ^b	Likelihood of Occurrence in ^c :	
					The Town Common / Bohle River	Halifax / Cleveland / Rows Bay
	<i>Sousa sahalensis</i> ^e	Indo-pacific humpback dolphin	M, C	V	May occur (suitable habitat near mouth, records nearby)	Known to occur
Dugongidae	<i>Dugong dugon</i>	dugong	M	V	May occur on occasion (but lack of key habitat)	Known to occur

a status of species under the EPBC Act; V – vulnerable, E – endangered, M – migratory, C – cetacean

b status of species under Queensland's NCWR; V – vulnerable, E – endangered

c based on records presented in the Atlas of Living Australia (ALA 2017) and professional judgement

d formerly *Orcaella brevirostris*

e formerly *Sousa chinensis*



Attachment C Photographs of Species Retained for Laboratory Analysis



Table 6.3 Biota species common / species name and the tissue sample type(s) analysed.



Mullet (*Mugil cephalus*), flesh, liver and whole individual samples.



Bream (*Acanthopagrus australis*), flesh, liver and whole individual samples.



Whiting (*Sillago* sp.), flesh sample.



Gizzard shad (*Anodontostoma chacunda*), whole individual and composite samples.



Southern herring (*Herklotsichthys castelnaui*), composite sample.



Silver biddy (*Gerres filamentosus*), whole individual and composite samples.





Silver javelin (*Pomadasys argenteus*), whole individual and composite samples.



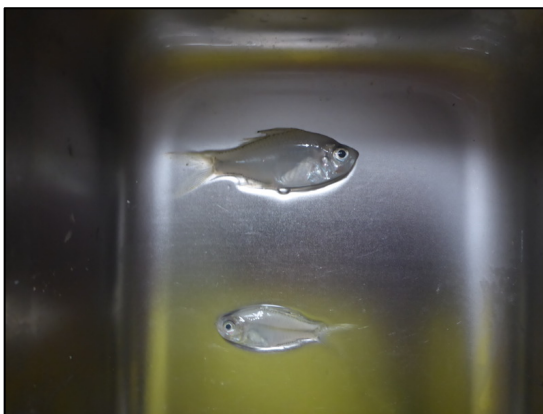
Moses perch (*Lutjanus russelli*), whole individual samples.



Ponyish (*Leiognathus equulus*), whole individual and composite samples.



Queenfish (*Scomberoides tol*), flesh sample.



Glassfish (estuarine) (*Ambassis nalua*), whole individual and composite samples.



Glassfish (freshwater) (*Ambassis agrammus*), composite samples.





Eastern rainbowfish (*Melanotaenia splendida splendida*), composite samples.



Freshwater prawn (*Macrobrachium* sp.), composite samples.



Mud crab (*Scylla serrata*), flesh samples.



Unidentified barnacle (*Cirripedia* sp.), composite sample.



Shrubby samphire (*Halosarcia* spp.), composite samples collected.



Oyster (*Saccostrea* sp.), composite samples collected.



Attachment D Laboratory Certificates of Analysis



CERTIFICATE OF ANALYSIS

Work Order : **ES1717792**
Client : **ECOLOGICAL SERVICE PROFESSIONALS**
Contact : AARON DUNLOP
Address : PO BOX 5935
 MANLY NSW, AUSTRALIA 4179
Telephone : ----
Project : 1658
Order number : ----
C-O-C number : ----
Sampler : AARON DUNLOP
Site : ----
Quote number : SY/115/17 V3
No. of samples received : 80
No. of samples analysed : 80

Page : 1 of 35
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 19-Jul-2017 12:30
Date Analysis Commenced : 24-Jul-2017
Issue Date : 09-Aug-2017 14:46



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
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW



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.

- EP231X: Various analytes fail ALS Static control limit range of 70%-130% as there is insufficient historical data for use of ALS Dynamic control limits.
- EP231X: ALS is not NATA accredited for the analysis of PFAS in biota when performed under ALS Method EP231X.
- EP231X: Poor matrix recovery on QC sample due to suspected matrix effects and non-target peak interferences.



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO001_GFC_17 0717	0874_BO001_RFC_17 0717	0874_BO002_MIF_170 716	0874_BO002_MIL_170 716	0874_BO002_M2_170 716
Client sampling date / time				17-Jul-2017 00:00	17-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-001	ES1717792-002	ES1717792-003	ES1717792-004	ES1717792-005
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	5.1	7.1	28.2	1.1	17.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	2	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	11.4	14.2	7.9	35.1	52.3
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	2.6	2.8	1.1	9.9	7.7
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	14	17	9	45	60
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5	<1	1	1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	4	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO001_GFC_17 0717	0874_BO001_RFC_17 0717	0874_BO002_MIF_170 716	0874_BO002_MIL_170 716	0874_BO002_M2_170 716
Client sampling date / time				17-Jul-2017 00:00	17-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-001	ES1717792-002	ES1717792-003	ES1717792-004	ES1717792-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	112	104	91.2	98.1	125



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO002_M3_170 716	0874_BO002_M4_170 716	0874_BO002_M5_170 716	0874_BO002_B1_170 716	0874_BO002_B2_170 716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-006	ES1717792-007	ES1717792-008	ES1717792-009	ES1717792-010
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	17.2	23.1	12.0	125	14.4
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	39.9	72.4	27.0	9.8	21.3
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	7.1	7.6	2	0.2	2.7
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	47	83	29	10	24
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO002_M3_170 716	0874_BO002_M4_170 716	0874_BO002_M5_170 716	0874_BO002_B1_170 716	0874_BO002_B2_170 716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-006	ES1717792-007	ES1717792-008	ES1717792-009	ES1717792-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	128	118	104	116	121



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO002_RC_170 716	0874_BO002_UFI_170 716	0874_BO002_BS1_17 0716	0874_BO002_GFC_17 0716	0874_BO002_PFC_17 0716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-011	ES1717792-012	ES1717792-013	ES1717792-014	ES1717792-015
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	17.7	5.0	3.8	6.8	44.8
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	2	<1	<1	5	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	137	5.9	33.4	86.9	63.2
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	15	1.1	2.6	9.1	4.8
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	152	7	36	96	68
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO002_RC_170 716	0874_BO002_UFI_170 716	0874_BO002_BS1_17 0716	0874_BO002_GFC_17 0716	0874_BO002_PFC_17 0716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-011	ES1717792-012	ES1717792-013	ES1717792-014	ES1717792-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	118	128	119	90.5	113



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO002_PC_170 716	0874_BO002_C1_170 716	0874_BO003_C1_170 714	0874_BO003_C2_170 714	0874_BO003_C3_170 714
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-016	ES1717792-017	ES1717792-018	ES1717792-019	ES1717792-020
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	16.8	21.1	36.5	21.1	9.3
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	6	1	<1	<1	1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	54.6	2.9	<0.5	<0.5	2.4
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	4.4	0.1	<0.5	<0.5	0.6
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	59	3	<1	<1	3
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO002_PC_170 716	0874_BO002_C1_170 716	0874_BO003_C1_170 714	0874_BO003_C2_170 714	0874_BO003_C3_170 714
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-016	ES1717792-017	ES1717792-018	ES1717792-019	ES1717792-020
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	108	126	125	121	121



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO003_SAM_17 0714	0874_BO004_C1_170 714	0874_BO004_C2_170 714	0874_BO004_C3_170 714	0874_BO004_OCF_17 0714
Client sampling date / time				14-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-021	ES1717792-022	ES1717792-023	ES1717792-024	ES1717792-025
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Seaweed	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	81.5	40.1	39.0	30.8	5.5
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTeDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO003_SAM_17 0714	0874_BO004_C1_170 714	0874_BO004_C2_170 714	0874_BO004_C3_170 714	0874_BO004_OCF_17 0714
Client sampling date / time				14-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-021	ES1717792-022	ES1717792-023	ES1717792-024	ES1717792-025
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	91.0	86.0	90.0	95.0	90.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO004_OCS_17 0714	0874_BO005_M1_170 715	0874_BO005_UFC_17 0715	0874_BO005_PFC_17 0715	0874_BO005_C1_170 715
Client sampling date / time				14-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-026	ES1717792-027	ES1717792-028	ES1717792-029	ES1717792-030
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	22.2	88.0	29.4	13.8	20.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	2	1	2	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	110	54.0	145	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	13	5	15	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	123	59	160	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	3	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO004_OCS_17 0714	0874_BO005_M1_170 715	0874_BO005_UFC_17 0715	0874_BO005_PFC_17 0715	0874_BO005_C1_170 715
Client sampling date / time				14-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-026	ES1717792-027	ES1717792-028	ES1717792-029	ES1717792-030
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	1	1	2	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	96.0	95.0	94.0	91.0	94.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO005_C2_170 715	0874_BO005_C3_170 715	0874_BO005_BARNF_ 170715	0874_BO005_SAM_17 0715	0874_BO006_BIL_170 715
Client sampling date / time				15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-031	ES1717792-032	ES1717792-033	ES1717792-034	ES1717792-035
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Seaweed	Fish
Ø Weight of Sample Prepared	----	0.1	g	41.5	21.8	12.4	41.9	1.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	1	<1	1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	0.5	<0.5	45.9	0.5	70.6
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	8.10	<0.5	7.4
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	54	<1	78
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO005_C2_170 715	0874_BO005_C3_170 715	0874_BO005_BARNF_ 170715	0874_BO005_SAM_17 0715	0874_BO006_BIL_170 715
Client sampling date / time				15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-031	ES1717792-032	ES1717792-033	ES1717792-034	ES1717792-035
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	91.0	95.0	96.0	95.0	90.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO006_BIF_170 715	0874_BO006_C1_170 715	0874_BO006_C2_170 715	0874_BO006_C3_170 715	0874_BO006_C4_170 715
Client sampling date / time				15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-036	ES1717792-037	ES1717792-038	ES1717792-039	ES1717792-040
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	26.0	7.3	26.6	35.8	17.5
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	2.0	1.0	0.7	<0.5	3.6
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	0.4
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	2	1	<1	<1	4
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO006_BIF_170 715	0874_BO006_C1_170 715	0874_BO006_C2_170 715	0874_BO006_C3_170 715	0874_BO006_C4_170 715
Client sampling date / time				15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-036	ES1717792-037	ES1717792-038	ES1717792-039	ES1717792-040
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	98.0	96.0	95.0	94.0	93.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO007_BIF_170 716	0874_BO007_B2_170 716	0874_BO007_B3_170 716	0874_BO007_WIF_17 0716	0874_BO007_M1_170 716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-041	ES1717792-042	ES1717792-043	ES1717792-044	ES1717792-045
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	6.0	16.3	16.3	20.6	13.9
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	1.5	9.7	24.7	6.3	85.6
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	2.4	3.7	2.1	11.6
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	2	12	28	8	97
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO007_BIF_170 716	0874_BO007_B2_170 716	0874_BO007_B3_170 716	0874_BO007_WIF_17 0716	0874_BO007_M1_170 716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-041	ES1717792-042	ES1717792-043	ES1717792-044	ES1717792-045
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	103	103	107	106	102



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO007_M2_170 716	0874_BO007_M3_170 716	0874_BO007_M4_170 716	0874_BO007_M5_170 716	0874_BO007_QIF_170 716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-046	ES1717792-047	ES1717792-048	ES1717792-049	ES1717792-050
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	15.3	23.8	20.5	12.6	19.4
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	217	65.3	156	35.6	5.4
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	50.1	11.7	30.6	2.9	0.8
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	267	77	187	38	6
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	3	<1	2	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO007_M2_170 716	0874_BO007_M3_170 716	0874_BO007_M4_170 716	0874_BO007_M5_170 716	0874_BO007_QIF_170 716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-046	ES1717792-047	ES1717792-048	ES1717792-049	ES1717792-050
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	94.1	104	107	104	103



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO007_BSC_17 0716	0874_BO007_PFC_17 0716	0874_BO007_UF1_17 0716	0874_BO007_R1_170 716	0874_BO007_GFC_17 0716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-051	ES1717792-052	ES1717792-053	ES1717792-054	ES1717792-055
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	31.1	46.2	38.1	23.1	3.5
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	2	<1	<1	3
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	1	<1	<1	2
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	52.2	185	23.6	41.1	163
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	3.0	12.2	2.6	2.0	14.8
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	55	197	26	43	178
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO007_BSC_17 0716	0874_BO007_PFC_17 0716	0874_BO007_UF1_17 0716	0874_BO007_R1_170 716	0874_BO007_GFC_17 0716
Client sampling date / time				16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-051	ES1717792-052	ES1717792-053	ES1717792-054	ES1717792-055
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	97.9	103	104	98.9	107



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO007_PC_170 716	0874_BO007_C1_170 715	0874_BO007_C2_170 715	0874_BO007_C3_170 715	0874_BO008_MIF_170 717
Client sampling date / time				16-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	17-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-056	ES1717792-057	ES1717792-058	ES1717792-059	ES1717792-060
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	4.4	23.4	37.8	19.5	26.4
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	41.1	1.0	<0.5	0.9	1.3
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	9.4	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	50	1	<1	1	1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO007_PC_170 716	0874_BO007_C1_170 715	0874_BO007_C2_170 715	0874_BO007_C3_170 715	0874_BO008_MIF_170 717
Client sampling date / time				16-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	15-Jul-2017 00:00	17-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-056	ES1717792-057	ES1717792-058	ES1717792-059	ES1717792-060
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	105	104	105	103	105



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO008_M1_170 717	0874_BO008_M2_170 717	0874_BO008_M3_170 717	0874_BO008_M4_170 717	0874_BO008_M5_170 717
Client sampling date / time				17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-061	ES1717792-062	ES1717792-063	ES1717792-064	ES1717792-065
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	0.6	112	42.1	43.4	45.1
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	60.2	11.2	32.9	15.6	22.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	1.8	0.8	3.1	1.4	1.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	62	12	36	17	24
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	4	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	2	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO008_M1_170 717	0874_BO008_M2_170 717	0874_BO008_M3_170 717	0874_BO008_M4_170 717	0874_BO008_M5_170 717
Client sampling date / time				17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-061	ES1717792-062	ES1717792-063	ES1717792-064	ES1717792-065
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	86.7	103	98.1	115	118



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO008_GFC_17 0717	0874_BO008_UFC_17 0717	0874_BO008_R1_170 717	0874_BO008_PFC_17 0717	0874_BO008_C1_170 717
Client sampling date / time				17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-066	ES1717792-067	ES1717792-068	ES1717792-069	ES1717792-070
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	28.5	18.0	4.3	19.1	31.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	2
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	5.0	4.5	37.4	15.1	0.9
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	1	0.5	0.6	1.9	0.1
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	6	5	38	17	1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO008_GFC_17 0717	0874_BO008_UFC_17 0717	0874_BO008_R1_170 717	0874_BO008_PFC_17 0717	0874_BO008_C1_170 717
Client sampling date / time				17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-066	ES1717792-067	ES1717792-068	ES1717792-069	ES1717792-070
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	82.9	98.7	112	102	106



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO008_C2_170 717	0874_BO008_PC_170 717	0874_BO008_SAM_17 0717	0874_BO009_SAM_17 0717	0874_BO010_M1_170 718
Client sampling date / time				17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	18-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-071	ES1717792-072	ES1717792-073	ES1717792-074	ES1717792-075
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Prawns	Seaweed	Seaweed	Fish
Ø Weight of Sample Prepared	----	0.1	g	29.8	28.6	76.8	83.2	9.9
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	3	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	0.7	34.5	<0.5	<0.5	16.8
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	0	1.5	<0.5	<0.5	2.2
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	36	<1	<1	19
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	2
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO008_C2_170 717	0874_BO008_PC_170 717	0874_BO008_SAM_17 0717	0874_BO009_SAM_17 0717	0874_BO010_M1_170 718
Client sampling date / time				17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	17-Jul-2017 00:00	18-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-071	ES1717792-072	ES1717792-073	ES1717792-074	ES1717792-075
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	118	89.3	101	107	113



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO010_PFC_17 0718	0874_BO010_UF1_17 0718	0874_BO010_RC_170 718	0874_BO010_GF1_17 0718	0874_BO010_SAM_17 0718
Client sampling date / time				18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-076	ES1717792-077	ES1717792-078	ES1717792-079	ES1717792-080
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Seaweed
Ø Weight of Sample Prepared	----	0.1	g	6.4	3.0	42.6	0.3	84.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	11.1	1.7	5.6	9.1	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	1.9	0.3	2.4	0.9	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	13	2	8	10	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO010_PFC_17 0718	0874_BO010_UF1_17 0718	0874_BO010_RC_170 718	0874_BO010_GF1_17 0718	0874_BO010_SAM_17 0718
Client sampling date / time				18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717792-076	ES1717792-077	ES1717792-078	ES1717792-079	ES1717792-080
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	99.2	105	107	117	97.1

Page : 35 of 35
Work Order : ES1717792
Client : ECOLOGICAL SERVICE PROFESSIONALS
Project : 1658



Surrogate Control Limits

Sub-Matrix: BIOTA		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130

CERTIFICATE OF ANALYSIS

Work Order : **ES1717821**
Client : **ECOLOGICAL SERVICE PROFESSIONALS**
Contact : AARON DUNLOP
Address : PO BOX 5935
 MANLY NSW, AUSTRALIA 4179
Telephone : ----
Project : 1658
Order number : ----
C-O-C number : ----
Sampler : AARON DUNLOP
Site : ----
Quote number : SY/115/17 V3
No. of samples received : 80
No. of samples analysed : 80

Page : 1 of 37
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 19-Jul-2017 12:30
Date Analysis Commenced : 20-Jul-2017
Issue Date : 08-Aug-2017 18:06



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
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW



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.

- EP231: Low matrix spike recovery due to matrix interference, confirmed by re-extraction
- EP231X: Various analytes fail ALS Static control limit range of 70%-130% as there is insufficient historical data for use of ALS Dynamic control limits.
- EP231X: ALS is not NATA accredited for the analysis of PFAS in biota when performed under ALS Method EP231X.



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO010_C1_170 718	0874_BO010_C2_170 718	0874_BO010_C3_170 718	0874_BO011_GFC_17 0714	0874_BO011_RFC_17 0714
Client sampling date / time				18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-001	ES1717821-002	ES1717821-003	ES1717821-004	ES1717821-005
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	23.7	11.6	13.5	20.2	17.2
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	0.8	0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO010_C1_170 718	0874_BO010_C2_170 718	0874_BO010_C3_170 718	0874_BO011_GFC_17 0714	0874_BO011_RFC_17 0714
Client sampling date / time				18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	14-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-001	ES1717821-002	ES1717821-003	ES1717821-004	ES1717821-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	80.0	83.0	98.0	93.0	93.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO011_MBC_17 0714	0874_BO012_C1_170 713	0874_BO012_C2_170 713	0874_BO012_C3_170 713	0874_BO012_OFC_17 0713
Client sampling date / time				14-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-006	ES1717821-007	ES1717821-008	ES1717821-009	ES1717821-010
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	73.1	27.8	24.0	20.3	32.3
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO011_MBC_17 0714	0874_BO012_C1_170 713	0874_BO012_C2_170 713	0874_BO012_C3_170 713	0874_BO012_OFC_17 0713
Client sampling date / time				14-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-006	ES1717821-007	ES1717821-008	ES1717821-009	ES1717821-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	87.0	90.0	82.0	93.0	93.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO012_BSC_17 0713	0874_BO012_RC_170 713	0874_BO012_GFC_17 0713	0874_BO012_PFC_17 0713	0874_BO012_PC_170 713
Client sampling date / time				13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-011	ES1717821-012	ES1717821-013	ES1717821-014	ES1717821-015
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	115	9.5	2.7	18.3	49.1
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	0.6	1.0	<0.5	1.3
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	0.70	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	1	<1	2
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO012_BSC_17 0713	0874_BO012_RC_170 713	0874_BO012_GFC_17 0713	0874_BO012_PFC_17 0713	0874_BO012_PC_170 713
Client sampling date / time				13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-011	ES1717821-012	ES1717821-013	ES1717821-014	ES1717821-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	95.0	91.0	91.0	90.0	91.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO012_SJ1_17 0713	0874_BO012_MP1_17 0713	0874_BO012_M1F_17 0713	0874_BO012_MIL_170 713	0874_BO012_M2F_17 0713
Client sampling date / time				13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-016	ES1717821-017	ES1717821-018	ES1717821-019	ES1717821-020
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	6.9	27.9	36.2	3.0	34.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	1.6	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	0.40	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	2	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	6	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO012_SJ1_17 0713	0874_BO012_MP1_17 0713	0874_BO012_M1F_17 0713	0874_BO012_MIL_170 713	0874_BO012_M2F_17 0713
Client sampling date / time				13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-016	ES1717821-017	ES1717821-018	ES1717821-019	ES1717821-020
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	90.0	93.0	88.0	92.0	105



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO012_M2L_17 0713	0874_BO012_M3_170 713	0874_BO012_M4_170 713	0874_BO012_M5_170 713	0874_BO012_SAM_17 0713
Client sampling date / time				13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-021	ES1717821-022	ES1717821-023	ES1717821-024	ES1717821-025
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Seaweed
Ø Weight of Sample Prepared	----	0.1	g	1.0	15.2	10.4	9.3	45.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	2.8	<0.5	1.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	0.7	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	3	<1	2	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	2	<1	2	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO012_M2L_17 0713	0874_BO012_M3_170 713	0874_BO012_M4_170 713	0874_BO012_M5_170 713	0874_BO012_SAM_17 0713
Client sampling date / time				13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-021	ES1717821-022	ES1717821-023	ES1717821-024	ES1717821-025
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	104	106	107	104	103



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_C1_170 712	0874_BO013_C2_170 712	0874_BO013_C3_170 712	0874_BO013_C4_170 712	0874_BO013_C5_170 712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-026	ES1717821-027	ES1717821-028	ES1717821-029	ES1717821-030
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	24.2	13.4	60.9	11.8	36.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_C1_170 712	0874_BO013_C2_170 712	0874_BO013_C3_170 712	0874_BO013_C4_170 712	0874_BO013_C5_170 712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-026	ES1717821-027	ES1717821-028	ES1717821-029	ES1717821-030
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	98.8	83.4	104	112	104



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_C6_170 712	0874_BO013_C7_170 712	0874_BO013_C8_170 712	0874_BO013_C9_170 712	0874_BO013_C10_17 0712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-031	ES1717821-032	ES1717821-033	ES1717821-034	ES1717821-035
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	39.5	31.4	17.9	34.3	12.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_C6_170 712	0874_BO013_C7_170 712	0874_BO013_C8_170 712	0874_BO013_C9_170 712	0874_BO013_C10_17 0712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-031	ES1717821-032	ES1717821-033	ES1717821-034	ES1717821-035
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	103	81.4	103	83.6	93.9



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_SAM_17 0712	0874_BO013_OCF_17 0712	0874_BO013_CCS_17 0712	0874_BO013_MIF_170 712	0874_BO013_MIL_170 712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-036	ES1717821-037	ES1717821-038	ES1717821-039	ES1717821-040
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Seaweed	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	49.4	28.5	54.1	29.5	2.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	7.2
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	0.7
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	8
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_SAM_17 0712	0874_BO013_OCF_17 0712	0874_BO013_CCS_17 0712	0874_BO013_MIF_170 712	0874_BO013_MIL_170 712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-036	ES1717821-037	ES1717821-038	ES1717821-039	ES1717821-040
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	101	103	103	104	104



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_M2F_17 0712	0874_BO013_M2L_17 0712	0874_BO013_M3_170 712	0874_BO013_M4_170 712	0874_BO013_MP1_17 0712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-041	ES1717821-042	ES1717821-043	ES1717821-044	ES1717821-045
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	14.6	1.7	23.6	26.6	86.5
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	1.9	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	0.7	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	2	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_M2F_17 0712	0874_BO013_M2L_17 0712	0874_BO013_M3_170 712	0874_BO013_M4_170 712	0874_BO013_MP1_17 0712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-041	ES1717821-042	ES1717821-043	ES1717821-044	ES1717821-045
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	114	110	96.3	102	105



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_MP2_17 0712	0874_BO013_BIF_170 712	0874_BO013_BIL_170 712	0874_BO013_B2_170 712	0874_BO013_UFI_170 712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-046	ES1717821-047	ES1717821-048	ES1717821-049	ES1717821-050
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	41.8	24.2	0.9	29.1	51.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_MP2_17 0712	0874_BO013_BIF_170 712	0874_BO013_BIL_170 712	0874_BO013_B2_170 712	0874_BO013_UFI_170 712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-046	ES1717821-047	ES1717821-048	ES1717821-049	ES1717821-050
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	103	102	106	105	103



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_BSC_17 0712	0874_BO013_PFC_17 0712	0874_BO013_SBC_17 0712	----	----
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1717821-051	ES1717821-052	ES1717821-053	-----	-----
				Result	Result	Result	----	----
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	----	----
Ø Weight of Sample Prepared	----	0.1	g	109	15.5	59.9	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	----	----
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	----	----
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	----	----
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	----	----
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	----	----
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	----	----
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	----	----
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	----	----



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				0874_BO013_BSC_17 0712	0874_BO013_PFC_17 0712	0874_BO013_SBC_17 0712	----	----
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1717821-051	ES1717821-052	ES1717821-053	-----	-----
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	----	----
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	----	----
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	----	----
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	2	µg/kg	<2	<2	<2	----	----
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	----	----
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	----	----
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	----	----
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	----	----
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	----	----
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	----	----
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	104	109	104	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO013_RS_170712	0874_QC3BO013_RE_170712	0874_QC3BO013_RC_170712	0874_QC3BO013_RO_170712	0874_QC3BO013_RF_170712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-054	ES1717821-055	ES1717821-056	ES1717821-057	ES1717821-058
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.005	<0.002	0.032	<0.002	<0.002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.006	<0.002	0.013	0.002	0.006
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.003	0.002	<0.002	<0.002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	0.004	<0.002	<0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.008	0.008	<0.002	<0.002
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.003	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO013_RS_170712	0874_QC3BO013_RE_170712	0874_QC3BO013_RC_170712	0874_QC3BO013_RO_170712	0874_QC3BO013_RF_170712
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-054	ES1717821-055	ES1717821-056	ES1717821-057	ES1717821-058
				Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.011	0.014	0.060	0.002	0.006
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.011	<0.002	0.044	0.002	0.006
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.011	0.014	0.061	0.002	0.006
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	101	81.3	97.5	79.6	84.6



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO012_RS_170712	0874_QC3BO012_RE_170712	0874_QC3BO012_RC_170713	0874_QC3BO012_RO_170713	0874_QC3BO012_RF_170713
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-059	ES1717821-060	ES1717821-061	ES1717821-062	ES1717821-063
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.003	<0.002	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.003	<0.002	<0.002	<0.002	0.003
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	0.004	<0.002	<0.002	<0.002	0.004
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO012_RS_170712	0874_QC3BO012_RE_170712	0874_QC3BO012_RC_170713	0874_QC3BO012_RO_170713	0874_QC3BO012_RF_170713
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00	13-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-059	ES1717821-060	ES1717821-061	ES1717821-062	ES1717821-063
				Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.010	<0.002	<0.002	<0.002	0.006
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.003	<0.002	<0.002	<0.002	0.003
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.010	<0.002	<0.002	<0.002	0.007
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	88.2	81.9	82.3	82.2	85.1



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO012_RP_ 170713	0874_QC3BO002_RS_ 170716	0874_QC3BO002_RE_ 170716	0874_QC3BO002_RF_ 170716	0874_QC3BO003_RE_ 170714
Client sampling date / time				13-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-064	ES1717821-065	ES1717821-066	ES1717821-067	ES1717821-068
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.006	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.004	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.039	<0.002	0.003	<0.002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.106	0.003	0.026	0.002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.004	<0.002	0.011	0.002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.012	<0.002	0.010	<0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.005	<0.002	<0.002	0.006
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.005	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.004
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO012_RP_ 170713	0874_QC3BO002_RS_ 170716	0874_QC3BO002_RE_ 170716	0874_QC3BO002_RF_ 170716	0874_QC3BO003_RE_ 170714
Client sampling date / time				13-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-064	ES1717821-065	ES1717821-066	ES1717821-067	ES1717821-068
				Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	<0.002	0.184	0.003	0.051	0.014
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	<0.002	0.146	0.003	0.029	0.002
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	<0.002	0.183	0.003	0.050	0.014
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	82.8	106	90.0	91.1	91.0



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO003_RC_170714	0874_QC3BO007_RS_170716	0874_QC3BO007_RE_170716	0874_QC3BO007_RF_170716	0874_QC3BO008_RS_170717
Client sampling date / time				14-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	17-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-069	ES1717821-070	ES1717821-071	ES1717821-072	ES1717821-073
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.006	<0.002	0.003	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.004	<0.002	0.010	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.005	0.044	<0.002	0.028	0.005
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.003	<0.002	0.004	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.018	0.120	<0.002	0.982	0.056
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.003	0.004	<0.002	<0.002	<0.002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.013	<0.002	<0.002	0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.005	0.005	<0.002	<0.002	<0.002
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.003
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	0.002	<0.002	<0.002	0.003	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO003_RC_ 170714	0874_QC3BO007_RS_ 170716	0874_QC3BO007_RE_ 170716	0874_QC3BO007_RF_ 170716	0874_QC3BO008_RS_ 170717
Client sampling date / time				14-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	16-Jul-2017 00:00	17-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-069	ES1717821-070	ES1717821-071	ES1717821-072	ES1717821-073
				Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.033	0.198	<0.002	1.03	0.066
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.023	0.163	<0.002	1.01	0.061
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.033	0.199	<0.002	1.03	0.066
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	87.3	107	93.7	115	108



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO008_RP_ 170717	0874_QC3BO010_RS_ 170718	0874_QC3BO010_RE_ 170718	0874_QC3BO010_RC_ 170718	0874_QC3BO011_RS_ 170714
Client sampling date / time				17-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-074	ES1717821-075	ES1717821-076	ES1717821-077	ES1717821-078
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.002	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.007	<0.002	<0.002	<0.002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.016	0.007	0.004	0.010	<0.002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.003	<0.002	0.003	<0.002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.004	<0.002	0.003	<0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO008_RP_170717	0874_QC3BO010_RS_170718	0874_QC3BO010_RE_170718	0874_QC3BO010_RC_170718	0874_QC3BO011_RS_170714
Client sampling date / time				17-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	18-Jul-2017 00:00	14-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	ES1717821-074	ES1717821-075	ES1717821-076	ES1717821-077	ES1717821-078
				Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.018	0.023	0.004	0.015	<0.002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.016	0.014	0.004	0.010	<0.002
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.018	0.023	0.004	0.016	<0.002
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	103	106	107	106	87.6



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO011_RF_170714	0874_QC3RICE_170716	----	----	----
Client sampling date / time				14-Jul-2017 00:00	17-Jul-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1717821-079	ES1717821-080	-----	-----	-----
				Result	Result	----	----	----
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	----	----	----
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				0874_QC3BO011_RF_170714	0874_QC3RICE_170716	----	----	----
Client sampling date / time				14-Jul-2017 00:00	17-Jul-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1717821-079	ES1717821-080	-----	-----	-----
				Result	Result	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	----	----	----
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	----	----	----
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	<0.002	<0.002	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	<0.002	<0.002	----	----	----
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	<0.002	<0.002	----	----	----
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	86.9	110	----	----	----



Surrogate Control Limits

Sub-Matrix: BIOTA		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231_TOP_S: PFAS Surrogate			
13C4-PFOS	----	70	130

APPENDIX C-2 ESTUARINE BIOTA SAMPLING AND ANALYSIS (JULY 2018B)

RAAF Base Townsville - PFAS Investigation

Estuarine Biota Sampling and Analysis



Prepared for: WSP Australia Pty Ltd (on behalf of the Department of Defence)

Prepared by Ecological Service Professionals Pty Ltd

July 2018

Document Control

Report Title: RAAF Base Townsville – PFAS Investigation: Estuarine Biota Sampling and Analysis

Project Reference: 1755

Client: WSP Australia

Client Contact: Phil Schulz, David Harris

Report Status	Version Number	Date Submitted	Authored By	Reviewed By	Issued By	Comment
Draft	1755.001V1	01/03/2018	Christoph Braun	Lauren Thorburn	Lauren Thorburn	Submitted for client review
Final	1755.001V2	26/07/2018		Simon Walker	Simon Walker	Update with minor client comments



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Executive Summary

This report has been prepared by Ecological Service Professionals (ESP) for WSP Australia Pty Ltd (WSP). It contributes to the *Royal Australian Air Force (RAAF) Base Townsville: Comprehensive Investigation of Per- and Poly-FluoroAlkyl Substances (PFAS)*, being prepared by WSP, on behalf of the Department of Defence. It presents the results of additional estuarine biota surveys that build upon the results of an initial survey of aquatic biota completed in July 2017. It contributes information towards the Human Health Risk Assessment (HHRA) and the Ecological Risk Assessment (ERA) being completed as part of the investigation.

The Investigation Area (IA) for the additional surveys focussed on the estuarine environments within the Townsville Town Common, Bohle River and Rowes Bay, which are located immediately downstream to the north-west and north east, respectively, of the Townsville RAAF Base and Townsville Airport. Comparative drainages to the south of Townsville (Sandfly Creek and Alligator Creeks) were also surveyed.

Estuarine biota were sampled from 30 November to 3 December 2017 and 12 December to 15 December 2017 in the aquatic environment downstream of the RAAF Base within the Investigation Area (IA) (the Town Common, Bohle River and drainages of Rowes Bay) and in two comparative locations (Alligator Creek and Sandfly Creek), for the analysis of PFAS in tissues. Species likely to be caught and consumed by recreational fishers within the IA were targeted, based on advice from the Queensland Department of Agriculture and Fisheries (DAF). The trophic level of each target biota type was also considered, and mangroves were included in the survey, to inform the ERA for the project.

PFOS/PFHxS was detected more frequently and in higher concentrations in most biota types within the IA than at the comparative sites. Six other components of PFAS were detected in low concentrations, predominantly in samples collected from the IA. No PFOS/PFHxS was detected in mangrove samples from either the IA or comparative sites.

Concentrations of PFOS/PFHxS in crustacean organs were higher than in flesh samples, and higher in fish livers than in fish flesh. The highest PFOS/PFHxS concentrations in crustacean organs and fish livers were detected in the IA, typically in the Town Common drainage.

No PFOS/PFHxS was detected in fish flesh sampled from the comparative drainages, but was present in fish livers of detritivores and apex predators from these drainages.

The highest PFOS/PFHxS concentrations overall were detected in the liver tissue of sea mullet (*Mugil cephalus*) from the Town Common drainage. However, this result is based on the analysis of two samples only, and would need to be confirmed with additional sampling.

Other important fisheries species within the IA, such as mud crabs and banana prawns, had consistently high levels of PFOS/PFHxS in organs, but not in flesh. Mud crab and prawn samples collected from the comparative drainages had concentrations of PFOS/PFHxS that were low or below the laboratory limit of reporting.



1 Introduction

This report has been prepared by Ecological Service Professionals (ESP) for WSP Australia Pty Ltd (WSP). It contributes to the *Royal Australian Air Force (RAAF) Base Townsville: Comprehensive Investigation of Per- and Poly-FluoroAlkyl Substances (PFAS)*, being prepared by WSP, on behalf of the Department of Defence. It presents the results of additional estuarine biota surveys that build upon the results of an initial survey of aquatic biota completed in July 2017. It contributes information towards the Human Health Risk Assessment (HHRA) and the Ecological Risk Assessment (ERA) being completed as part of the investigation.

1.1 Scope of Works

The aim of the current surveys was to supplement previous investigations of PFAS concentrations in aquatic biota (ESP 2018) by targeting local estuarine biota of importance to commercial and recreational fisheries.

Specifically, the scope of works for this investigation were:

- Sampling of target estuarine biota (mangroves, mud crab, prawn, mullet, bream and barramundi) within the IA and comparative locations for the analysis of PFAS in these biota, by a National Association of Testing Authorities (NATA) accredited laboratory.
- Where possible, supplement previous findings by increasing the sample size of target species.
- Reporting on the findings of the analysis of PFAS in estuarine biota samples from the IA and comparative sites.

1.2 Project Area

The Town Common and Bohle River are located north-west of the Townsville RAAF Base and Townsville Airport, in the Bohle River drainage sub-basin of the Ross River drainage basin. Three Mile Creek (also in the Bohle River drainage sub-basin) is located to the east of the Townsville RAAF Base, and drains into Rowes Bay. These watercourses collectively form the Investigation Area (IA) for the Project (Figure 1.1).



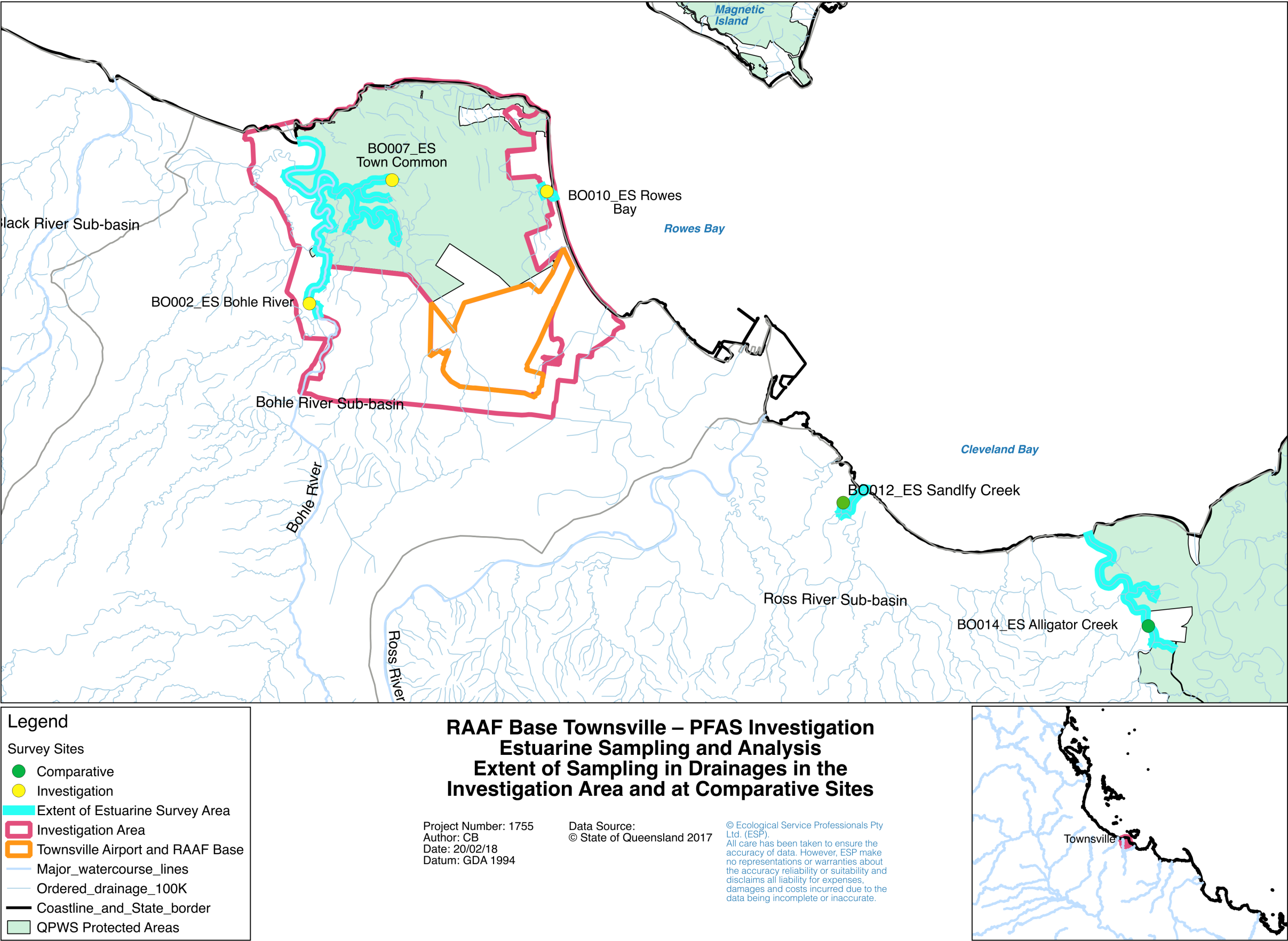


Figure 1.1 Investigation Area (IA), showing the location of the estuarine reaches surveyed in each drainage, and the site names used.



2 Field Survey Methods

2.1 Survey Design and Timing

2.1.1 Survey Design

The survey design was informed by the results of an initial survey focussing on freshwater and estuarine biota in July 2017 (ESP 2018); and feedback from the Queensland Government Interdepartmental Committee (IDC) and Project Technical Advisor. The estuarine survey was designed in general accordance with the *Sampling and Quality Plan (SAQP) – Version 1* (WSP 2017), prepared by WSP as the lead consultant for the investigation.

The survey design focussed on the drainages of the Town Common, the Bohle River and Rowes Bay (within the IA); and two comparative locations in Alligator Creek and Sandfly Creek (south of the IA). Species likely to be caught and consumed by recreational fishers within the IA were targeted, based on advice from the Queensland Department of Agriculture and Fisheries (DAF). The trophic level of each target biota type was also considered, and mangroves were included in the survey, to inform the ecological risk assessment (ERA) for the project. Target species, their trophic level and target sample types and numbers for the survey are presented in Table 2.1.

Due to the mobile nature of most of the species being sampled, sampling was completed at a drainage scale, to increase catch success (Figure 1.1, Table 2.2). While site names allocated to each sample were consistent with those used in the initial July 2017 survey, sampling was completed throughout the drainage (blue areas shown in Figure 1.1), wherever suitable habitat was available. Despite substantial survey effort, not all intended target species were caught as per the original survey design (Table 2.1), due to the temporal and spatial patchiness in the presence of some species.



Table 2.1 Target species, sample type and sample numbers planned for the estuarine survey.

Planned drainages to be surveyed	Biota	Trophic level	Max. number of individual samples per drainage	Sample type for analysis per location	Total sample number planned (max.)
Bohle River Town Common Rowes Bay Comparative	mullet	detritivore	8	flesh ^A	32
				liver ^A	
	bream	consumer	8	flesh ^A	32
				liver ^A	
	flathead	piscivore (apex predator)	8	flesh ^A	32
				liver ^A	
	barramundi	piscivore (apex predator)	8	flesh ^A	32
				liver ^A	
	mud crab	scavenging omnivore	8	flesh ^A	32
				organs ^A	
	prawn	omnivore	8	flesh ^B	32
				organs ^B	
	mangrove	primary producer	4	leaves (picked from tree) ^B	16
				detritus (collected from ground) ^B	

^A Individuals to be used for each sample where possible; composite sample from two or more individuals or whole fish to be used if needed for minimum sample weight requirement

^B Composite of several individuals / mangrove leaves to be used for each sample



Table 2.2 Sites codes, types, locations and the biota type(s) sampled at each site.

Site Type	Site Code	Location / Drainage [^]	Easting	Northing	Biota		
					Crustaceans	Fish	Mangroves
IA (Estuarine)	0874_BO002_ES	Bohle River	-19.2394	146.7073	Yes	Yes	Yes
	0874_BO007_ES	Town Common	-19.2066	146.7305	Yes	Yes	Yes
	0874_BO010_ES	Rowes Bay (Three Mile Creek*)	-19.2112	146.7754	Yes	Yes	Yes
Comparative (Estuarine)	0874_BO012_ES	Sandfly Creek**	-19.1558	146.5992	Yes	Yes	Yes
	0874_BO014_ES	Alligator Creek***	-19.2912	146.8481	Yes	Yes	Yes

[^] sampling occurred throughout drainage, as shown in Figure 1.1

^{*} drains from the Base into Rowes Bay

^{**} sampled during second survey event to supplement catches from Alligator Creek

^{***} sampled during first survey event



2.1.2 Timing

Estuarine biota were sampled during two late spring / early summer surveys, from 30 November to 3 December 2017, and 12 to 15 December 2017. The weather during the survey was sunny during the day, and daytime temperatures were average for the time of year, ranging from 30–32.4°C. Rainfall for the region was below average for the region in the 12 months prior to the two surveys (BOM 2018), with the exception of May and October 2017, when above average rainfall was recorded (Figure 2.1).

Intermediate tides (between neap and spring) dominated the tidal cycle around Townsville during both surveys, and ranged between approximately 0.36 m (low) and 3.68 m (high) for the first survey and 0.73 m (low) and 3.12 m (high) for the second survey. High tides occurred in early morning and late afternoon during both surveys (Willy Weather 2018) (Table 2.3).

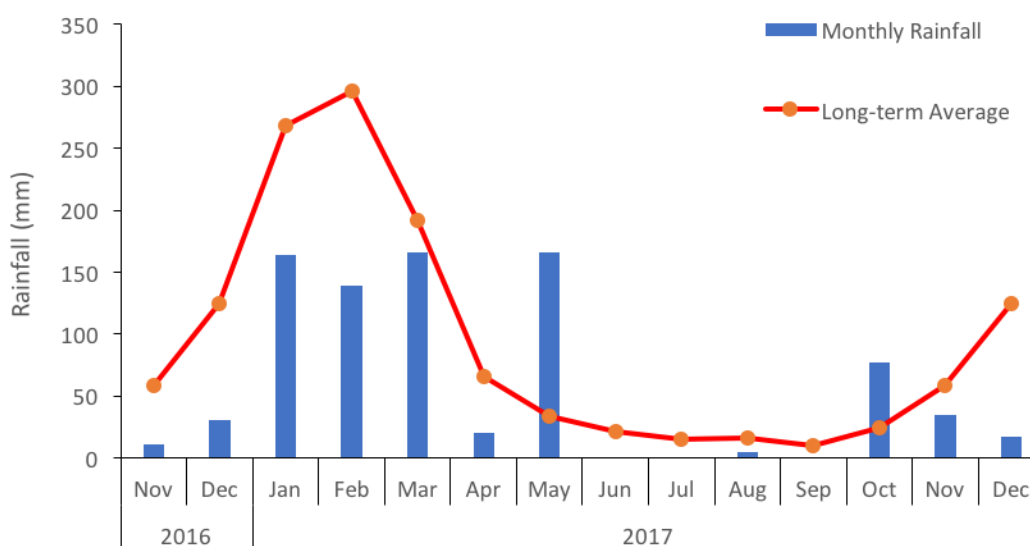


Figure 2.1 Monthly total and average rainfall (mm) over 12 months prior to the survey at BOM station 32040 (Townsville Aero).

Table 2.3 Tidal cycle dates, times (24 hr) and approximate water heights (m).

Tide	Date							
	30/11	01/12	02/12	03/12	12/12	13/12	14/12	15/12
Low	0.50 (0.68 m)	1.16 (0.51 m)	1.44 (0.36 m)	2.15 (0.72 m)	0.04 (0.81 m)	0.43 (0.74 m)	1.15 (0.73 m)	1.38 (0.74 m)
High	6.40 (2.99 m)	7.16 (3.27 m)	7.54 (3.51 m)	8.38 (3.68 m)	6.07 (2.74 m)	6.47 (2.92 m)	7.21 (3.04 m)	7.51 (3.12 m)
Low	12.48 (1.12 m)	13.29 (1.03 m)	14.13 (0.98 m)	15.04 (0.99 m)	12.13 (1.26 m)	13.02 (1.25 m)	13.43 (1.28 m)	14.19 (1.32 m)
High	18.25 (3.15 m)	18.59 (3.21 m)	19.37 (3.2 m)	20.21 (3.1 m)	17.50 (2.99 m)	18.26 (2.93 m)	18.56 (2.85 m)	19.24 (2.77 m)

Source: Willy Weather 2018.



2.2 Biota Sampling

Estuarine biota were sampled using a variety of methods, depending on the biota type, in accordance with the *Queensland Monitoring and Sampling Manual* (DEHP 2013b). All biota sampling was completed in accordance with ESP's DAF Animal Ethics Committee approval (#CA 2017/06/1072), DAF General Fisheries Permit (#193593), Department of National Parks, Sport and Racing – Queensland Parks and Wildlife Service Permit (#WITK18589217) and Department of Environment and Heritage Protection – Scientific Purposes Permit (#WISP14986614).

The gear types used for biota surveys included:

- dual wing fyke nets (6 mm and 17 mm mesh)
- Four entry point, collapsible, 50 mm mesh crab pots, baited with fresh, store bought whole mullet and chicken
- 2.4 m radius cast nets (25 and 10 mm mesh), and
- recreational fishing equipment (rods and reels) using lures and fresh bait (store bought and locally caught).

The gear type and survey effort is presented in Table 2.4.

Due to the low abundances of target fish species (Table 2.1) caught, most individuals were retained for analysis. All biota taken for samples were euthanised in an ice slurry. Where samples could not be prepared on-site (due to tidal access restrictions), samples were prepared at the nearest boat ramp in accordance with strict sample preparation and quality assurance / quality control (QA/QC) protocols (see Section 2.3.4). The biota retained for analysis at each site and the sample numbers and type(s) are shown in (Table 2.5) and photographs of each species retained are presented in Attachment A.



Table 2.4 Gear type and survey effort (hours) in each drainage.

Drainage	Date	Gear Type	Total Number	Effort
Bohle River	30/11/17	line	3 x 6	19.5 hrs
		cast net	1	70 shots
	1/12/17	crab pot	2 x 8	32 hrs
		line	6	12 hrs
		cast net	1	55 shots
	3/12/17	crab pot	8	32 hrs
		line	4 x 6	12 hrs
		cast net	1	35 shots
		crab pot	2 x 8; 4	51.3 hrs
	12/12/17	line	3	3 hrs
		fyke	2	8 hrs
		cast net	1	20 shots
	13/12/17	crab pot	2 x 4	32 hrs
Town Common	1/12/17	crab pot	2 x 4	20 hrs
		line	6 & 2	4 hrs
		cast net	1	5 shots
	14/12/17	line	4	8 hrs
		fyke	1	3 hrs
Rowes Bay	14/12/17	cast net	1	10 shots
		crab pot	8 & 6	152 hrs
		line	3	15 hrs
Alligator Creek (Comparative)	2/12/17	cast net	1	30 shots
		crab pot	8	52.5 hrs
		line	4 x 6	79.5 hrs
Sandfly Creek (Comparative)	13/12/17	cast net	1	50 shots
		line	2 x 4	5.5 hrs
		fyke	2	3 hrs
		cast net	1	40 shots



Table 2.5 Number of samples collected for analysis from each drainage.

		Drainage								
		Bohle River		Town Common		Rowes Bay		Comparative		Grand Total
Biota Type	Component	Composite	Individual	Composite	Individual	Composite	Individual	Composite	Individual	
Fish										
mullet ^a	flesh	2	7	2	—	1		5	3	20
	liver	2	7	2	—	—	—	5		16
bream ^a	flesh	1	2	—	3	—	—	3	1	10
	liver	1	2	—	3	—	—	2	1	9
flathead ^a	flesh	4	—	—	—	—	—	—	—	4
	liver	4	—	—	—	—	—	—	—	4
anchovy ^b	flesh	—	—	1	—	—	—	1	—	2
catfish ^b	flesh	—	1	2	1	—	—	—	—	4
	liver	—	1	2	1	—	—	—	—	4
grunter ^b	flesh	—	1	—	2	—	—	3	1	7
	liver	—	1	—	2	—	—	2	1	6
whiting ^b	flesh	—	—	—	—	—	—	1	—	1
mangrove jack ^c	flesh	—	1	—	—	—	1	—	1	3
	liver	—	1	—	—	—	1	—	1	3
cod ^c	flesh	—	—	—	2	1	—	—	—	3
	liver	—	—	—	2	1	—	—	—	3
queenfish ^c	flesh	—	—	—	—	—	—	—	1	1
	liver	—	—	—	—	—	—	—	1	1
	whole	—	—	—	—	—	—	1	—	1



		Drainage								
		Bohle River		Town Common		Rowes Bay		Comparative		Grand Total
Biota Type	Component	Composite	Individual	Composite	Individual	Composite	Individual	Composite	Individual	
threadfin salmon ^c	flesh	–	–	–	–	–	–	1	–	1
Crustaceans										
banana prawn ^a	flesh	4	–	4	–	–	–	8	–	16
	organ	4	–	4	–	–	–	8	–	16
mud crab ^a	flesh	–	6	–	8	1	–	–	8	23
	organ	–	6	–	8	1	–	–	8	23
Marine Plants										
mangrove ^a	leaves	4	–	4	–	4	–	4	–	16
	detritus	4	–	4	–	4	–	4	–	16
	Total	30	36	25	32	13	2	48	27	213

^a target species as outlined in Table 2.1

^b consumer species used as substitute for bream

^c apex predator species used as substitute for barramundi



2.2.1 Crustaceans

Mud crabs (*Scylla serrata*) were collected from the Bohle River, Town Common and a comparative drainage (Alligator Creek) using crab pots (Table 2.5). Two large crabs (Order Brachyura) were caught from the Rowes Bay drainage (Three Mile Creek), composited and included in the analysis, as no mud crabs were caught from this estuary. All crabs were kept in nally bins until the target number of individuals had been caught at each estuarine site, then all crabs were euthanised and tissue and organ samples were prepared (for details on sample preparation see Section 2.3.1).

Banana prawns (*Fenneropenaeus* sp.) were collected from all drainages except for Rowes Bay (Three Mile Creek) using a cast net. All prawns were euthanised, identified and counted. Up to 15 individuals were pooled into a single composite sample from each of the estuarine sites where prawns were collected (for details on sample preparation see Section 2.3.1).

2.2.2 Fish

Fish (various species) were sampled at all sites using cast nets and fishing rods. In addition, fyke nets were used in the Bohle River, Sandfly Creek and Town Common on sand banks and near feeder creeks where water depth and access points allowed for safe setting and retrieval of nets, and suitable habitat was present.

Each fish was identified, counted and a representative of each species photographed. Fish were euthanised and kept cool on ice until tissue sample preparation (Section 2.3.2).

A total of 103 fish, representing ten species from ten families, were caught at the four estuarine sites (Table 2.5). While the aim was to sample the same species from the IA and comparative drainages, the following species were sampled in only one location:

- queenfish, threadfin salmon and whiting were only sampled only from the comparative drainages, and
- catfish, estuarine cod and flathead were only sampled from the IA.

Where target species (see Table 2.1) such as barramundi or bream were not caught or in caught in low numbers, other species of the same trophic level were substituted (e.g. mangrove jack as substitute for barramundi, grunter as substitute for bream, Table 2.5).

2.2.3 Mangroves

Four composite samples of mangrove leaves were collected from each drainage. Each composite sample consisted of leaves from up to two *Avicennia marina* and *Rhizophora* spp. trees per species at each site. A composite sample contained between ten and 30 leaves and flowers.

Four composite samples of mangrove leaf detritus were collected at each site, from the substrate immediately adjacent to the trees used to collect leaf samples.

2.3 Sample Preparation

A total of 213 biota samples (excluding QA/QC replicates) from crustaceans, fish and mangrove were submitted to the laboratory for analysis. The species, sample type (individual



or composite) and tissue type (liver, flesh or whole organism, plant material) collected per site are presented in Table 2.5. Each biota type was rinsed prior to sample preparation in accordance with the *Queensland Monitoring and Sampling Manual* (DEHP 2013b; as described in Section 2.3.4). The total number of samples for each biota type (excluding QA/QC replicates) submitted to the laboratory for analysis is shown in Table 2.5.

Images of species retained for analysis are displayed in Attachment A.

2.3.1 Crustaceans

All crustaceans were rinsed prior to sample preparation in accordance with the *Queensland Monitoring and Sampling Manual* (DEHP 2013b).

Crab tissue samples were taken from both claws and all legs if possible, using stainless steel scissors, tweezers and pliers. For organ samples from crabs, the gills were first removed from the branchial chamber, and testes and gut tissue was sampled using stainless steel instruments.

Prawn flesh samples consisted of peeled muscle tissue, while organ samples included gut, hindgut and heads (including shell). All prawn samples were prepared using stainless steel instruments.

2.3.2 Fish

All fish were rinsed prior to sample preparation in accordance with the *Queensland Monitoring and Sampling Manual* (DEHP 2013b). Specimens were carefully dissected using stainless steel knives, scissors or scalpel and forceps to obtain separate samples of either muscle (flesh) or liver. Where there was insufficient total weight of flesh or liver for analysis, samples were pooled for composite analysis.

2.3.3 Mangroves

All plant material collected at a site was rinsed and then retained to provide composite samples.

2.3.4 Quality Assurance / Quality Control (QA/QC)

Prior to use and sample preparation, all equipment and each organism type was rinsed separately in a PFAS-free rinsate. All equipment was cleaned at the beginning of each day, between sites and between tissue sample preparation for each biota type to limit the potential for contamination from external sources and / or cross-contamination between sites and organisms. Other QA/QC procedures, as outlined in the *Queensland Monitoring and Sampling Manual* (DEHP 2013b) were followed such as wearing new powder-free nitrile gloves for preparation of each sample. Equipment was dipped in Liquinox (a PFAS-free industrial strength cleaner), potable / tap water, then in de-ionised water before every use. All trays used were stainless steel and stainless steel scissors, filleting knives, forceps and scalpels were thoroughly cleaned using Liquinox and de-ionised water before use at each site. Scalpel blades were changed between biota types at each site.



For quality control and assurance purposes and to determine whether there was contamination introduced from the sampling equipment, biota or procedure, the following gear and biota rinsate samples were collected:

- the ice slurry used to euthanise fish, crabs and prawns
- a sample of the rinsate from equipment (scalpels, forceps, trays) preparation, and
- a random sample of the biota rinsate collected at a single random site, each day.

One triplicate sample (i.e. three separate samples collected at the same time) of each rinsate type (ice slurry, equipment and biota) was taken during both surveys.

One field blank sample consisting of de-ionised rinsate water provided by the primary laboratory was also collected by transferring the water into a sample container on site.

In order to determine variation in PFAS concentrations within a biota sample and between laboratories (Section 2.4), duplicate or triplicate samples were collected from each location. Replicates for each biota type (fish, crustaceans, plants) and sample type (flesh and liver/organ, leaf and detritus) were collected where possible (Table 2.6). In case of composite samples, the replicates were split from the pool of specimens, and in the case of individual samples, replicates were taken from the same specimen.

Table 2.6 Replicate biota samples collected from each drainage; no biota replicate samples were collected at Rowes Bay.

Drainage	Biota	Component	Sample Type	Replicates
Bohle River	bream	flesh	individual	3
	prawn	organ	composite	2
	prawn	flesh	composite	2
Town Common	crab	flesh	individual	3
	catfish	liver	individual	3
	catfish	flesh	individual	3
	cod	flesh	individual	3
Sandfly Creek	mangrove jack	flesh	individual	3
	mangrove	leaves	composite	3
	mangrove	detritus	composite	3
	prawn	organ	composite	2
	prawn	flesh	composite	2
	bream	flesh	individual	3
	bream	liver	individual	2



Drainage	Biota	Component	Sample Type	Replicates
Alligator Creek	catfish	flesh	individual	3
	queenfish	flesh	individual	3
	mullet	flesh	composite	3

2.4 Laboratory and Data Analysis

Biota and QA/QC rinsate samples were analysed by a NATA-accredited laboratory (ALS Environmental) for the full suite of components of PFAS (Laboratory Certificates of Analysis are presented in Attachment B). For QA/QC triplicates, two replicates were analysed by the primary laboratory (ALS Environmental), with a third sample being analysed by a reference laboratory (Eurofins mgt). For QA/QC duplicates, one sample was analysed by each laboratory.

The laboratory results were summarised as follows:

- The total concentrations of PFOS and PFHxS were summed for each sample, to provide a value for comparison between biota, sample types, trophic level and drainages.
- Where more than one sample of any biota type for each trophic level was collected, the mean, standard error and range of PFOS/PFHxS concentrations were calculated for each trophic level (primary producer and consumer, detritivore, omnivore, consumer and apex predator (where available) in each drainage (drainages as per Table 2.2), and tabulated or graphed.
- Where only a single sample was collected from a drainage, only the total concentrations of PFOS/PFHxS were tabulated and graphed.
- Where more than four samples for an individual target species have been collected within a drainage to date (including results from the initial July 2017 survey, where relevant); the mean, standard error and range of PFOS/PFHxS concentrations were calculated for the species and sample type.

For assessing the variation between inter- and intra- laboratory replicates, the Relative Percent Difference (RPD) was calculated from duplicate and triplicate samples. The acceptable limits of variation for calculated RPD's were the same as those used by the NATA-accredited laboratories, specifically:

- 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%.

Where LOR's differed between laboratories, the higher LOR (less sensitive) was used as a guideline to determine acceptable RPDs.



2.5 Limitations

This report presents the results of estuarine sampling completed across two surveys in November and December 2017, with no seasonal replication. The survey was aimed at collecting a range of recreationally important crustacean and fish species from the IA (Town Common, Bohle River and Rowes Bay drainages) and comparative drainages for the analysis of PFAS in tissue samples. It was intended to also survey Ross Creek within Townsville; however, this site was removed from the program in order to focus survey effort on catching target species within the IA and comparative drainages.

Large predatory / recreationally important fish species such as barramundi were intended to be sampled with priority. Despite substantial effort targeting large predator species (> 150 hours of line fishing) and local advice regarding survey sites, we were unable to catch barramundi. The current surveys occurred during a seasonal closure of the barramundi fishery (annual spawning season). Anecdotal information from local fishing reports and individuals at the time suggested that recreational fishers in other creeks were also not catching these target species. However, other apex predator species (e.g. mangrove jack, queenfish) were used as a substitute when caught. One individual queenfish was sampled whole as it was too small to dissect. This result was excluded from analysis of flesh results, as it included liver tissue with potential high levels of PFOS/PFHxS.

For health and safety reasons, the survey methods used for estuarine biota were limited to those that could be completed safely from a boat or sandbank (with a spotter present), as sampling was in known crocodile habitat.



3 Results

Of the suite of PFAS components, PFOS, PFHxS and their surrogates were the most widespread, and detected (i.e. concentrations were above the laboratory limit of reporting (LOR)) in most samples from the IA. The following were also detected, though in far fewer samples:

- Perfluoropentane sulfonic acid (PFPeS) in the IA and in one comparative sample
- Perfluoroheptane sulfonic acid (PFHpS) in the IA
- Perfluorodecane sulfonic acid (PFDS) in two samples from the IA and in one comparative sample
- Perfluorobutanoic acid (PFBA) and Perfluoropentanoic acid (PFPeA) in one comparative sample
- Perfluorohexanoic acid (PFHxA), Perfluoroheptanoic acid (PFHpA), Perfluorooctanoic acid (PFOA), Perfluorononanoic acid (PFNA) and Perfluorodecanoic acid (PFDA) in samples from the IA, and
- Perfluorooctane sulfonamide (FOSA) in samples from the IA.

3.1 Concentration of PFOS / PFHxS in Biota in November/December 2017

PFOS/PFHxS was detected in a range biota types within the IA and comparative drainages (refer to Attachment B for full laboratory results). In the IA, PFOS/PFHxS was detected (i.e. the concentration was above the laboratory LOR) in 89 out of 138 samples analysed (64.5%), while only seven out of 42 samples (16.7%) from the comparative drainages showed detectable levels of PFOS/PFHxS (Table 3.1).

The concentrations of PFOS/PFHxS in each biota type are discussed below.



Table 3.1 Proportion of biota samples with PFOS/PFHxS concentrations above laboratory limit of reporting (LOR).

Drainage	Trophic Level	Biota Type	Total Number of Samples	Number of Samples Above LOR	Proportion (%) of Samples Above LOR
Bohle River	crustacean	omnivore flesh	10	5	50
		omnivore organ	10	10	100
	fish	apex predator flesh	5	1	20
		apex predator liver	5	5	100
		consumer flesh	5	1	20
		consumer liver	5	2	40
		detritivore flesh	9	8	89
		detritivore liver	9	9	100
	plant	detritus	4	0	0
		leaves	4	0	0
Town Common	crustacean	omnivore flesh	12	9	75
		omnivore organ	12	12	100
	fish	apex predator flesh	2	2	100
		apex predator liver	2	2	100
		consumer flesh	9	9	100
		consumer liver	8	8	100
		detritivore flesh	2	2	100
		detritivore liver	2	2	100
	plant	detritus	4	0	0
		leaves	4	0	0
Rowes Bay	crustacean	omnivore flesh	1	0	0
		omnivore organ	1	1	100
	fish	apex predator flesh	2	0	0
		apex predator liver	2	1	50
		detritivore flesh	1	0	0
	plant	detritus	4	0	0
		leaves	4	0	0
Total IA			138	89	64.5



Drainage	Trophic Level	Biota Type	Total Number of Samples	Number of Samples Above LOR	Proportion (%) of Samples Above LOR
Comparative	crustacean	omnivore flesh	17	0	0
		omnivore organ	16	4	25
	fish	apex predator flesh	3	0	0
		apex predator liver	2	1	50
		consumer flesh	10	0	0
		consumer liver	6	0	0
		detritivore flesh	8	0	0
		detritivore liver	5	2	40
	plant	detritus	4	0	0
		leaves	4	0	0
Total Comparative			42	7	17



3.1.1 Crustaceans

The concentration of PFOS/PFHxS in crab and prawn organs was above the LOR in all samples from the IA, but only detected in a quarter of the samples from the comparative drainages (Table 3.1). Concentrations of PFOS/PFHxS in crab and prawn flesh samples from the Bohle River and Town Common were much lower than in the organ samples, and PFOS/PFHxS were not detected in any prawn or crab flesh samples from Rowes Bay and the comparative drainages (Table 3.1 & Figure 3.1).

Within the IA, concentrations of PFOS/PFHxS in prawn flesh and organs were higher in the Town Common than in the Bohle River, whereas concentrations in crab flesh and liver were highest in the Town Common, lower in the Bohle River and the lowest in Rowes Bay (Figure 3.1 & Table 3.2).

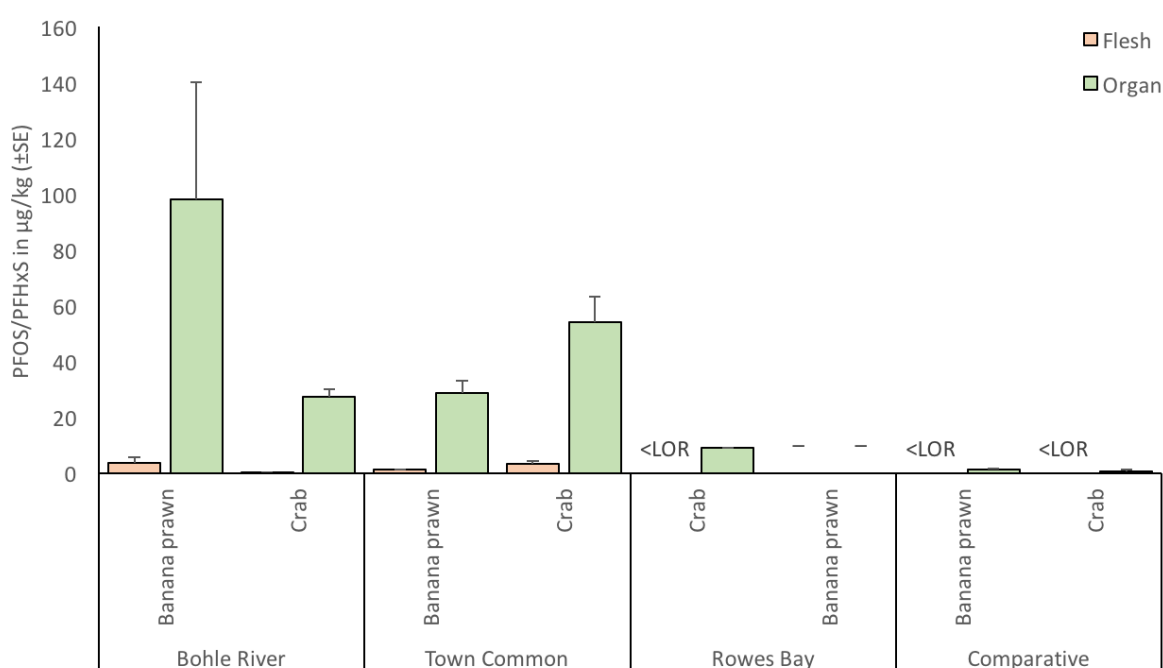


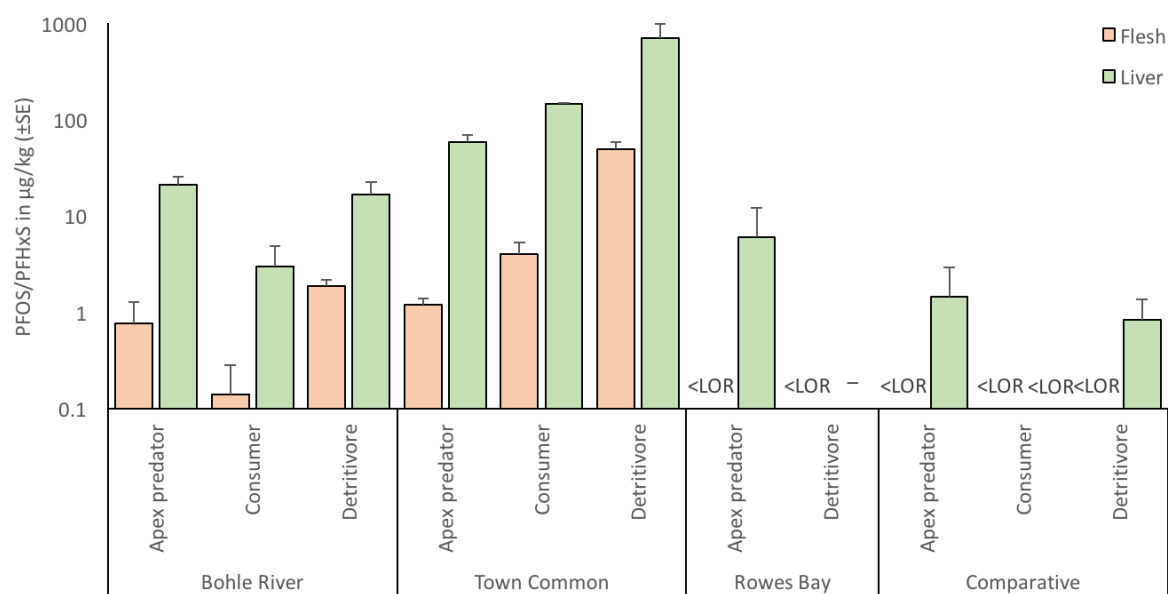
Figure 3.1 Concentrations of PFOS/PFHxS (± SE) in crustaceans pooled among sites in each drainage area.

3.1.2 Fish

Concentrations of PFOS/PFHxS above the LOR were detected in almost all fish and liver samples from the IA (Figure 3.2), but only in liver samples from detritivores and apex predators from the comparative drainages. When detected, PFOS/PFHxS concentrations from the same tissue type and trophic level were generally higher in the IA than at the comparative drainages. Within the IA, the highest concentrations of PFOS/PFHxS were generally recorded within the Town Common (Figure 3.2).

Liver samples consistently showed higher concentrations of PFOS/PFHxS than tissue samples. No PFOS/ PFHxS was detected in fish flesh samples from Rowes Bay or the comparative drainages (Figure 3.2). The highest PFOS/ PFHxS concentrations were detected in liver tissues of detritivores (mullet) from the Town Common drainages, with a mean of 702 µg/kg (Table 3.2).





- not sampled

Figure 3.2 Concentrations of PFOS/PFHxS ($\pm$ SE) in fish flesh from all sites and liver samples where available (asterisk indicates samples with concentrations below the LOR). Note the vertical axis is on a logarithmic scale.

3.1.3 Mangroves

The concentration PFOS/PFHxS in mangrove leaves and detritus was below the LOR in samples from all drainages (Table 3.2).



Table 3.2 The number of samples (n), mean, standard error ($\pm$ S.E.), minimum and maximum of PFOS/PFHxS concentrations in biota from different trophic levels sampled from each drainage.

Drainage	Biota Type	Trophic Level / Tissue	n	Mean ($\mu\text{g/kg}$)	($\pm$ S.E.)	Minimum ($\mu\text{g/kg}$)	Maximum ($\mu\text{g/kg}$)
Bohle River	crustacean	crab flesh	6	0.17	0.17	0	1
		crab organ	6	27.33	2.78	18	34.2
		prawn flesh	4	3.58	1.95	1	9.4
		prawn organ	4	98.25	41.91	37	221
	fish	apex predator flesh	5	0.76	0.52	0	2.6
		apex predator liver	5	21.24	4.04	9	31.8
		consumer flesh	5	0.14	0.14	0	0.7
		consumer liver	5	3.00	1.90	0	9
		detritivore flesh	9	1.87	0.32	0	3
		detritivore liver	9	16.64	5.73	3	60
	plant	plant detritus	4	<LOR	NA	NA	NA
		plant leaves	4	<LOR	NA	NA	NA
Town Common	crustacean	crab flesh	8	3.25	1.06	0	8
		crab organ	8	54.08	9.08	25	103
		prawn flesh	4	1.15	0.05	1.1	1.3
		prawn organ	4	28.75	4.39	19	38
	fish	apex predator flesh	2	1.20	0.20	1	1.4
		apex predator liver	2	58.50	10.50	48	69
		consumer flesh	9	4.07	3.64	0.5	11
		consumer liver	8	146.70	132.26	29.6	407
		detritivore flesh	2	49.00	10.00	39	59
		detritivore liver	2	702.00	282.00	420	984
	plant	plant detritus	4	<LOR	NA	NA	NA
		plant leaves	4	<LOR	NA	NA	NA
Rowes Bay	crustacean	crab flesh	1	<LOR*	NA	NA	NA
		crab organ	1	9*	NA	9	9
		prawn flesh	–	–	–	–	–
		prawn organ	–	–	–	–	–
	fish	apex predator flesh	2	<LOR	NA	NA	NA
		apex predator liver	2	6.00	6.00	0	12
		detritivore flesh	1	<LOR*	NA	NA	NA
	plant	plant detritus	4	<LOR	NA	NA	NA
		plant leaves	4	<LOR	NA	NA	NA



Drainage	Biota Type	Trophic Level / Tissue	n	Mean (µg/kg)	(± S.E.)	Minimum (µg/kg)	Maximum (µg/kg)
Comparative	crustacean	crab flesh	8	<LOR	NA	NA	NA
		crab organ	8	0.63	0.63	0	5
		prawn flesh	8	<LOR	NA	NA	NA
		prawn organ	8	1.13	0.58	0	4
	fish	apex predator flesh	3	<LOR	NA	NA	NA
		apex predator liver	2	1.45	1.45	0	2.9
		consumer flesh	10	<LOR	NA	NA	NA
		consumer liver	6	<LOR	NA	NA	NA
		detritivore flesh	8	<LOR	NA	NA	NA
		detritivore liver	5	0.84	0.52	<LOR	2.2
	plant	plant detritus	4	<LOR	NA	NA	NA
		plant leaves	4	<LOR	NA	NA	NA

* total values presented where only one sample collected

– not sampled

NA Minimum, Maximum and Standard Error not calculated for results of single sample or where all results were <LOR



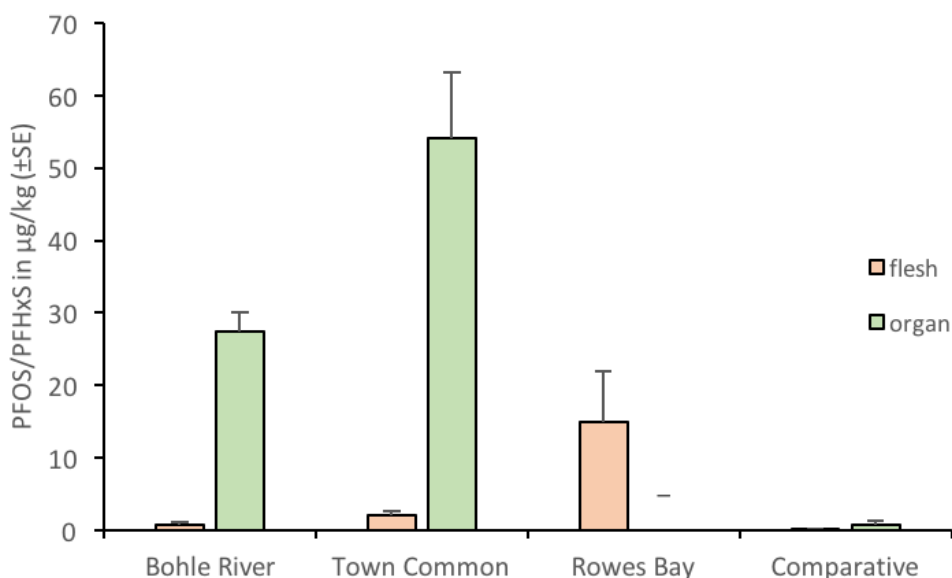
3.2 Concentration of PFOS / PFHxS in Recreationally Important Fisheries Species

3.2.1 Mud Crabs (*Scylla serrata*)

Concentrations of PFOS/PFHxS in mud crab flesh and organs were higher in the IA than at the comparative drainages (Table 3.3). Flesh samples had lower concentrations of PFOS/PFHxS than organ samples (if available) across the drainages; note that during the initial survey in July 2017, only flesh was sampled and during the most recent survey, no mud crabs were caught at Rows Bay. Organ samples of mud crab from the Town Common had the highest concentrations of PFOS/PFHxS across the drainages (Figure 3.3).

Table 3.3 Concentrations of PFOS/PFHxS in mud crab (*Scylla serrata*) flesh and organs from all surveys. –: not sampled

Drainage	Sample Type	n	Minimum (µg/kg)	Maximum (µg/kg)	Mean (µg/kg)	(± S.E.)
Bohle River	flesh	13.00	<LOR	4.00	0.77	0.41
	organ	6.00	18.00	34.20	27.33	2.78
Town Common	flesh	18.00	<LOR	8.00	1.95	0.59
	organ	8.00	25.00	103.00	54.08	9.08
Rows Bay	flesh	5.00	0.70	39.00	14.94	6.95
	organ	–	–	–	–	–
Comparative	flesh	22.00	<LOR	1.00	0.05	0.05
	organ	8.00	<LOR	5.00	0.63	0.63



– not sampled

Figure 3.3 Concentrations (mean ± S.E.) of PFOS/PFHxS in mud crab (*Scylla serrata*) flesh and organs.



3.2.2 Banana Prawn (*Fenneropenaeus* sp.)

Only samples collected during the most recent surveys are discussed below, as banana prawn samples collected in July 2017 were whole organisms, including both organs and flesh. Concentrations of PFOS/PFHxS were consistently lower in organ samples than in flesh samples, and higher in the IA than the comparative drainages (Table 3.4). In contrast to mud crab samples, the concentration of PFOS/PFHxS in prawns was higher in the Bohle River than in the Town Common (Figure 3.4). No PFOS/PFHxS was found in flesh samples from the comparative drainages.

Table 3.4 Concentrations of PFOS/PFHxS in banana prawn (*Fenneropenaeus* sp.) flesh and organs from the November/December 2017 survey.

Drainage	Sample Type	n	Minimum (µg/kg)	Maximum (µg/kg)	Mean (µg/kg)	(± S.E.)
Bohle River	flesh	4	1	9.40	3.58	3.91
	organ	4	37	221	98.25	83.81
Town Common	flesh	4	1.10	1.30	1.15	0.10
	organ	4	19	38	28.75	8.77
Comparative	flesh	8	<LOR	<LOR	<LOR	–
	organ	8	<LOR	4	1.13	1.64

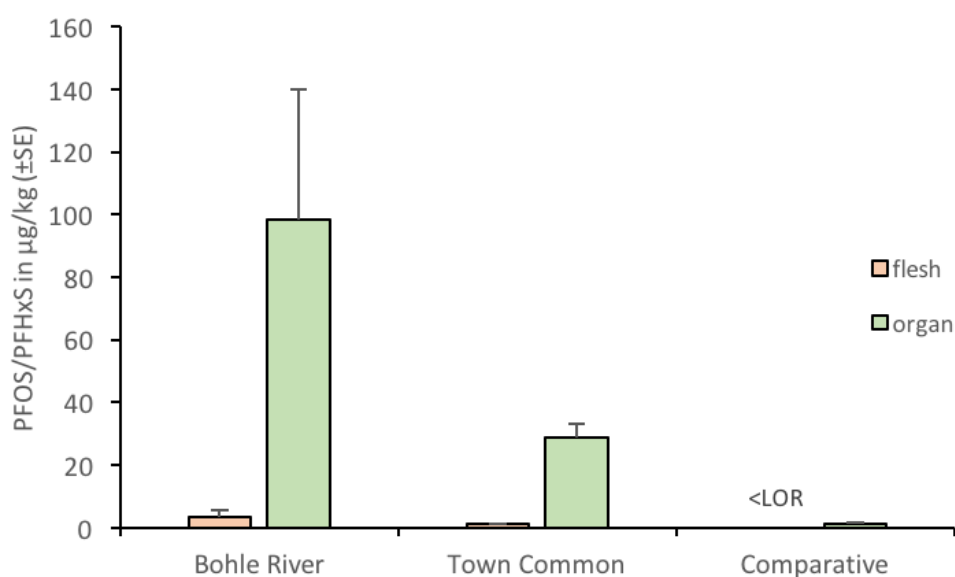


Figure 3.4 Concentrations (mean ± S.E.) of PFOS/PFHxS in banana prawn (*Fenneropenaeus* sp.) flesh and organs.



3.2.4 Mullet (*Mugil cephalus*)

Mullet liver and flesh samples show a similar pattern as flesh and organ samples in crustaceans (see above), in that internal organ samples (i.e. liver) had consistently higher concentrations of PFOS/PFHxS than flesh samples collected from the same individuals (Table 3.5).

Similar to mud crab samples, concentrations of PFOS/PFHxS in mullet were higher in samples from the Town Common than from the Bohle River and Rowes Bay (Figure 3.5). The highest concentration of PFOS/PFHxS overall (984 µg/kg) was detected in a composite liver sample from the Town Common.

PFOS/PFHxS was also detected in mullet samples collected from the comparative drainages, although at lower concentrations than in the IA.

Table 3.5 Concentrations of PFOS/PFHxS in mullet (*Mugil cephalus*) flesh and liver samples from all surveys.

Drainage	Sample Type	n	Minimum (µg/kg)	Maximum (µg/kg)	Mean (µg/kg)	(± S.E.)
Bohle River	flesh	10	0	9.00	2.58	2.44
	liver	10	3	60.00	19.68	18.84
Town Common	flesh	2	39	59.00	49.00	14.14
	liver	2	420	984.00	702.00	398.81
Rowes Bay	flesh	2	<LOR	1.30	0.65	0.92
	liver	1	62	62.00	62.00	–
Comparative	flesh	12	<LOR	7.90	0.66	2.28
	liver	9	<LOR	3.50	1.08	1.35

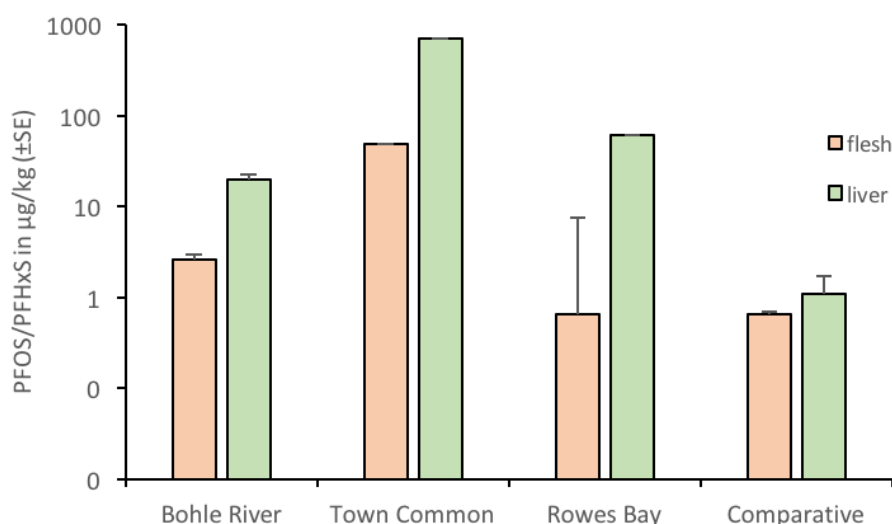


Figure 3.5 Concentrations (mean ± S.E.) of PFOS/PFHxS in mullet (*Mugil cephalus*) flesh and liver samples. Note the logarithmic scale on the vertical axis.



3.4 Quality Assurance / Quality Control

3.4.1 Rinsate Samples

The analysed QA/QC rinsate samples confirmed that the potential for sample contamination was low (Table 3.6). Specifically:

- The field blank collected was free of PFOS/PFHxS.
- PFOS/PFHxS was detected in the ice slurry used to euthanise fauna at all sites except Rowes Bay and Sandfly Creek (comparative). However, these samples of slurry were collected while biota was in the slurry. This suggests PFOS/PFHxS is present on the surface of biota, which is consistent with the results of the initial July survey (ESP 2018).
- PFOS/PFHxS was detected in low concentrations ($<0.105 \mu\text{g/L}$) in two equipment rinsates from the Bohle River. All other equipment rinsates were below the laboratory LOR.
- PFOS/PFHxS was detected in biota rinsate samples at most sites prior to sample preparation. These were generally in lower concentrations than in ice slurry samples. This suggests that PFOS/PFHxS was present on the surface of biota prior to sample preparation.

While PFOS/PFHxS was detected at most QA/QC procedural points, it is considered likely that the source of the PFOS/PFHxS was the environment (e.g. water or the surface of biota), and the rinsing procedures likely removed most or all of this contamination prior to sample preparation. Since the concentrations in equipment rinsates were very low, and generally lower than biota or ice slurry samples, contamination of biota samples from equipment is considered unlikely. There were no consistent trends to suggest that contamination of the biota samples from sampling equipment or sample handling had occurred.

3.4.2 Duplicate Samples

All inter-lab and internal QA/QC samples (replicates) did not exceed the acceptable limits for relative percent difference (RPD).

In addition, further investigation (including re-testing) was completed into the high concentrations recorded from mullet samples collected in the Town Common. This investigation confirmed that there is inherent heterogeneity in PFAS concentrations in biological tissue. However, the level of variation was considered acceptable by the laboratory, and was consistent with the NATA-accredited methodology used. This result highlights the importance of having a sufficiently large sample size when interpreting concentrations of PFAS in biota tissue.



Table 3.6 Concentrations of PFOS/PFHxS in QA/QC rinsate samples.

Rinsate Type	Drainage	PFOS/PFHxS (µg/L)
ice slurry*	BO002_ES, Bohle River	0.005
		0.022
		0.257
	BO007_ES, Town Common	0.074
		0.117
	BO010_ES, Rowes Bay	<LOR
	BO014_ES, Alligator Creek	0.037
	BO012_ES, Sandfly Creek	<LOR
equipment	BO002_ES, Bohle River	0.005
		0.104
		<LOR
	BO007_ES, Town Common	<LOR
	BO010_ES, Rowes Bay	<LOR
	BO014_ES, Alligator Creek	<LOR
	BO012_ES, Sandfly Creek	<LOR
biota prior to sample preparation	BO002_ES, Bohle River	0.003
		0.042
		0.044
	BO007_ES, Town Common	0.02
		0.107
	BO010_ES, Rowes Bay	0.004
	BO014_ES, Alligator Creek	<LOR
	BO012_ES, Sandfly Creek	0.038
Field Blank	BO007_ES, Town Common	<LOR

* ice slurry used to euthanise fauna, containing de-ionised water



4 Conclusions

The current surveys confirmed the findings of the initial July 2017 survey, i.e. that of the three primary PFAS chemicals that have sufficient toxicological information to derive ecological protection guidelines, PFOS and PFHxS occurred in most biota types, from most trophic levels within the IA, and in some biota types at comparative drainages (ESP 2018). PFOA, was only present in samples from the IA at low concentrations. Six other components of PFAS were detected in low concentrations, mostly from the IA.

PFOS/PFHxS was detected in a range of biota types within the IA and comparative drainages, and more frequently and in higher concentrations in the IA than the comparative drainages. No PFOS/PFHxS was detected in mangrove samples from either the IA or comparative sites.

Concentrations of PFOS/PFHxS in crustacean organs were higher than in flesh samples. The highest PFOS/PFHxS concentrations in crustaceans were detected in the IA; concentrations in mud crabs were highest in the Town Common, while concentrations in prawns were highest in the Bohle River.

Concentrations of PFOS/PFHxS above the LOR were also frequently detected in fish and liver tissues in the IA. Liver samples consistently showed higher concentrations of PFOS/PFHxS than tissue samples. This trend is consistent with the results of the previous survey (ESP 2018) and other marine and estuarine biota (Faxneld et al. 2014). No PFOS/PFHxS was detected in flesh samples from the comparative drainages.

The highest PFOS/ PFHxS concentrations overall were detected in liver tissues of detritivores (sea mullet, *Mugil cephalus*) from the Town Common. These concentrations may be indicative of a relatively high presence of PFOS/PFHxS in detritivore food sources within this system (detritus, benthic organisms and micro-algae (Blaber 1976, Tung 1981)). However, this result is based on the analysis of two samples only, and would need to be confirmed with additional sampling.

Other important fisheries species within the IA, such as mud crabs and banana prawns, had consistently high levels of PFOS/PFHxS in organs, but not in flesh. Mud crab and prawn samples collected from the comparative drainages had concentrations of PFOS/PFHxS that were low or below the laboratory limit of reporting.



5 References

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Attachment A Photographs of each Species Retained for Laboratory Analysis



Table A1 Biota species common / species name and the tissue sample type(s) analysed.



Mullet (*Mugil cephalus*), individual flesh and liver samples, composite flesh and liver samples.



Bream (*Acanthopagrus australis*), individual flesh and liver samples, composite flesh and liver samples.



Whiting (*Sillago* sp.), composite flesh sample.



Flathead (*Platycephalus fuscus*), composite flesh and liver samples.



Anchovy (*Engraulis australis*), composite flesh sample.



Estuary cod (*Epinephelus malabaricus*), individual flesh and liver samples.





Mangrove jack (*Lutjanus argentimaculatus*), individual flesh and liver samples.



Cattfish (*Neoarius graeffi*), individual flesh and liver samples; composite liver samples.



Grunter, or Javelin Fish (*Pomadasys argenteus*), individual and composite flesh and liver samples.



Queenfish (*Scomberoides tol*), individual flesh and liver samples.



Mud crab (*Scylla serrata*), individual flesh and organ samples.



Banana prawn (*Fenneropenaeus* sp.), composite flesh and organ samples.





Crab (Order Brachyura) from Rowes Bay, composite samples collected.



Stilted mangrove (*Rhizophora* sp.), composite samples collected.



Grey mangrove (*Avicennia marina*), composite samples collected.



Typical aggregation of mangrove detritus, composite samples.



Attachment B Laboratory Certificates of Analysis



CERTIFICATE OF ANALYSIS

Work Order	: ES1730645	Page	: 1 of 51
Client	: ECOLOGICAL SERVICE PROFESSIONALS	Laboratory	: Environmental Division Sydney
Contact	: REBECCA KING	Contact	: Customer Services ES
Address	: PO BOX 5935	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
	MANLY NSW, AUSTRALIA 4179		
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 1755	Date Samples Received	: 05-Dec-2017 10:50
Order number	: ----	Date Analysis Commenced	: 05-Dec-2017
C-O-C number	: ----	Issue Date	: 21-Dec-2017 10:26
Sampler	: ----		
Site	: ----		
Quote number	: SY/115/17 V4		
No. of samples received	: 121		
No. of samples analysed	: 117		



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Marc Centner	Technical Manager	Sydney Organics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW



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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS 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.

- EP231X: ALS is not NATA accredited for the analysis of PFAS in biota when performed under ALS Method EP231X.
- EP231X-LL (TOP): Surrogate recoveries below Data Quality Objective (DQO) on various samples due to matrix interferences. Insufficient sample provided for re-extraction and re-analysis.
- EP231X: Surrogate recoveries bias low and not determined due to sample matrix interferences and high dilutions, confirmed by re-extraction and re-analysis.
- EP231X: Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP231:Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_PO1	BO002_PF1	BO002_MJL1	BO002_MJF1	BO002_FHL1
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00
Compound	CAS Number	LOR	Unit		ES1730645-001	ES1730645-002	ES1730645-003	ES1730645-004	ES1730645-005
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		Fish	Fish	Fish	Fish	Fish
∅ Weight of Sample Prepared	----	0.1	g		14.0	27.1	19.5	72.9	14.8
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		141	5	2	<1	1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		2	<1	<2	<1	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		72.8	4.4	13.4	<0.5	21.5
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		7.2	<0.5	<4.0	<0.5	3.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		80	4	17	<1	25
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<2	<1	<2	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<2	<1	<2	<1	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<5	<2	<5	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_PO1	BO002_PF1	BO002_MJL1	BO002_MJF1	BO002_FHL1
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00
Compound	CAS Number	LOR	Unit		ES1730645-001	ES1730645-002	ES1730645-003	ES1730645-004	ES1730645-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<2	<1	<2	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<5	<2	<5	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<5	<2	<5	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<5	<2	<5	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<5	<2	<5	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<2	<1	<2	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<2	<1	<2	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		Not Determined	72.0	Not Determined	77.0	80.0
Ø 13C8-PFOA	----	1	%		Not Determined	60.0	Not Determined	87.0	48.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_FHF1	BO002_FHL2	BO002_FHF2	BO002_BF1	BO002_BL1
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00
Compound	CAS Number	LOR	Unit		ES1730645-006	ES1730645-007	ES1730645-008	ES1730645-009	ES1730645-010
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		Fish	Fish	Fish	Fish	Fish
∅ Weight of Sample Prepared	----	0.1	g		27.7	17.1	34.4	42.5	15.8
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		2.6	31.8	1.2	0.7	8.3
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	<4.0	<0.5	<0.5	0.7
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		3	35	1	<1	9
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<2	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<5	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_FHF1	BO002_FHL2	BO002_FHF2	BO002_BF1	BO002_BL1
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00
Compound	CAS Number	LOR	Unit		ES1730645-006	ES1730645-007	ES1730645-008	ES1730645-009	ES1730645-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<2	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<2	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<2	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		86.0	Not Determined	67.0	70.0	83.0
Ø 13C8-PFOA	----	1	%		71.0	Not Determined	64.0	63.0	47.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_CO1	BO002_CF1	BO002_MF1	BO002_ML1	BO002_MF2
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00
Compound	CAS Number	LOR	Unit		ES1730645-011	ES1730645-012	ES1730645-013	ES1730645-014	ES1730645-015
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
Ø Sample Description	----	-	--		Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g		19.8	57.6	34.2	97.5	31.8
EP231A: Perfluoroalkyl Sulfonic Acids									
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		8	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		21.4	<0.5	2.4	3.3	1.4
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<4.0	<0.5	<0.5	0.7	0.6
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		23	<1	2	4	2
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<2	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		5	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<2	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<5	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_CO1	BO002_CF1	BO002_MF1	BO002_ML1	BO002_MF2
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00
Compound	CAS Number	LOR	Unit		ES1730645-011	ES1730645-012	ES1730645-013	ES1730645-014	ES1730645-015
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<2	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<2	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<2	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		Not Determined	63.0	81.0	86.0	68.0
Ø 13C8-PFOA	----	1	%		Not Determined	53.0	72.0	45.0	76.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_ML2	BO002_MF3	BO002_ML3	BO002_MF4	BO002_ML4
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00
Compound	CAS Number	LOR	Unit		ES1730645-016	ES1730645-017	ES1730645-018	ES1730645-019	ES1730645-020
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		Fish	Fish	Fish	Fish	Fish
∅ Weight of Sample Prepared	----	0.1	g		12.9	156	15.4	30.7	15.6
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		13.9	<0.5	7.5	2.2	13.9
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		1.1	<0.5	0.5	0.8	1.1
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		15	<1	8	3	15
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_ML2	BO002_MF3	BO002_ML3	BO002_MF4	BO002_ML4
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00
Compound	CAS Number	LOR	Unit		ES1730645-016	ES1730645-017	ES1730645-018	ES1730645-019	ES1730645-020
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		80.0	64.0	86.0	63.0	84.0
Ø 13C8-PFOA	----	1	%		42.0	58.0	40.0	46.0	48.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_MF5	BO002_ML5	BO007_BF1	BO007_BL1	BO007_CO1
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	01-Dec-2017 16:00	01-Dec-2017 16:00	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-021	ES1730645-022	ES1730645-023	ES1730645-024	ES1730645-025
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		115	14.6	52.4	14.8	50.5
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<2	<2
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<2	21
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	3	20
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<2	<2
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		0.8	11.4	0.6	26.6	24.8
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	0.6	<0.5	<4.0	<4.0
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	12	<1	30	27
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<2	<2
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<2	16
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<2	5
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<2	12
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<2	<2
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<2	<2
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<2	<2
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<2	<2
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<1	<1	<2	<2
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<5	<5



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_MF5	BO002_ML5	BO007_BF1	BO007_BL1	BO007_CO1
Client sampling date / time					30-Nov-2017 16:00	30-Nov-2017 16:00	01-Dec-2017 16:00	01-Dec-2017 16:00	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-021	ES1730645-022	ES1730645-023	ES1730645-024	ES1730645-025
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<2	<2
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<5	<5
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<5	<5
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<5	<5
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<5	<5
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<2	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		85.0	87.0	62.0	Not Determined	Not Determined
Ø 13C8-PFOA	----	1	%		72.0	59.0	62.0	Not Determined	Not Determined



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CF1	BO007_CO2	BO007_CF2	BO007_CO3	BO007_CF3
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-026	ES1730645-027	ES1730645-028	ES1730645-029	ES1730645-030
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		68.9	61.5	134	46.9	64.4
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	3	<1	17	2
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	56	3	21	1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<2	<1	2	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<0.5	42.6	5.0	40.8	2.5
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	4.4	<0.5	5.2	0.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	47	5	46	3
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<2	<1	<2	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	4	<1	26	3
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<2	<1	7	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	15	<1	19	1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<5	<2	<5	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CF1	BO007_CO2	BO007_CF2	BO007_CO3	BO007_CF3
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-026	ES1730645-027	ES1730645-028	ES1730645-029	ES1730645-030
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<2	<1	<2	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<2	<1	<2	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<2	<1	<2	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		68.0	Not Determined	89.0	Not Determined	80.0
Ø 13C8-PFOA	----	1	%		43.0	Not Determined	64.0	Not Determined	65.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CO4	BO007_CF4	BO007_CO5	BO007_CF5	BO007_CO6
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-031	ES1730645-032	ES1730645-033	ES1730645-034	ES1730645-035
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		52.0	62.6	50.4	67.0	141
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<2	<1	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		2	2	16	<1	2
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		16	4	44	2	35
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<2	<1	2
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		12.8	<0.5	27.8	0.9	12.7
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		1.2	2.0	<4.0	1.1	4.3
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		14	2	30	2	17
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<2	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<2	<1	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		3	<1	4	<1	5
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<2	<1	2
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		4	<1	5	<1	4
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<2	<1	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<2	<1	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<2	<1	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<2	<1	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<1	<2	<1	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<5	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CO4	BO007_CF4	BO007_CO5	BO007_CF5	BO007_CO6
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-031	ES1730645-032	ES1730645-033	ES1730645-034	ES1730645-035
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<2	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<5	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<5	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<5	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<5	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<2	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<2	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		77.0	74.0	Not Determined	56.0	90.0
Ø 13C8-PFOA	----	1	%		45.0	61.0	Not Determined	40.0	59.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CF6	BO007_CO7	BO007_CF7	BO007_CO8	BO007_CF8_R1
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-036	ES1730645-037	ES1730645-038	ES1730645-039	ES1730645-040
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		49.8	70.2	68.1	68.3	72.3
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	2	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	7	<1	26	2
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<0.5	17.5	<0.5	11.7	1.5
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	0.5	<0.5	1.3	0.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	18	<1	13	2
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	4	<1	3	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	2	<1	1	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	7	<1	6	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	1	<1	<1	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CF6	BO007_CO7	BO007_CF7	BO007_CO8	BO007_CF8_R1
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-036	ES1730645-037	ES1730645-038	ES1730645-039	ES1730645-040
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		57.0	90.0	66.0	85.0	57.0
Ø 13C8-PFOA	----	1	%		36.0	50.0	41.0	53.0	46.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CF8_R2	BO002_BF2	BO002_ML6	BO002_MF6	BO002_BL3
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-041	ES1730645-042	ES1730645-044	ES1730645-045	ES1730645-046
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		69.6	57.6	42.4	31.9	19.9
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		2	<1	<1	<1	<2
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		0.6	<0.5	1.0	1.8	<2.5
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	<0.5	1.0	1.2	<2.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		1	<1	2	3	<2
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<5



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CF8_R2	BO002_BF2	BO002_ML6	BO002_MF6	BO002_BL3
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-041	ES1730645-042	ES1730645-044	ES1730645-045	ES1730645-046
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<2
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<5
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<5
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<5
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<5
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<2
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		72.0	75.0	91.0	63.0	70.0
Ø 13C8-PFOA	----	1	%		42.0	54.0	63.0	49.0	50.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_BF3_R1	BO002_BF3_R2	BO002_FHF3	BO002_FHL3	BO012_CF1_R1*
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-047	ES1730645-048	ES1730645-049	ES1730645-050	ES1730645-051
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		74.9	85.3	36.4	14.3	98.3
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<0.5	<0.5	<0.5	11.6	<0.5
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	<0.5	<0.5	12.4	<0.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	<1	<1	24	<1
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_BF3_R1	BO002_BF3_R2	BO002_FHF3	BO002_FHL3	BO012_CF1_R1*
Client sampling date / time					[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[01-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-047	ES1730645-048	ES1730645-049	ES1730645-050	ES1730645-051
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		63.0	97.0	65.0	63.0	99.0
Ø 13C8-PFOA	----	1	%		52.0	87.0	45.0	33.0	73.0

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_CF1_R2 *	BO012_CO1 *	BO012_CF2 *	BO012_CO2 *	BO012_CF3 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-052	ES1730645-053	ES1730645-054	ES1730645-055	ES1730645-056
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
Ø Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
Ø Weight of Sample Prepared	----	0.1	g		71.7	83.1	38.1	47.8	46.4
EP231A: Perfluoroalkyl Sulfonic Acids									
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<0.5	<2.5	<0.5	<2.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	<2.5	<0.5	<2.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<2	<1	<2	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<2	<1	<2	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<5	<2	<5	<2

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_CF1_R2 *	BO012_CO1 *	BO012_CF2 *	BO012_CO2 *	BO012_CF3 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-052	ES1730645-053	ES1730645-054	ES1730645-055	ES1730645-056
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<2	<1	<2	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<2	<1	<2	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<2	<1	<2	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		62.0	60.0	89.0	60.0	72.0
Ø 13C8-PFOA	----	1	%		42.0	60.0	47.0	40.0	64.0

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_CO3 *	BO012_CF4 *	BO012_CO4 *	BO012_CF5 *	BO012_CO5 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-057	ES1730645-058	ES1730645-059	ES1730645-060	ES1730645-061
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		40.2	47.5	49.7	50.4	39.8
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		6	<1	<2	<1	<2
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<2	<1	5	<1	<2
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<2.5	<0.5	<2.5	<0.5	<4.0
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<2.5	<0.5	<2.5	<0.5	<4.0
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<2	<1	<2	<1	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<2	<1	<2	<1	<2
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<5	<2	<5	<2	<5

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_CO3 *	BO012_CF4 *	BO012_CO4 *	BO012_CF5 *	BO012_CO5 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-057	ES1730645-058	ES1730645-059	ES1730645-060	ES1730645-061
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<2	<1	<2	<1	<2
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<5	<2	<5	<2	<5
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<5	<2	<5	<2	<5
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<5	<2	<5	<2	<5
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<5	<2	<5	<2	<5
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<2	<1	<2	<1	<2
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<2	<1	<2	<1	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		70.0	70.0	70.0	75.0	Not Determined
Ø 13C8-PFOA	----	1	%		30.0	43.0	60.0	54.0	Not Determined

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_CF6 *	BO012_CO6 *	BO012_CF7 *	BO012_CO7 *	BO012_CF8 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-062	ES1730645-063	ES1730645-064	ES1730645-065	ES1730645-066
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		54.5	47.4	58.1	142	37.0
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<0.5	<4.0	<0.5	<0.5	<0.5
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	<4.0	<0.5	<0.5	<0.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<2	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<2	<1	<1	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<5	<2	<2	<2

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_CF6 *	BO012_CO6 *	BO012_CF7 *	BO012_CO7 *	BO012_CF8 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-062	ES1730645-063	ES1730645-064	ES1730645-065	ES1730645-066
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<2	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<2	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<2	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		71.0	Not Determined	81.0	84.0	64.0
Ø 13C8-PFOA	----	1	%		42.0	Not Determined	42.0	39.0	40.0

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_CO8 *	BO012_GF1_R1 *	BO012_GF1_R2 *	BO012_GL1 *	BO012_QF1_R1 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-067	ES1730645-068	ES1730645-069	ES1730645-070	ES1730645-071
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		50.1	55.7	50.1	17.4	108
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<4.0	<0.5	<0.5	<4.0	<0.5
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<4.0	<0.5	<0.5	<4.0	<0.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<2	<1	<1	4	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<2	<1	<1	<2	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<5	<2	<2	<5	<2

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_CO8 *	BO012_GF1_R1 *	BO012_GF1_R2 *	BO012_GL1 *	BO012_QF1_R1 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-067	ES1730645-068	ES1730645-069	ES1730645-070	ES1730645-071
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<2	<1	<1	<2	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<5	<2	<2	<5	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<5	<2	<2	<5	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<5	<2	<2	<5	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<5	<2	<2	<5	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<2	<1	<1	<2	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<2	<1	<1	<2	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		Not Determined	64.0	50.0	Not Determined	84.0
Ø 13C8-PFOA	----	1	%		Not Determined	30.0	32.0	Not Determined	24.0

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_QF1_R2*	BO012_QL1 *	BO012_BL1 *	BO012_BF1 *	BO012_GF2 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-072	ES1730645-073	ES1730645-074	ES1730645-075	ES1730645-078
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
Ø Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
Ø Weight of Sample Prepared	----	0.1	g		70.8	28.1	15.2	50.8	119
EP231A: Perfluoroalkyl Sulfonic Acids									
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<0.5	<4.0	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	<4.0	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<2	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<2	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<5	<2	<2	<2

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_QF1_R2 *	BO012_QL1 *	BO012_BL1 *	BO012_BF1 *	BO012_GF2 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-072	ES1730645-073	ES1730645-074	ES1730645-075	ES1730645-078
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<2	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<5	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<2	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<2	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		33.0	Not Determined	84.0	91.0	69.0
Ø 13C8-PFOA	----	1	%		16.0	Not Determined	42.0	42.0	52.0

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_GL2 *	BO012_GF3 *	BO012_GL3 *	BO012_MF1_R1 *	BO012_MF1_R2 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-079	ES1730645-080	ES1730645-081	ES1730645-082	ES1730645-083
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		16.5	31.7	13.5	43.9	31.9
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<4.0	<0.5	<0.5	<0.5	<0.5
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<4.0	<0.5	<0.5	<0.5	<0.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<2	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<5	<2	<2	<2	<2

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_GL2 *	BO012_GF3 *	BO012_GL3 *	BO012_MF1_R1 *	BO012_MF1_R2 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-079	ES1730645-080	ES1730645-081	ES1730645-082	ES1730645-083
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<2	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<2	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<2	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		Not Determined	62.0	69.0	60.0	64.0
Ø 13C8-PFOA	----	1	%		Not Determined	53.0	73.0	69.0	70.0

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_ML1 *	BO012_MF2 *	BO012_ML2 *	BO012_MF3 *	BO012_ML3 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-084	ES1730645-085	ES1730645-086	ES1730645-087	ES1730645-088
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
Ø Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
Ø Weight of Sample Prepared	----	0.1	g		29.7	37.8	15.2	48.5	28.9
EP231A: Perfluoroalkyl Sulfonic Acids									
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_ML1 *	BO012_MF2 *	BO012_ML2 *	BO012_MF3 *	BO012_ML3 *
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-084	ES1730645-085	ES1730645-086	ES1730645-087	ES1730645-088
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		63.0	99.0	78.0	65.0	90.0
Ø 13C8-PFOA	----	1	%		69.0	114	76.0	61.0	87.0

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_PO1 *	BO012_PF1 *	BO012_PO2 *	BO012_PF2 *	BO002_CO2
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[03-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-089	ES1730645-090	ES1730645-091	ES1730645-092	ES1730645-093
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		24.5	35.2	18.0	38.1	91.4
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	11
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<0.5	<0.5	<0.5	<0.5	23.2
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	<0.5	<0.5	<0.5	<4.0
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	<1	<1	<1	24
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	9
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	3
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	4
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<2
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<5

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_PO1 *	BO012_PF1 *	BO012_PO2 *	BO012_PF2 *	BO002_CO2
Client sampling date / time					[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]	[03-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-089	ES1730645-090	ES1730645-091	ES1730645-092	ES1730645-093
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<2
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<5
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<5
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<5
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<5
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<2
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		77.0	61.0	84.0	83.0	100
Ø 13C8-PFOA	----	1	%		63.0	66.0	66.0	75.0	80.0

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_CF2	BO002_CO3	BO002_CF3	BO002_CO4	BO002_CF4
Client sampling date / time					[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-094	ES1730645-095	ES1730645-096	ES1730645-097	ES1730645-098
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		69.8	65.4	59.5	67.3	49.5
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	10	<1	7	<1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		<0.5	24.0	<0.5	13.4	1.0
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	<4.0	<0.5	<4.0	<0.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	25	<1	15	1
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<2	<1	<2	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<2	<1	3	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	5	<1	3	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<1	<2	<1	<2	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<5	<2	<5	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_CF2	BO002_CO3	BO002_CF3	BO002_CO4	BO002_CF4
Client sampling date / time					[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-094	ES1730645-095	ES1730645-096	ES1730645-097	ES1730645-098
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<2	<1	<2	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<5	<2	<5	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<2	<1	<2	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<2	<1	<2	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		65.0	110	65.0	90.0	61.0
Ø 13C8-PFOA	----	1	%		60.0	70.0	69.0	60.0	66.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_ML7	BO002_MF7	BO002_ML8	BO002_MF8	BO002_FHF4
Client sampling date / time					[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-099	ES1730645-100	ES1730645-101	ES1730645-102	ES1730645-103
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
∅ Sample Description	----	-	--		FISH	FISH	FISH	FISH	FISH
∅ Weight of Sample Prepared	----	0.1	g		15.0	68.3	14.8	61.8	37.3
EP231A: Perfluoroalkyl Sulfonic Acids									
∅ Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		20.8	1.6	8.7	2.0	<0.5
∅ Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<4.0	<0.5	3.3	1.0	<0.5
∅ Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		24	2	12	3	<1
∅ Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<2	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
∅ Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
∅ Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg		<2	<1	<1	<1	<1
∅ Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<5	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_ML7	BO002_MF7	BO002_ML8	BO002_MF8	BO002_FHF4
Client sampling date / time					[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-099	ES1730645-100	ES1730645-101	ES1730645-102	ES1730645-103
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<2	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<5	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<2	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<2	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		110	64.0	82.0	112	79.0
Ø 13C8-PFOA	----	1	%		60.0	77.0	42.0	54.0	26.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO002_FHL4	BO002_GF1	BO002_GL1 BO002_BL1	BO002_BL2 BO007_BL2	----
Client sampling date / time				[03-Dec-2017]	[03-Dec-2017]	03-Dec-2017 00:00	01-Dec-2017 00:00	----
Compound	CAS Number	LOR	Unit	ES1730645-104	ES1730645-105	ES1730645-120	ES1730645-121	-----
				Result	Result	Result	Result	----
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	FISH	FISH	fish	fish	----
Ø Weight of Sample Prepared	----	0.1	g	13.3	28.5	0.5	2.4	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	5.5	<0.5	5.5	<4.0	----
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	3.5	<0.5	0.5	<4.0	----
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	9	<1	6	<2	----
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<2	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	----
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluorotridecanoic acid (PFTriDA)	72629-94-8	1	µg/kg	<1	<1	<1	<2	----
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<5	----



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

BO002_FHL4

BO002_GF1

BO002_GL1
BO002_BL1

BO002_BL2
BO007_BL2

Client sampling date / time

[03-Dec-2017]

[03-Dec-2017]

03-Dec-2017 00:00

01-Dec-2017 00:00

Compound

CAS Number

LOR

Unit

ES1730645-104

ES1730645-105

ES1730645-120

ES1730645-121

Result

Result

Result

Result

EP231C: Perfluoroalkyl Sulfonamides

Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<2	----
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<5	----
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<5	----
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<5	----
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<5	----
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<2	----
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<2	----

EP231D: (n:2) Fluorotelomer Sulfonic Acids

Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	----
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	----
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	----
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	----

EP231S: PFAS Surrogate

Ø 13C4-PFOS	----	1	%	95.0	86.0	213	Not Determined	----
Ø 13C8-PFOA	----	1	%	36.0	49.0	118	Not Determined	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO002_RE	BO002_RS	BO002_RB	BO007_FB_R1	BO007_RS_R1
Client sampling date / time				30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	01-Dec-2017 16:00	01-Dec-2017 16:00
Compound	CAS Number	LOR	Unit	ES1730645-107	ES1730645-108	ES1730645-109	ES1730645-110	ES1730645-111
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.032
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.005	0.005	0.003	<0.002	0.085
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.017
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.003	<0.002	<0.002	<0.002	0.025
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.011
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.015	<0.002	<0.002	<0.002	0.028
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO002_RE	BO002_RS	BO002_RB	BO007_FB_R1	BO007_RS_R1
Client sampling date / time				30-Nov-2017 16:00	30-Nov-2017 16:00	30-Nov-2017 16:00	01-Dec-2017 16:00	01-Dec-2017 16:00
Compound	CAS Number	LOR	Unit	ES1730645-107	ES1730645-108	ES1730645-109	ES1730645-110	ES1730645-111
				Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.012	0.009	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.025	0.017	0.012	<0.002	0.198
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.005	0.005	0.003	<0.002	0.117
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.025	0.005	0.003	<0.002	0.198
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	76.5	27.5	37.0	36.5	43.5
13C8-PFOA	----	0.002	%	79.5	38.0	52.0	53.5	48.0



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO007_RB_R1	BO002_RE_R1	BO012_RE *	BO012_RB	BO012_R5
Client sampling date / time				01-Dec-2017 16:00	01-Dec-2017 16:00	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit	ES1730645-112	ES1730645-113	ES1730645-114	ES1730645-115	ES1730645-116
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.022	<0.002	<0.002	<0.002	0.006
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.085	<0.002	<0.002	<0.002	0.031
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.021	<0.002	<0.002	<0.002	<0.002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.034	<0.002	<0.002	<0.002	0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.013	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.033	0.003	<0.002	<0.002	<0.002
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BO007_RB_R1	BO002_RE_R1	BO012_RE *	BO012_RB *	BO012_R5 *
Client sampling date / time					01-Dec-2017 16:00	01-Dec-2017 16:00	[02-Dec-2017]	[02-Dec-2017]	[02-Dec-2017]
Compound	CAS Number	LOR	Unit		ES1730645-112	ES1730645-113	ES1730645-114	ES1730645-115	ES1730645-116
					Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L		<0.005	0.010	<0.005	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L		0.208	0.013	<0.002	<0.002	0.039
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L		0.107	<0.002	<0.002	<0.002	0.037
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L		0.208	0.003	<0.002	<0.002	0.039
EP231_TOP_S: PFAS Surrogate									
13C4-PFOS	----	0.002	%		51.5	75.5	82.5	51.5	40.5
13C8-PFOA	----	0.002	%		52.5	62.5	67.5	72.0	29.0

*Sample collected from Site BO014 Alligator Creek



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO002_RE_031217	BO002_RB_031217	BO002_R5_031217	----	----
Client sampling date / time				[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	----	----
Compound	CAS Number	LOR	Unit	ES1730645-117	ES1730645-118	ES1730645-119	-----	-----
				Result	Result	Result	----	----
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.005	<0.002	<0.002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.005	<0.002	<0.002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.022	<0.002	0.062	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	0.003	<0.002	<0.002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.082	0.044	0.195	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	----	----
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.004	<0.002	<0.002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.007	<0.002	0.032	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.002	<0.002	0.009	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.006	<0.002	0.019	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BO002_RE_031217	BO002_RB_031217	BO002_R5_031217	----	----
Client sampling date / time					[03-Dec-2017]	[03-Dec-2017]	[03-Dec-2017]	----	----
Compound	CAS Number	LOR	Unit		ES1730645-117	ES1730645-118	ES1730645-119	-----	-----
				Result	Result	Result		----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L		<0.005	<0.005	<0.005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L		<0.005	<0.005	<0.005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L		<0.002	<0.002	<0.002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L		<0.002	<0.002	<0.002	----	----
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L		<0.005	<0.005	<0.005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L		<0.005	0.005	0.007	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L		<0.005	<0.005	<0.005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L		<0.005	<0.005	<0.005	----	----
EP231_TOP_P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L		0.136	0.049	0.324	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L		0.104	0.044	0.257	----	----
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L		0.136	0.044	0.317	----	----
EP231_TOP_S: PFAS Surrogate									
13C4-PFOS	----	0.002	%		82.5	52.5	55.0	----	----
13C8-PFOA	----	0.002	%		86.0	65.0	36.5	----	----

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Work Order : ES1730645
Client : ECOLOGICAL SERVICE PROFESSIONALS
Project : 1755



Surrogate Control Limits

Sub-Matrix: FISH		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	50	130
13C8-PFOA	----	50	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231_TOP_S: PFAS Surrogate			
13C4-PFOS	----	60	130
13C8-PFOA	----	60	130

QUALITY CONTROL REPORT

Work Order	: ES1730645	Page	: 1 of 27
Client	: ECOLOGICAL SERVICE PROFESSIONALS	Laboratory	: Environmental Division Sydney
Contact	: REBECCA KING	Contact	: Customer Services ES
Address	: PO BOX 5935 MANLY NSW, AUSTRALIA 4179	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 1755	Date Samples Received	: 05-Dec-2017
Order number	: ----	Date Analysis Commenced	: 05-Dec-2017
C-O-C number	: ----	Issue Date	: 21-Dec-2017
Sampler	: ----		
Site	: ----		
Quote number	: SY/115/17 V4		
No. of samples received	: 121		
No. of samples analysed	: 117		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Marc Centner	Technical Manager	Sydney Organics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW



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: BIOTA

Sub-Matrix: BIOTA				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: 1291577)									
ES1730645-002	BO002_PF1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	5	4	29.1	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	4	3	40.6	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
ES1730645-011	BO002_CO1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	8	8	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	23	21	11.8	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<2	<2	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1291580)									
ES1730645-021	BO002_MF5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
ES1730645-031	BO007_CO4	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	2	2	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	16	17	0.00	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	14	14	0.00	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291582)									
ES1730645-041	BO007_CF8_R2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	2	2	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	1	2	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
ES1730645-051	BO012_CF1_R1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1291584)									
ES1730645-061	BO012_CO5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<2	<2	0.00	No Limit
ES1730645-071	BO012_QF1_R1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1291587)									
ES1730645-082	BO012_MF1_R1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
ES1730645-091	BO012_PO2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1291592)									
ES1730645-101	BO002_ML8	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1291592) - continued									
ES1730645-101	BO002_ML8	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	12	12	0.00	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1312058)									
ES1730645-121	BO002_BL2 BO007_BL2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<2	<2	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1291577)									
ES1730645-002	BO002_PF1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
		ES1730645-011	BO002_CO1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<2	<2
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			1	µg/kg	<2	<2	0.00	No Limit
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			1	µg/kg	<2	<2	0.00	No Limit
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1			1	µg/kg	5	4	23.2	No Limit
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			1	µg/kg	<2	<2	0.00	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			1	µg/kg	<2	<2	0.00	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			1	µg/kg	<2	<2	0.00	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			1	µg/kg	<2	<2	0.00	No Limit
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			1	µg/kg	<2	<2	0.00	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			2	µg/kg	<5	<5	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4			5	µg/kg	<5	<5	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1291580)									
ES1730645-021	BO002_MF5	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1291580) - continued									
ES1730645-021	BO002_MF5	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
ES1730645-031	BO007_CO4	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	3	2	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	4	4	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
		EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1291582)							
ES1730645-041	BO007_CF8_R2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
		ES1730645-051	BO012_CF1_R1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			2	µg/kg	<2	<2	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1291582) - continued									
ES1730645-051	BO012_CF1_R1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1291584)									
ES1730645-061	BO012_CO5	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
ES1730645-071	BO012_QF1_R1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1291587)									
ES1730645-082	BO012_MF1_R1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
ES1730645-091	BO012_PO2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1291587) - continued									
ES1730645-091	BO012_PO2	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1291592)									
ES1730645-101	BO002_ML8	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1312058)									
ES1730645-121	BO002_BL2 BO007_BL2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1291577)									
ES1730645-002	BO002_PF1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291577) - continued									
ES1730645-002	BO002_PF1	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1730645-011	BO002_CO1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1291580)									
ES1730645-021	BO002_MF5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1730645-031	BO007_CO4	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291580) - continued									
ES1730645-031	BO007_CO4	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1291582)									
ES1730645-041	BO007_CF8_R2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1730645-051	BO012_CF1_R1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1291584)									
ES1730645-061	BO012_CO5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<5	<5	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1291584) - continued									
ES1730645-061	BO012_CO5	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	0.00	No Limit
ES1730645-071	BO012_QF1_R1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1291587)									
ES1730645-082	BO012_MF1_R1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1730645-091	BO012_PO2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit



Sub-Matrix: BIOTA				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: 1291587) - continued									
ES1730645-091	BO012_PO2	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1291592)									
ES1730645-101	BO002_ML8	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1312058)									
ES1730645-121	BO002_BL2 BO007_BL2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1291577)									
ES1730645-002	BO002_PF1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit

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Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1291577) - continued									
ES1730645-002	BO002_PF1	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1730645-011	BO002_CO1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1291580)									
ES1730645-021	BO002_MF5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1730645-031	BO007_CO4	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1291582)									
ES1730645-041	BO007_CF8_R2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1730645-051	BO012_CF1_R1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit

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Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291582) - continued									
ES1730645-051	BO012_CF1_R1	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1291584)									
ES1730645-061	BO012_CO5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1730645-071	BO012_QF1_R1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1291587)									
ES1730645-082	BO012_MF1_R1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1730645-091	BO012_PO2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1291592)									
ES1730645-101	BO002_ML8	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit

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 Work Order : ES1730645
 Client : ECOLOGICAL SERVICE PROFESSIONALS
 Project : 1755



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1291592) - continued									
ES1730645-101	BO002_ML8	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1312058)									
ES1730645-121	BO002_BL2 BO007_BL2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	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: BIOTA

Sub-Matrix: BIOTA				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: 1291577)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	80.0	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	75.8	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	78.4	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	79.9	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	70.9	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	69.8	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1291580)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	86.3	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	85.8	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	105	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	75.8	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	71.6	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	61.9	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1291582)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	70.6	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	73.0	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	75.2	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	83.9	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	70.6	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	79.0	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1291584)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	113	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	97.8	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	100	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	67.9	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	75.8	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	73.7	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1291587)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	2.5 µg/kg	65.8	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	2.5 µg/kg	92.5	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	2.5 µg/kg	71.9	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	2.5 µg/kg	93.7	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	2.5 µg/kg	85.2	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	2.5 µg/kg	89.4	50	130

Method Blank (MB) Report

Spike

Spike Recovery (%)

Recovery Limits (%)

CAS Number

LOR

Unit

Result

Concentration

LCS

Low

High

EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	80.0	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	99.4	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	98.0	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	83.0	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	77.2	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	75.3	50	130

EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	114	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	71.5	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	119	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	78.7	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	79.7	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	92.8	50	130

EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	87.4	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	91.5	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	82.9	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	78.8	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	71.6	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	71.6	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	71.4	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	76.2	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	75.2	50	130
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	66.6	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	79.1	50	130

EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	97.8	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	104	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	95.6	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	101	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	96.4	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	84.5	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	85.0	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	66.7	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	84.7	50	130
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	66.5	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	93.4	50	130

EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1291582)



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291582) - continued								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	73.8	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	73.5	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	89.6	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	77.4	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	74.4	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	84.0	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	79.9	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	69.5	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	72.6	50	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	68.7	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	75.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1291584)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	84.0	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	81.2	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	112	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	117	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	79.8	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	117	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	89.2	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	77.9	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	79.0	50	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	84.8	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	94.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1291587)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	12.5 µg/kg	89.3	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	2.5 µg/kg	90.7	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	2.5 µg/kg	98.2	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	2.5 µg/kg	96.5	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	2.5 µg/kg	84.8	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	2.5 µg/kg	87.3	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	2.5 µg/kg	85.0	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	2.5 µg/kg	85.8	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	2.5 µg/kg	89.8	50	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	2.5 µg/kg	78.9	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	6.25 µg/kg	86.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1291592)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	83.6	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	98.8	50	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291592) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	82.7	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	76.7	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	79.8	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	107	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	112	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	64.4	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	67.8	50	130
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	64.4	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	111	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1312058)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	90.2	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	114	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	109	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	95.6	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	68.8	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	83.7	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	73.4	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	72.8	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	65.8	50	130
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	63.4	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	91.7	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291577)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	79.8	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	82.4	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	81.6	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	84.3	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	76.6	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	66.2	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	81.4	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291580)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	68.7	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	75.0	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	87.8	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	82.4	50	130



Sub-Matrix: BIOTA

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291580) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	80.2	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	62.9	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	73.1	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291582)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	66.6	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	80.5	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	77.7	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	81.0	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	82.5	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	68.1	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	93.0	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291584)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	96.8	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	79.2	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	113	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	83.0	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	84.2	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	70.2	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	90.2	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291587)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	2.5 µg/kg	76.1	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	6.25 µg/kg	88.0	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	6.25 µg/kg	88.4	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	6.25 µg/kg	76.0	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	6.25 µg/kg	93.0	50	130

Sub-Matrix: BIOTA				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: 1291587) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	2.5 µg/kg	93.0	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	2.5 µg/kg	87.1	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291592)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	113	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	87.9	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	108	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	116	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	98.7	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	93.6	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	98.3	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1312058)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	79.4	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	85.2	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	78.2	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	84.9	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	81.6	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	62.0	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	73.8	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291577)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	80.6	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	69.6	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	64.8	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	107	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291580)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	103	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	89.4	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	95.4	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	104	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291582)								



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291582) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	96.0	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	83.8	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	84.0	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	111	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291584)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	110	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	112	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	113	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	110	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291587)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	2.5 µg/kg	80.6	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	2.5 µg/kg	77.8	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	2.5 µg/kg	81.3	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	2.5 µg/kg	103	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291592)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	89.2	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	114	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	90.6	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	68.9	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1312058)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	93.9	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	101	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	90.2	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	117	50	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: BIOTA

				Matrix Spike (MS) Report			
				Spike	Spike Recovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1291577)							
ES1730645-002	BO002_PF1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	5 µg/kg	119	30	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	5 µg/kg	114	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	5 µg/kg	77.6	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	5 µg/kg	66.0	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	5 µg/kg	92.0	50	130

Matrix Spike (MS) Report

<i>Spike</i>	<i>SpikeRecovery</i> (%)	<i>Recovery Limits (%)</i>	
<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291577) - continued							
ES1730645-002	BO002_PF1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	79.8	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	113	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	108	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	112	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	88.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	106	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	101	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	84.8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	80.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	52.4	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	107	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1291580)							
ES1730645-023	BO007_BF1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	72.6	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	99.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	97.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	91.6	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	71.6	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	76.0	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	71.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	58.0	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	54.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	52.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	77.4	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1291582)							
ES1730645-042	BO002_BF2	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	73.0	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	78.4	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	92.8	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	82.8	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	75.6	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	77.2	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	68.8	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	70.0	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	87.6	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	56.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	73.9	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1291584)							
ES1730645-062	BO012_CF6	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	67.1	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	67.2	50	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291584) - continued							
ES1730645-062	BO012_CF6	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	109	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	115	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	57.2	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	75.6	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	67.2	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	57.6	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	56.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	68.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	75.4	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1291587)							
ES1730645-082	BO012_MF1_R1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	12.5 µg/kg	92.6	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	2.5 µg/kg	111	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	2.5 µg/kg	128	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	2.5 µg/kg	119	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	2.5 µg/kg	108	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	2.5 µg/kg	103	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	2.5 µg/kg	87.2	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	2.5 µg/kg	88.8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	2.5 µg/kg	99.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2.5 µg/kg	95.2	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	6.25 µg/kg	123	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1291592)							
ES1730645-102	BO002_MF8	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	66.7	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	89.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	119	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	120	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	66.4	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	102	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	83.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	60.8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	58.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	59.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	106	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291577)							
ES1730645-002	BO002_PF1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	104	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	83.8	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	65.3	30	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291577) - continued							
ES1730645-002	BO002_PF1	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	64.0	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	68.5	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	88.4	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	104	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291580)							
ES1730645-023	BO007_BF1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	79.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	58.2	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	53.4	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	65.3	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	51.5	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	72.0	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	68.0	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291582)							
ES1730645-042	BO002_BF2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	75.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	64.6	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	54.7	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	58.7	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	69.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	70.4	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	86.0	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291584)							
ES1730645-062	BO012_CF6	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	80.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	52.8	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	50.1	30	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291584) - continued							
ES1730645-062	BO012_CF6	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	51.8	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	48.3	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	54.0	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	53.2	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291587)							
ES1730645-082	BO012_MF1_R1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	2.5 µg/kg	103	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	6.25 µg/kg	81.3	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	6.25 µg/kg	62.7	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	6.25 µg/kg	72.0	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	6.25 µg/kg	93.8	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	2.5 µg/kg	99.2	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	2.5 µg/kg	124	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1291592)							
ES1730645-102	BO002_MF8	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	123	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	72.2	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	90.1	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	70.7	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	61.4	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	66.8	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	70.4	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291577)							
ES1730645-002	BO002_PF1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	125	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	111	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	113	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	115	50	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1291580)							
ES1730645-023	BO007_BF1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	112	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	92.4	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	71.2	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	108	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291582)							
ES1730645-042	BO002_BF2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	117	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	103	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	96.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	110	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291584)							
ES1730645-062	BO012_CF6	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	111	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	122	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	106	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	117	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291587)							
ES1730645-082	BO012_MF1_R1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2.5 µg/kg	99.2	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2.5 µg/kg	99.2	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2.5 µg/kg	92.0	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2.5 µg/kg	117	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1291592)							
ES1730645-102	BO002_MF8	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	109	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	114	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	91.6	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	109	50	130

CERTIFICATE OF ANALYSIS

Work Order : **ES1732353**
Client : **ECOLOGICAL SERVICE PROFESSIONALS**
Contact : REBECCA KING
Address : PO BOX 5935
 MANLY NSW, AUSTRALIA 4179
Telephone : ----
Project : 1755 PFAS IN BIOTA
Order number : ----
C-O-C number : ----
Sampler : REBECCA KING/CHRIS BRAUN
Site : ----
Quote number : SY/115/17 V4
No. of samples received : 134
No. of samples analysed : 134

Page : 1 of 59
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 19-Dec-2017 10:30
Date Analysis Commenced : 02-Jan-2018
Issue Date : 16-Jan-2018 18:20



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
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW



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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS 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.

- EP231X: ALS is not NATA accredited for the analysis of PFAS in biota when performed under ALS Method EP231X.
- EP231X-LL (TOP): Poor surrogate recoveries on samples "BO007_RE_171214_R1" & "BO007_RB_171214_R1" is due to possible matrix interferences. Insufficient sample provided for re-extraction & re-analysis.



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO002_C05	BO002_CF5	BO002_C06	BO002_CF6	BO002_CFF1
Client sampling date / time				12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-001	ES1732353-002	ES1732353-003	ES1732353-004	ES1732353-005
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	47.7	102	33.3	30.7	31.9
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	6	<1	7	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	10.2	<0.5	18.6	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	1.8	<0.5	2.4	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	12	<1	21	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	1	<1	4	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	2	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	6	<1	9	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_C05	BO002_CF5	BO002_C06	BO002_CF6	BO002_CFF1
Client sampling date / time					12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-001	ES1732353-002	ES1732353-003	ES1732353-004	ES1732353-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		106	52.0	70.0	61.0	66.0
Ø 13C8-PFOA	----	1	%		99.0	59.0	65.0	84.0	69.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO002_CFL1	BO002_MF10	BO002_ML10	BO002_PO2	BO002_PF2
Client sampling date / time				12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-006	ES1732353-007	ES1732353-008	ES1732353-009	ES1732353-010
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Sample Description	----	-	--	Organ	Fish	Organ	Prawn	Prawn
Weight of Sample Prepared	----	0.1	g	0.6	56.1	0.5	17.1	17.5

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	3	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	1.3	52.3	31.8	1.0
Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	0.7	7.7	2.2	<0.5
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	2	60	34	1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	2	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_CFL1	BO002_MF10	BO002_ML10	BO002_PO2	BO002_PF2
Client sampling date / time					12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-006	ES1732353-007	ES1732353-008	ES1732353-009	ES1732353-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		74.0	72.0	82.0	85.0	72.0
Ø 13C8-PFOA	----	1	%		71.0	64.0	74.0	72.0	88.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_PO3	BO002_PF3	BO002_PO4_R1	BO002_PF4_R1	BO012_PO3_R1
Client sampling date / time					12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-011	ES1732353-012	ES1732353-013	ES1732353-014	ES1732353-015
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
Ø Sample Description	----	-	--		Prawn	Prawn	Prawn	Prawn	Prawn
Ø Weight of Sample Prepared	----	0.1	g		13.4	14.2	11.3	14.7	21.1
EP231A: Perfluoroalkyl Sulfonic Acids									
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		5	<1	8	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		1	<1	2	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		46.8	1.4	70.0	1.9	3.2
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		2.2	0.6	3.0	<0.5	0.8
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		49	2	73	2	4
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		1	<1	2	<1	8
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO002_PO3	BO002_PF3	BO002_PO4_R1	BO002_PF4_R1	BO012_PO3_R1
Client sampling date / time					12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-011	ES1732353-012	ES1732353-013	ES1732353-014	ES1732353-015
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		107	56.0	114	51.0	93.0
Ø 13C8-PFOA	----	1	%		85.0	71.0	86.0	81.0	72.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_PO8	BO012_PF3_R1	BO012_PF8	BO012_PO4	BO012_PF4
Client sampling date / time					13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-016	ES1732353-017	ES1732353-018	ES1732353-019	ES1732353-020
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
Ø Sample Description	----	-	--		Prawn	Prawn	Prawn	Prawn	Prawn
Ø Weight of Sample Prepared	----	0.1	g		31.0	23.4	32.4	27.7	29.6
EP231A: Perfluoroalkyl Sulfonic Acids									
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		1.8	<0.5	<0.5	1.4	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		1.2	<0.5	<0.5	0.6	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		3	<1	<1	2	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		10	<1	<1	5	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_PO8	BO012_PF3_R1	BO012_PF8	BO012_PO4	BO012_PF4
Client sampling date / time					13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-016	ES1732353-017	ES1732353-018	ES1732353-019	ES1732353-020
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		89.0	51.0	61.0	113	96.0
Ø 13C8-PFOA	----	1	%		96.0	78.0	73.0	79.0	109



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO012_PO5	BO012_PF5	BO012_PO6	BO012_PF6	BO012_PO7
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-021	ES1732353-022	ES1732353-023	ES1732353-024	ES1732353-025
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Prawn	Prawn	Prawn	Prawn	Prawn
Ø Weight of Sample Prepared	----	0.1	g	73.0	23.1	36.8	30.8	39.2
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	3	<1	5	<1	5
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_PO5	BO012_PF5	BO012_PO6	BO012_PF6	BO012_PO7
Client sampling date / time					13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-021	ES1732353-022	ES1732353-023	ES1732353-024	ES1732353-025
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		77.0	55.0	115	58.0	87.0
Ø 13C8-PFOA	----	1	%		61.0	51.0	68.0	51.0	76.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO012_PF7	BO012_MF4	BO012_ML4	BO012_MF5	BO012_ML5
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-026	ES1732353-027	ES1732353-028	ES1732353-029	ES1732353-030
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Prawn	Fish	Organ	Fish	Organ
Ø Weight of Sample Prepared	----	0.1	g	30.9	25.7	1.4	18.5	1.9
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	2.2	<0.5	1.1
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	0.9
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	2	<1	2
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	5	<1	4
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_PF7	BO012_MF4	BO012_ML4	BO012_MF5	BO012_ML5
Client sampling date / time					13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-026	ES1732353-027	ES1732353-028	ES1732353-029	ES1732353-030
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		67.0	76.0	95.0	70.0	90.0
Ø 13C8-PFOA	----	1	%		71.0	68.0	99.0	80.0	99.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO012_MF6	BO012_MF7	BO012_MF8	BO012_BF2_R1	BO012_BF2_R2
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-031	ES1732353-032	ES1732353-033	ES1732353-034	ES1732353-035
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	16.0	24.3	22.0	40.8	42.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_MF6	BO012_MF7	BO012_MF8	BO012_BF2_R1	BO012_BF2_R2
Client sampling date / time					13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-031	ES1732353-032	ES1732353-033	ES1732353-034	ES1732353-035
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		72.0	61.0	64.0	76.0	60.0
Ø 13C8-PFOA	----	1	%		83.0	72.0	84.0	94.0	97.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO012_BL2_R1	BO012_BF3	BO012_BL3	BO012_BF4	BO012_MJF1_R1
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-036	ES1732353-037	ES1732353-038	ES1732353-039	ES1732353-040
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Organ	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	0.9	35.3	1.9	0.8	37.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_BL2_R1	BO012_BF3	BO012_BL3	BO012_BF4	BO012_MJF1_R1
Client sampling date / time					13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-036	ES1732353-037	ES1732353-038	ES1732353-039	ES1732353-040
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		112	58.0	94.0	78.0	73.0
Ø 13C8-PFOA	----	1	%		101	65.0	82.0	83.0	86.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO012_MJF1_R2	BO012_MJL1	BO012_GF3	BO012_WF1	BO012_TSF1
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-041	ES1732353-042	ES1732353-043	ES1732353-044	ES1732353-045
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Organ	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	28.4	0.6	2.4	9.7	8.3
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	2.9	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	3	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	3	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO012_MJF1_R2	BO012_MJL1	BO012_GF3	BO012_WF1	BO012_TSF1
Client sampling date / time					13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-041	ES1732353-042	ES1732353-043	ES1732353-044	ES1732353-045
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		85.0	122	62.0	83.0	64.0
Ø 13C8-PFOA	----	1	%		71.0	79.0	73.0	91.0	63.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO012_QW1	BO012_AF1	BO010_CO1	BO010_CF1	BO007_PO1 BO007_PO1_R1
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-046	ES1732353-047	ES1732353-048	ES1732353-049	ES1732353-050
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Prawn
Ø Weight of Sample Prepared	----	0.1	g	4.2	11.0	26.0	18.0	9.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	1.2	<0.5	5.8	<0.5	18.4
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	2.2	<0.5	0.6
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	1	<1	8	<1	19
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	2	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO012_QW1	BO012_AF1	BO010_CO1	BO010_CF1	BO007_PO1 BO007_PO1_R1
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-046	ES1732353-047	ES1732353-048	ES1732353-049	ES1732353-050
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	86.0	78.0	101	68.0	69.0
Ø 13C8-PFOA	----	1	%	84.0	71.0	70.0	70.0	79.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO007_PF1 BO007_PF1_R1	BO007_PO2	BO007_PF2	BO007_PO3	BO007_PF3
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-051	ES1732353-052	ES1732353-053	ES1732353-054	ES1732353-055
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Prawn	Prawn	Prawn	Fish	Prawn
Ø Weight of Sample Prepared	----	0.1	g	23.7	32.6	18.1	14.3	18.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	3	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	1.1	23.1	1.1	30.3	1.3
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	0.9	<0.5	0.7	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	1	24	1	31	1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO007_PF1 BO007_PF1_R1	BO007_PO2	BO007_PF2	BO007_PO3	BO007_PF3
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-051	ES1732353-052	ES1732353-053	ES1732353-054	ES1732353-055
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	64.0	94.0	53.0	96.0	93.0
Ø 13C8-PFOA	----	1	%	73.0	92.0	70.0	90.0	65.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO007_PO4	BO007_PF4	BO007_AF1 BO007_A1	BO007_CFL1_R1	BO007_CFL1_R2
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-056	ES1732353-057	ES1732353-058	ES1732353-059	ES1732353-060
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Prawn	Prawn	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	20.8	19.8	2.8	15.1	12.3
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	2	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	34.2	1.1	7.6	48.9	47.0
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	1.8	<0.5	<0.5	4.1	2.0
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	36	1	8	53	49
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO007_PO4	BO007_PF4	BO007_AF1 BO007_A1	BO007_CFL1_R1	BO007_CFL1_R2
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-056	ES1732353-057	ES1732353-058	ES1732353-059	ES1732353-060
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	94.0	64.0	65.0	101	77.0
Ø 13C8-PFOA	----	1	%	68.0	67.0	55.0	73.0	70.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO007_CFF1_R1	BO007_CFF1_R2	BO007_CFL2	BO007_CFF2	BO007_CFL3
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-061	ES1732353-062	ES1732353-063	ES1732353-064	ES1732353-065
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g	134	152	0.6	40.5	1.2
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	21	<1	74
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	14	<1	12
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	0.5	<0.5	315	10.0	173
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	71.0	1.0	44.0
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	386	11	217
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	2	<1	5
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	2	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CFF1_R1	BO007_CFF1_R2	BO007_CFL2	BO007_CFF2	BO007_CFL3
Client sampling date / time					14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-061	ES1732353-062	ES1732353-063	ES1732353-064	ES1732353-065
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		66.0	74.0	64.0	51.0	67.0
Ø 13C8-PFOA	----	1	%		79.0	85.0	75.0	64.0	57.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CFF3	BO007_BF2	BO007_BL2	BO007_BF3	BO007_BL3
Client sampling date / time					14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-066	ES1732353-067	ES1732353-068	ES1732353-069	ES1732353-070
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
Ø Sample Description	----	-	--		Fish	Fish	Fish	Fish	Fish
Ø Weight of Sample Prepared	----	0.1	g		38.5	26.2	1.0	23.1	0.4
EP231A: Perfluoroalkyl Sulfonic Acids									
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	2
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		1.4	1.9	78.8	6.8	113
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		0.6	<0.5	7.2	<0.5	7.0
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		2	2	86	7	120
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CFF3	BO007_BF2	BO007_BL2	BO007_BF3	BO007_BL3
Client sampling date / time					14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-066	ES1732353-067	ES1732353-068	ES1732353-069	ES1732353-070
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	2
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		65.0	51.0	74.0	58.0	67.0
Ø 13C8-PFOA	----	1	%		72.0	66.0	68.0	58.0	78.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO007_CODF1_R1	BO007_CODF1_R2	BO007_CODL1	BO007_CODF2	BO007_CODL2
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-071	ES1732353-072	ES1732353-073	ES1732353-074	ES1732353-075
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Organ
Ø Weight of Sample Prepared	----	0.1	g	30.7	33.3	0.8	41.9	0.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	1	<1	3
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	1.0	<0.5	40.2	1.4	58.9
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	6.8	<0.5	7.1
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	1	<1	47	1	66
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_CODF1_R1	BO007_CODF1_R2	BO007_CODL1	BO007_CODF2	BO007_CODL2
Client sampling date / time					14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-071	ES1732353-072	ES1732353-073	ES1732353-074	ES1732353-075
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		53.0	52.0	62.0	50.0	53.0
Ø 13C8-PFOA	----	1	%		61.0	52.0	54.0	56.0	57.0



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_GF1	BO007_GL1	BO007_GF2	BO007_GL2	BO007_MF1
Client sampling date / time					14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-076	ES1732353-077	ES1732353-078	ES1732353-079	ES1732353-080
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
Ø Sample Description	----	-	--		Fish	Organ	Fish	Organ	Fish
Ø Weight of Sample Prepared	----	0.1	g		15.8	0.2	27.2	0.4	5.0
EP231A: Perfluoroalkyl Sulfonic Acids									
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg		4.2	114	1.4	63.0	50.7
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg		<0.5	3.0	0.6	5.0	8.3
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		4	117	2	68	59
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg		<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids									
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg		<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_GF1	BO007_GL1	BO007_GF2	BO007_GL2	BO007_MF1
Client sampling date / time					14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-076	ES1732353-077	ES1732353-078	ES1732353-079	ES1732353-080
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	5	<1	2	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		61.0	69.0	50.0	63.0	68.0
Ø 13C8-PFOA	----	1	%		70.0	55.0	66.0	61.0	82.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO007_ML1	BO007_MF2	BO007_ML2	BO007_MF1	BO010_CODF1
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-081	ES1732353-082	ES1732353-083	ES1732353-084	ES1732353-085
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Fish	Fish	Fish	Organ	Fish
Ø Weight of Sample Prepared	----	0.1	g	0.8	2.0	0.7	0.6	27.1
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	3	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	854	33.1	344	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	129	5.9	76.0	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	983	39	420	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	2	<1	3	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	12	<1	6	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO007_ML1	BO007_MF2	BO007_ML2	BO007_MF1	BO010_CODF1
Client sampling date / time					14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-081	ES1732353-082	ES1732353-083	ES1732353-084	ES1732353-085
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		76.0	62.0	95.0	53.0	51.0
Ø 13C8-PFOA	----	1	%		66.0	53.0	66.0	51.0	52.0



Analytical Results

Sub-Matrix: FISH
 (Matrix: BIOTA)

Client sample ID

				BO010_CODL1	BO010_MJF1	BO010_MJL1	----	----
Client sampling date / time				15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1732353-086	ES1732353-087	ES1732353-088	-----	-----
				Result	Result	Result	----	----
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Organ	Fish	Organ	----	----
Ø Weight of Sample Prepared	----	0.1	g	0.8	37.0	0.9	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	----	----
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	----	----
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	9.4	----	----
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	2.6	----	----
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	12	----	----
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	----	----
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	----	----
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	----	----
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	----	----
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	----	----



Analytical Results

Sub-Matrix: FISH (Matrix: BIOTA)				Client sample ID	BO010_CODL1	BO010_MJF1	BO010_MJL1	----	----
Client sampling date / time					15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1732353-086	ES1732353-087	ES1732353-088	-----	-----
				Result	Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	----	----
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	----	----
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	----	----
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	----	----
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	----	----
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	----	----
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	----	----
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	----	----
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	----	----
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	----	----
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%	54.0	54.0	59.0	59.0	----	----
Ø 13C8-PFOA	----	1	%	52.0	53.0	58.0	58.0	----	----



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

				BO012_MANGL1_R1	BO012_MANGL1_R2	BO012_MANGL2	BO012_MANGL3	BO012_MANGL4
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-089	ES1732353-090	ES1732353-091	ES1732353-092	ES1732353-093
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	PLANT	PLANT	PLANT	PLANT	PLANT
Ø Weight of Sample Prepared	----	0.1	g	21.5	64.5	48.6	61.9	66.4
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

				BO012_MANGL1_R1	BO012_MANGL1_R2	BO012_MANGL2	BO012_MANGL3	BO012_MANGL4
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-089	ES1732353-090	ES1732353-091	ES1732353-092	ES1732353-093
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231P: PFAS Sums								
^ Ø Sum of PFAS	----	1	µg/kg	<1	----	----	----	----
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	52.0	52.0	50.0	64.0	51.0
Ø 13C8-PFOA	----	1	%	54.0	54.0	57.0	59.0	58.0



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

Client sampling date / time				BO012_MANGD1	BO012_MANGD2_R1	BO012_MANGD2_R2	BO012_MANG D3	BO012_MANG D4
13-Dec-2017 00:00				13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-094	ES1732353-095	ES1732353-096	ES1732353-097	ES1732353-098
Result				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	PLANT	PLANT	PLANT	PLANT	PLANT
Ø Weight of Sample Prepared	----	0.1	g	51.5	98.8	67.1	57.1	25.3
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

				BO012_MANGD1	BO012_MANGD2_R1	BO012_MANGD2_R2	BO012_MANG D3	BO012_MANG D4
Client sampling date / time				13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-094	ES1732353-095	ES1732353-096	ES1732353-097	ES1732353-098
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	55.0	56.0	56.0	60.0	56.0
Ø 13C8-PFOA	----	1	%	54.0	54.0	57.0	52.0	53.0



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

Client sampling date / time				BO007_MANG L1	BO007_MANG D1	BO007_MANG L2	BO007_MANG D2	BO007_MANG L3
14-Dec-2017 00:00				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-099	ES1732353-100	ES1732353-101	ES1732353-102	ES1732353-103
Result				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	PLANT	PLANT	PLANT	PLANT	PLANT
Ø Weight of Sample Prepared	----	0.1	g	51.7	24.7	57.5	22.8	40.1

EP231A: Perfluoroalkyl Sulfonic Acids

Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1

EP231B: Perfluoroalkyl Carboxylic Acids

Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

				BO007_MANG L1	BO007_MANG D1	BO007_MANG L2	BO007_MANG D2	BO007_MANG L3
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-099	ES1732353-100	ES1732353-101	ES1732353-102	ES1732353-103
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	65.0	65.0	51.0	59.0	51.0
Ø 13C8-PFOA	----	1	%	77.0	62.0	62.0	61.0	50.0



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

Client sampling date / time				BO007_MANG D3	BO007_MANG L4	BO007_MANG D4	BO002_MANG L1	BO002_MANG D1
14-Dec-2017 00:00				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-104	ES1732353-105	ES1732353-106	ES1732353-107	ES1732353-108
Result				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	PLANT	PLANT	PLANT	PLANT	PLANT
Ø Weight of Sample Prepared	----	0.1	g	46.1	34.0	31.4	31.3	31.9

EP231A: Perfluoroalkyl Sulfonic Acids

Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1

EP231B: Perfluoroalkyl Carboxylic Acids

Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: PLANT (Matrix: BIOTA)				Client sample ID	BO007_MANG D3	BO007_MANG L4	BO007_MANG D4	BO002_MANG L1	BO002_MANG D1
Client sampling date / time					14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732353-104	ES1732353-105	ES1732353-106	ES1732353-107	ES1732353-108
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		82.0	75.0	52.0	51.0	93.0
Ø 13C8-PFOA	----	1	%		65.0	64.0	59.0	61.0	58.0



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

				BO002_MANG L2	BO002_MANG D2	BO002_MANG L3	BO002_MANG D3	BO002_MANG L4
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-109	ES1732353-110	ES1732353-111	ES1732353-112	ES1732353-113
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Leaf	Leaf	Leaf	Leaf	Leaf
Ø Weight of Sample Prepared	----	0.1	g	57.5	47.5	46.3	20.5	47.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

				BO002_MANG L2	BO002_MANG D2	BO002_MANG L3	BO002_MANG D3	BO002_MANG L4
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-109	ES1732353-110	ES1732353-111	ES1732353-112	ES1732353-113
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	69.0	55.0	52.0	68.0	50.0
Ø 13C8-PFOA	----	1	%	62.0	66.0	60.0	60.0	59.0



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

				BO002_MANG D4	BO010_MANG L1	BO010_MANG D1	BO010_MANG L2	BO010_MANG D2
Client sampling date / time				14-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-114	ES1732353-115	ES1732353-116	ES1732353-117	ES1732353-118
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Leaf	Leaf	Leaf	Leaf	Leaf
Ø Weight of Sample Prepared	----	0.1	g	24.7	30.0	23.5	31.3	19.3
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	<1
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	<1
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

				BO002_MANG D4	BO010_MANG L1	BO010_MANG D1	BO010_MANG L2	BO010_MANG D2
Client sampling date / time				14-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-114	ES1732353-115	ES1732353-116	ES1732353-117	ES1732353-118
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
Ø 13C4-PFOS	----	1	%	64.0	50.0	53.0	51.0	51.0
Ø 13C8-PFOA	----	1	%	67.0	56.0	59.0	58.0	60.0



Analytical Results

Sub-Matrix: PLANT
 (Matrix: BIOTA)

Client sample ID

				BO010_MANG L3	BO010_MANG D3	BO010_MANG L4	BO010_MANG D4	----
Client sampling date / time				15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	----
Compound	CAS Number	LOR	Unit	ES1732353-119	ES1732353-120	ES1732353-121	ES1732353-122	-----
				Result	Result	Result	Result	----
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Leaf	Leaf	Leaf	Leaf	----
Ø Weight of Sample Prepared	----	0.1	g	48.4	28.1	38.8	34.0	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Ø Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	----
Ø Perfluorooctane sulfonic acid (PFOS) - Branched	----	0.5	µg/kg	<0.5	<0.5	<0.5	<0.5	----
Ø Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	<1	<1	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Ø Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	----
Ø Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	<1	<1	----
Ø Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	----



Analytical Results

Sub-Matrix: PLANT (Matrix: BIOTA)				Client sample ID	BO010_MANG L3	BO010_MANG D3	BO010_MANG L4	BO010_MANG D4	----
Client sampling date / time					15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	15-Dec-2017 00:00	----
Compound	CAS Number	LOR	Unit		ES1732353-119	ES1732353-120	ES1732353-121	ES1732353-122	-----
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides									
Ø Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg		<1	<1	<1	<1	----
Ø N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg		<2	<2	<2	<2	----
Ø N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	----
Ø N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	----
Ø N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	----
Ø N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	----
Ø N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
Ø 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	----
Ø 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	----
Ø 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	----
Ø 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	----
EP231S: PFAS Surrogate									
Ø 13C4-PFOS	----	1	%		52.0	52.0	63.0	71.0	----
Ø 13C8-PFOA	----	1	%		58.0	60.0	62.0	59.0	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO002_RS_171212	BO002_RE_171212	BO002_RB_171212	BO012_RE_171213	BO012_RB_171213
Client sampling date / time				12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-123	ES1732353-124	ES1732353-125	ES1732353-126	ES1732353-127
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.004
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.004	<0.002	<0.002	<0.002	0.012
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.018	<0.002	0.042	<0.002	0.026
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.09	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.003	0.003	0.007	<0.002	0.003
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.004
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.003
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO002_RS_171212	BO002_RE_171212	BO002_RB_171212	BO012_RE_171213	BO012_RB_171213
Client sampling date / time				12-Dec-2017 00:00	12-Dec-2017 00:00	12-Dec-2017 00:00	13-Dec-2017 00:00	13-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-123	ES1732353-124	ES1732353-125	ES1732353-126	ES1732353-127
				Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.025	0.003	0.139	<0.002	0.054
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.022	<0.002	0.042	<0.002	0.038
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.025	0.003	0.139	<0.002	0.054
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	78.0	112	65.0	102	92.0
13C8-PFOA	----	0.002	%	71.5	74.0	98.5	96.0	81.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO012_RS_171213	BO007_RE_171214_R 1	BO007_RS_171214_R 1	BO007_RB_171214_R 1	BO010_RE_171215
Client sampling date / time				13-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	15-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-128	ES1732353-129	ES1732353-130	ES1732353-131	ES1732353-132
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	<0.002	0.005	0.004	<0.002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	<0.002	0.069	0.016	<0.002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.003	0.002	<0.002	0.002	0.002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	0.004	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO012_RS_171213	BO007_RE_171214_R 1	BO007_RS_171214_R 1	BO007_RB_171214_R 1	BO010_RE_171215
Client sampling date / time				13-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	15-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732353-128	ES1732353-129	ES1732353-130	ES1732353-131	ES1732353-132
				Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.007	0.002	0.074	0.022	0.002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	<0.002	<0.002	0.074	0.020	<0.002
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.007	0.002	0.074	0.022	0.002
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	66.5	110	64.5	40.5	91.5
13C8-PFOA	----	0.002	%	63.0	13.5	63.0	52.5	60.0



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO010_RS_171215	BO010_RB_171215	----	----	----
Client sampling date / time				15-Dec-2017 00:00	15-Dec-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1732353-133	ES1732353-134	-----	-----	-----
				Result	Result	----	----	----
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.004	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	----	----	----
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO010_RS_171215	BO010_RB_171215	----	----	----
Client sampling date / time				15-Dec-2017 00:00	15-Dec-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1732353-133	ES1732353-134	-----	-----	-----
				Result	Result	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	----	----	----
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	----	----	----
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	<0.002	0.004	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	<0.002	0.004	----	----	----
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	<0.002	0.004	----	----	----
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	63.0	80.5	----	----	----
13C8-PFOA	----	0.002	%	85.5	85.0	----	----	----



Surrogate Control Limits

Sub-Matrix: FISH		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	50	130
13C8-PFOA	----	50	130

Sub-Matrix: PLANT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	50	130
13C8-PFOA	----	50	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231_TOP_S: PFAS Surrogate			
13C4-PFOS	----	60	130
13C8-PFOA	----	60	130

QUALITY CONTROL REPORT

Work Order	: ES1732353	Page	: 1 of 30
Client	: ECOLOGICAL SERVICE PROFESSIONALS	Laboratory	: Environmental Division Sydney
Contact	: REBECCA KING	Contact	: Customer Services ES
Address	: PO BOX 5935 MANLY NSW, AUSTRALIA 4179	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 1755 PFAS IN BIOTA	Date Samples Received	: 19-Dec-2017
Order number	: ----	Date Analysis Commenced	: 02-Jan-2018
C-O-C number	: ----	Issue Date	: 16-Jan-2018
Sampler	: REBECCA KING/CHRIS BRAUN		
Site	: ----		
Quote number	: SY/115/17 V4		
No. of samples received	: 134		
No. of samples analysed	: 134		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW



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: BIOTA

Sub-Matrix: BIOTA				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: 1352353)									
ES1732353-001	BO002_C05	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	6	4	28.4	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	12	10	15.0	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
ES1732353-011	BO002_PO3	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	5	5	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	1	2	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	49	48	2.11	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1352356)									
ES1732353-021	BO012_PO5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
ES1732353-031	BO012_MF6	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit

EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1358613)



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1358613) - continued									
ES1732353-101	BO007_MANG L2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
ES1732353-111	BO002_MANG L3	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1358614)									
ES1732353-121	BO010_MANG L4	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	<1	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1352353)									
ES1732353-001	BO002_C05	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	6	4	50.8	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
ES1732353-011	BO002_PO3	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1352353) - continued									
ES1732353-011	BO002_PO3	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1352356)									
ES1732353-021	BO012_PO5	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	3	3	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
ES1732353-031	BO012_MF6	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1352357)									
ES1732353-041	BO012_MJF1_R2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
ES1732353-051	BO007_PF1 BO007_PF1_R1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1352357) - continued									
ES1732353-051	BO007_PF1 BO007_PF1_R1	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit	
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1352358)									
ES1732353-061	BO007_CFF1_R1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
			EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00
ES1732353-071	BO007_CODF1_R1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
			EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1352359)									
ES1732353-084	BO007_MF1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit

Sub-Matrix: BIOTA				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: 1352359) - continued									
ES1732353-084	BO007_MF1	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
ES1732353-091	BO012_MANGL2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
		EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1358613)							
ES1732353-101	BO007_MANG L2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
		ES1732353-111	BO002_MANG L3	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8			1	µg/kg	<1	<1	0.00	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			2	µg/kg	<2	<2	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4			5	µg/kg	<5	<5	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1358614)									



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1358614) - continued									
ES1732353-121	BO010_MANG L4	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit		
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1352353)									
ES1732353-001	BO002_C05	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
		ES1732353-011	BO002_PO3	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1		µg/kg	<1	<1	0.00	No Limit	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1		µg/kg	<1	<1	0.00	No Limit	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2		µg/kg	<2	<2	0.00	No Limit	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2		µg/kg	<2	<2	0.00	No Limit	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2		µg/kg	<2	<2	0.00	No Limit	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2		µg/kg	<2	<2	0.00	No Limit	
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1352356)									
ES1732353-021	BO012_PO5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1352356) - continued									
ES1732353-021	BO012_PO5	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-031	BO012_MF6	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1352357)									
ES1732353-041	BO012_MJF1_R2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-051	BO007_Pf1 BO007_Pf1_R1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1352357) - continued									
ES1732353-051	BO007_PF1 BO007_PF1_R1	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1352358)									
ES1732353-061	BO007_CFF1_R1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-071	BO007_CODF1_R1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1352359)									
ES1732353-084	BO007_MF1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1352359) - continued									
ES1732353-084	BO007_MF1	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-091	BO012_MANGL2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1358613)									
ES1732353-101	BO007_MANG L2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-111	BO002_MANG L3	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1358613) - continued									
ES1732353-111	BO002_MANG L3	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1358614)									
ES1732353-121	BO010_MANG L4	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1352353)									
ES1732353-001	BO002_C05	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-011	BO002_PO3	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit

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 Work Order : ES1732353
 Client : ECOLOGICAL SERVICE PROFESSIONALS
 Project : 1755 PFAS IN BIOTA



Sub-Matrix: BIOTA				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: 1352353) - continued									
ES1732353-011	BO002_PO3	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1352356)									
ES1732353-021	BO012_PO5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-031	BO012_MF6	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1352357)									
ES1732353-041	BO012_MJF1_R2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-051	BO007_PF1 BO007_PF1_R1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1352358)									
ES1732353-061	BO007_CFF1_R1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1352358) - continued									
ES1732353-061	BO007_CFF1_R1	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-071	BO007_CODF1_R1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1352359)									
ES1732353-084	BO007_MF1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-091	BO012_MANGL2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1358613)									
ES1732353-101	BO007_MANG L2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1732353-111	BO002_MANG L3	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit



Sub-Matrix: BIOTA				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: 1358613) - continued									
ES1732353-111	BO002_MANG L3	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1358614)									
ES1732353-121	BO010_MANG L4	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 1352353)									
ES1732353-001	BO002_C05	EP231X: Sum of PFAS	----	1	µg/kg	25	# 18	32.6	0% - 20%
ES1732353-011	BO002_PO3	EP231X: Sum of PFAS	----	1	µg/kg	56	55	1.80	0% - 20%
EP231P: PFAS Sums (QC Lot: 1352356)									
ES1732353-021	BO012_PO5	EP231X: Sum of PFAS	----	1	µg/kg	3	3	0.00	No Limit
ES1732353-031	BO012_MF6	EP231X: Sum of PFAS	----	1	µg/kg	<1	<1	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 1352357)									
ES1732353-041	BO012_MJF1_R2	EP231X: Sum of PFAS	----	1	µg/kg	<1	<1	0.00	No Limit
ES1732353-051	BO007_PF1 BO007_PF1_R1	EP231X: Sum of PFAS	----	1	µg/kg	1	<1	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 1352358)									
ES1732353-061	BO007_CFF1_R1	EP231X: Sum of PFAS	----	1	µg/kg	<1	<1	0.00	No Limit
ES1732353-071	BO007_CODF1_R1	EP231X: Sum of PFAS	----	1	µg/kg	1	2	66.7	No Limit
EP231P: PFAS Sums (QC Lot: 1352359)									
ES1732353-084	BO007_MF1	EP231X: Sum of PFAS	----	1	µg/kg	<1	<1	0.00	No Limit
ES1732353-091	BO012_MANGL2	EP231X: Sum of PFAS	----	1	µg/kg	<1	<1	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 1358613)									
ES1732353-101	BO007_MANG L2	EP231X: Sum of PFAS	----	1	µg/kg	<1	<1	0.00	No Limit
ES1732353-111	BO002_MANG L3	EP231X: Sum of PFAS	----	1	µg/kg	<1	<1	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 1358614)									
ES1732353-121	BO010_MANG L4	EP231X: Sum of PFAS	----	1	µg/kg	<1	<1	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: **BIOTA**

Sub-Matrix: BIOTA				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: 1352353)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	70.2	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	55.4	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	67.8	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	83.1	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	73.2	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	76.1	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1352356)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	57.0	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	58.6	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	61.8	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	75.8	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	67.8	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	69.8	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1352357)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	82.8	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	65.9	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	67.2	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	86.3	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	77.7	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	84.6	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1352358)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	66.6	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	59.4	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	58.8	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	76.4	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	73.2	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	69.9	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1352359)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	66.5	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	64.7	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	60.7	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	75.0	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	70.0	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	65.9	50	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1352357) - continued								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	95.2	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	120	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	106	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	78.3	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	89.3	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	76.8	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	84.6	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	88.9	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	83.2	50	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	89.4	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	125	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1352358)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	75.6	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	90.6	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	82.3	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	66.6	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	83.2	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	64.0	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	72.9	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	84.1	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	71.9	50	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	71.1	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	88.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1352359)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	78.1	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	88.9	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	86.4	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	69.8	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	80.2	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	65.3	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	73.7	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	77.0	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	67.4	50	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	65.9	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	89.3	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1358613)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	79.0	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	88.2	50	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1358613) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	84.8	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	68.3	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	80.4	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	67.2	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	75.0	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	83.8	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	73.3	50	130
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	69.6	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	87.7	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1358614)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	71.3	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	88.6	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	84.2	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	66.5	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	79.9	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	60.5	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	68.4	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	69.9	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	76.0	50	130
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	64.9	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	126	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352353)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	66.6	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	72.4	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	64.5	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	78.6	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	74.2	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	66.8	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	58.1	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352356)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	65.4	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	55.1	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	70.0	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	71.2	50	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352356) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	59.5	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	57.6	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	62.8	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352357)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	86.9	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	72.5	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	82.0	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	62.8	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	94.4	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	87.4	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	66.4	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352358)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	66.7	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	61.5	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	74.2	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	74.1	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	65.6	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	68.5	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	82.6	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352359)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	65.0	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	58.6	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	80.2	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	74.4	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	70.0	50	130

Sub-Matrix: BIOTA				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound		CAS Number	LOR		Unit	Result	Spike Concentration	Spike Recovery (%) LCS
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352359) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)		2355-31-9	1	µg/kg	<1	5 µg/kg	61.4	50 130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)		2991-50-6	1	µg/kg	<1	5 µg/kg	59.4	50 130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1358613)								
EP231X: Perfluorooctane sulfonamide (FOSA)		754-91-6	1	µg/kg	<1	5 µg/kg	66.1	50 130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)		31506-32-8	2	µg/kg	<2	12.5 µg/kg	51.2	50 130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)		4151-50-2	2	µg/kg	<2	12.5 µg/kg	64.9	50 130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)		24448-09-7	2	µg/kg	<2	12.5 µg/kg	73.7	50 130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)		1691-99-2	2	µg/kg	<2	12.5 µg/kg	55.8	50 130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)		2355-31-9	1	µg/kg	<1	5 µg/kg	75.6	50 130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)		2991-50-6	1	µg/kg	<1	5 µg/kg	76.0	50 130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1358614)								
EP231X: Perfluorooctane sulfonamide (FOSA)		754-91-6	1	µg/kg	<1	5 µg/kg	51.4	50 130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)		31506-32-8	2	µg/kg	<2	12.5 µg/kg	62.6	50 130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)		4151-50-2	2	µg/kg	<2	12.5 µg/kg	54.8	50 130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)		24448-09-7	2	µg/kg	<2	12.5 µg/kg	84.6	50 130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)		1691-99-2	2	µg/kg	<2	12.5 µg/kg	51.3	50 130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)		2355-31-9	1	µg/kg	<1	5 µg/kg	63.4	50 130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)		2991-50-6	1	µg/kg	<1	5 µg/kg	75.7	50 130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352353)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)		757124-72-4	2	µg/kg	<2	5 µg/kg	63.8	50 130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)		27619-97-2	2	µg/kg	<2	5 µg/kg	56.9	50 130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)		39108-34-4	2	µg/kg	<2	5 µg/kg	60.9	50 130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)		120226-60-0	2	µg/kg	<2	5 µg/kg	119	50 130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352356)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)		757124-72-4	2	µg/kg	<2	5 µg/kg	56.1	50 130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)		27619-97-2	2	µg/kg	<2	5 µg/kg	54.6	50 130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)		39108-34-4	2	µg/kg	<2	5 µg/kg	59.2	50 130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)		120226-60-0	2	µg/kg	<2	5 µg/kg	105	50 130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352357)								



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352357) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	68.3	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	67.6	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	78.1	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	113	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352358)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	58.1	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	52.8	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	57.8	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	112	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352359)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	89.0	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	86.0	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	70.5	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	125	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1358613)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	83.0	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	71.7	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	68.2	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	124	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1358614)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	62.2	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	63.7	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	88.7	50	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	113	50	130
EP231P: PFAS Sums (QCLot: 1352353)								
EP231X: Sum of PFAS	----	1	µg/kg	<1	----	----	----	----
EP231P: PFAS Sums (QCLot: 1352356)								
EP231X: Sum of PFAS	----	1	µg/kg	<1	----	----	----	----
EP231P: PFAS Sums (QCLot: 1352357)								
EP231X: Sum of PFAS	----	1	µg/kg	<1	----	----	----	----
EP231P: PFAS Sums (QCLot: 1352358)								
EP231X: Sum of PFAS	----	1	µg/kg	<1	----	----	----	----
EP231P: PFAS Sums (QCLot: 1352359)								
EP231X: Sum of PFAS	----	1	µg/kg	<1	----	----	----	----
EP231P: PFAS Sums (QCLot: 1358613)								
EP231X: Sum of PFAS	----	1	µg/kg	<1	----	----	----	----
EP231P: PFAS Sums (QCLot: 1358614)								



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1352359) - continued							
ES1732353-082	BO007_MF2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	5 µg/kg	52.0	30	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	5 µg/kg	51.2	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	5 µg/kg	57.6	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	5 µg/kg	72.8	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	5 µg/kg	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	5 µg/kg	63.2	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1358613)							
ES1732353-102	BO007_MANG D2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	5 µg/kg	63.2	30	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	5 µg/kg	51.2	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	5 µg/kg	54.1	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	5 µg/kg	50.0	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	5 µg/kg	57.4	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	5 µg/kg	50.6	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1358614)							
ES1732353-122	BO010_MANG D4	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	5 µg/kg	64.0	30	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	5 µg/kg	56.5	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	5 µg/kg	59.0	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	5 µg/kg	91.5	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	5 µg/kg	82.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	5 µg/kg	104	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1352353)							
ES1732353-002	BO002_CF5	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	83.2	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	95.0	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	75.2	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	62.4	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	83.4	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	55.2	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	60.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	56.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	55.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	5 µg/kg	62.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	99.5	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1352356)							
ES1732353-022	BO012_PF5	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	101	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	93.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	76.0	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	68.8	30	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1352356) - continued							
ES1732353-022	BO012_PF5	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	87.6	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	63.2	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	75.2	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	78.8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	71.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	68.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	89.3	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1352357)							
ES1732353-042	BO012_MJL1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	87.6	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	125	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	103	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	82.8	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	81.3	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	75.2	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	65.1	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	74.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	69.6	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	54.9	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	96.4	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1352358)							
ES1732353-062	BO007_CFF1_R2	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	51.5	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	65.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	58.8	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	46.4	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	62.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	51.2	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	53.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	51.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	54.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	53.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	57.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1352359)							
ES1732353-082	BO007_MF2	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	67.8	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	87.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	72.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	65.6	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	75.2	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	55.6	50	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1352359) - continued							
ES1732353-082	BO007_MF2	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	70.8	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	70.4	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	69.6	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	60.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	64.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1358613)							
ES1732353-102	BO007_MANG D2	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	57.6	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	53.5	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	82.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	62.9	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	56.1	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	52.0	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	51.4	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	57.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	54.9	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	54.4	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	109	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1358614)							
ES1732353-122	BO010_MANG D4	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	78.2	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	93.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	85.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	68.2	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	84.2	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	57.2	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	62.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	59.9	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	68.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	66.8	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	110	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352353)							
ES1732353-002	BO002_CF5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	52.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	59.3	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	64.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	40.4	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	34.9	30	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1352353) - continued							
ES1732353-002	BO002_CF5	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	67.0	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	74.5	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352356)							
ES1732353-022	BO012_PF5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	74.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	62.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	60.3	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	62.2	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	34.4	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	82.4	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	57.6	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352357)							
ES1732353-042	BO012_MJL1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	69.9	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	41.6	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	88.4	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	80.0	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	61.0	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	84.7	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	64.8	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352358)							
ES1732353-062	BO007_CFF1_R2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	50.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	40.3	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	37.9	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	46.1	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	41.0	30	130



Sub-Matrix: **BIOTA**

Sub-Matrix: BIOTA				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: 1352358) - continued							
ES1732353-062	BO007_CFF1_R2	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	59.2	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	60.0	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1352359)							
ES1732353-082	BO007_MF2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	52.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	42.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	59.5	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	46.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	80.8	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	56.4	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	58.0	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1358613)							
ES1732353-102	BO007_MANG D2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	58.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	66.8	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	40.1	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	65.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	78.5	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	62.3	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	68.6	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1358614)							
ES1732353-122	BO010_MANG D4	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	58.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	85.6	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	37.0	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	75.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	35.0	30	130



Sub-Matrix: BIOTA

Sub-Matrix: BIOTA				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: 1358614) - continued							
ES1732353-122	BO010_MANG D4	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	88.1	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	96.7	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352353)							
ES1732353-002	BO002_CF5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	58.1	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	60.4	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	57.5	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	75.8	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352356)							
ES1732353-022	BO012_PF5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	61.2	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	59.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	75.6	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	127	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352357)							
ES1732353-042	BO012_MJL1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	71.0	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	61.8	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	69.4	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	58.8	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352358)							
ES1732353-062	BO007_CFF1_R2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	50.0	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	54.4	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	50.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	51.2	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1352359)							
ES1732353-082	BO007_MF2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	79.6	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	76.8	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	60.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	74.0	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1358613)							
ES1732353-102	BO007_MANG D2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	54.8	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	55.8	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	57.0	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	50.2	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1358614)							
ES1732353-122	BO010_MANG D4	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	63.0	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	63.8	50	130



Sub-Matrix: BIOTA

Laboratory sample IDClient sample IDMethod: CompoundCAS Number				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1358614) - continued							
ES1732353-122	BO010_MANG D4	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	55.7	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	58.0	50	130

Certificate of Analysis

Ecological Service Professionals
PO BOX 5815
Manly
QLD 4179

Attention: Rebecca King

Report 575887-S
Project name PFAS IN BIOTA
Project ID 1755
Received Date Dec 05, 2017

Client Sample ID			BO002_BF3_R 3	BO007_CF3_R 3	BO012_CF1_R 3	BO012_QF1_R 3
Sample Matrix			Fish	Fish	Fish	Fish
Eurofins I mgt Sample No.			B17-De06476	B17-De06477	B17-De06482	B17-De06483
Date Sampled			Dec 01, 2017	Dec 01, 2017	Dec 02, 2017	Dec 02, 2017
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	7.6	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	7.6	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	7.6	< 5	< 5
Sum of WA DER PFAS (n=10)*	10	ug/kg	< 10	< 10	< 10	< 10
Sum of PFASs (n=28)*	50	ug/kg	< 50	< 50	< 50	< 50
Perfluoroalkyl carboxylic acids (PFCAs) - Trace						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTeDA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	73	70	72	70
13C5-PFPeA (surr.)	1	%	102	100	104	101
13C5-PFHxA (surr.)	1	%	116	75	79	117
13C4-PFHpA (surr.)	1	%	94	80	86	97
13C8-PFOA (surr.)	1	%	66	67	71	68
13C5-PFNA (surr.)	1	%	74	80	81	81
13C6-PFDA (surr.)	1	%	67	66	69	82
13C2-PFUnDA (surr.)	1	%	65	65	64	77
13C2-PFDoDA (surr.)	1	%	67	66	60	86
13C2-PFTeDA (surr.)	1	%	70	60	52	81
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA) -						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	^{N09} < 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	^{N09} < 5	^{N09} 7.6	< 5	< 5
Perfluorodecanesulfonic acid (PFDS)	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	130	87	93	127

Client Sample ID			BO002_BF3_R 3	BO007_CF3_R 3	BO012_CF1_R 3	BO012_QF1_R 3
Sample Matrix			Fish	Fish	Fish	Fish
Eurofins I mgt Sample No.			B17-De06476	B17-De06477	B17-De06482	B17-De06483
Date Sampled			Dec 01, 2017	Dec 01, 2017	Dec 02, 2017	Dec 02, 2017
Test/Reference	LOR	Unit				
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFASs) -						
18O2-PFHxS (surr.)	1	%	81	77	82	79
13C8-PFOS (surr.)	1	%	76	72	72	80
Perfluoroalkane sulfonamides (PFASAs) - Trace						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	104	91	86	103
D3-N-MeFOSA (surr.)	1	%	71	74	69	71
D5-N-EtFOSA (surr.)	1	%	67	67	64	60
D7-N-MeFOSE (surr.)	1	%	49	49	45	55
D9-N-EtFOSE (surr.)	1	%	50	42	43	54
D5-N-EtFOSAA (surr.)	1	%	120	96	100	140
D3-N-MeFOSAA (surr.)	1	%	81	76	79	77
n:2 Fluorotelomer sulfonic acids - Trace						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	54	40	52	55
13C2-6:2 FTS (surr.)	1	%	44	45	49	69
13C2-8:2 FTS (surr.)	1	%	58	62	64	90

Client Sample ID			BO012_MF1_R 3	BO012_GF1_R 3
Sample Matrix			Fish	Fish
Eurofins I mgt Sample No.			B17-De06484	B17-De06485
Date Sampled			Dec 02, 2017	Dec 02, 2017
Test/Reference	LOR	Unit		
PFASs Summations				
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5
Sum of WA DER PFAS (n=10)*	10	ug/kg	< 10	< 10
Sum of PFASs (n=28)*	50	ug/kg	< 50	< 50

Client Sample ID			BO012_MF1_R 3	BO012_GF1_R 3
Sample Matrix			Fish	Fish
Eurofins I mgt Sample No.			B17-De06484	B17-De06485
Date Sampled			Dec 02, 2017	Dec 02, 2017
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5
Perfluoroundecanoic acid (PFUnA) ^{N11}	5	ug/kg	< 5	< 5
Perfluorododecanoic acid (PFDoA) ^{N11}	5	ug/kg	< 5	< 5
Perfluorotridecanoic acid (PFTriDA)	5	ug/kg	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5
13C4-PFBA (surr.)	1	%	77	71
13C5-PFPeA (surr.)	1	%	101	95
13C5-PFHxA (surr.)	1	%	125	109
13C4-PFHpA (surr.)	1	%	105	88
13C8-PFOA (surr.)	1	%	78	62
13C5-PFNA (surr.)	1	%	91	70
13C6-PFDA (surr.)	1	%	90	55
13C2-PFUnDA (surr.)	1	%	87	52
13C2-PFDoDA (surr.)	1	%	99	46
13C2-PFTeDA (surr.)	1	%	91	46
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA) -				
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)	5	ug/kg	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)	5	ug/kg	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5	< 5
Perfluorodecanesulfonic acid (PFDS)	5	ug/kg	< 5	< 5
13C3-PFBS (surr.)	1	%	136	121
18O2-PFHxS (surr.)	1	%	84	77
13C8-PFOS (surr.)	1	%	86	65
Perfluoroalkane sulfonamides (PFASAs) - Trace				
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10
13C8-FOSA (surr.)	1	%	121	94
D3-N-MeFOSA (surr.)	1	%	50	63
D5-N-EtFOSA (surr.)	1	%	74	61
D7-N-MeFOSE (surr.)	1	%	58	45
D9-N-EtFOSE (surr.)	1	%	38	43
D5-N-EtFOSAA (surr.)	1	%	212	85
D3-N-MeFOSAA (surr.)	1	%	97	78

Client Sample ID			BO012_MF1_R3	BO012_GF1_R3
Sample Matrix			Fish	Fish
Eurofins I mgt Sample No.			B17-De06484	B17-De06485
Date Sampled			Dec 02, 2017	Dec 02, 2017
Test/Reference	LOR	Unit		
n:2 Fluorotelomer sulfonic acids - Trace				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS) ^{N11}	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS) ^{N11}	10	ug/kg	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	5	ug/kg	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	65	51
13C2-6:2 FTS (surr.)	1	%	68	40
13C2-8:2 FTS (surr.)	1	%	108	52

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace			
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	Brisbane	Dec 05, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFASs) - Trace	Brisbane	Dec 05, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs) - Trace	Brisbane	Dec 05, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids - Trace	Brisbane	Dec 05, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			

Company Name: Ecological Service Professionals Pty Ltd
Address: PO BOX 5815
Manly
QLD 4179
Project Name: PFAS IN BIOTA
Project ID: 1755

Order No.: 5815
Report #: 575887
Phone: 0428 118 496
Fax:

Received: Dec 5, 2017 3:30 PM
Due: Dec 19, 2017
Priority: 10 Day
Contact Name: INFO

Eurofins | mgt Analytical Services Manager : Ryan Gilbert

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	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 # 23736							
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	BO002_BF3_R3	Dec 01, 2017		Fish	B17-De06476		X
2	BO007_CF3_R3	Dec 01, 2017		Fish	B17-De06477		X
3	BO002_RE_R2	Dec 01, 2017		Water	B17-De06478	X	
4	BO007_RB_R2	Dec 01, 2017		Water	B17-De06479	X	
5	BO007_RS_R2	Dec 01, 2017		Water	B17-De06480	X	
6	BO007_FB_R	Dec 01, 2017		Water	B17-De06481	X	

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Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	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 # 23736							
	2						
7	BO012_CF1_R3	Dec 02, 2017		Fish	B17-De06482		X
8	BO012_QF1_R3	Dec 02, 2017		Fish	B17-De06483		X
9	BO012_MF1_R3	Dec 02, 2017		Fish	B17-De06484		X
10	BO012_GF1_R3	Dec 02, 2017		Fish	B17-De06485		X
Test Counts						4	6

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs) - Trace							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkane sulfonamides (PFASAs) - Trace							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids - Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	%	92			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	98			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	104			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	103			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	88			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	90			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	94			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	87			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	88			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	80			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	89			50-150	Pass	
LCS - % Recovery							

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA) - Trace										
Perfluorobutanesulfonic acid (PFBS)				%	91			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)				%	102			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)				%	90			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)				%	112			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)				%	87			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)				%	96			50-150	Pass	
LCS - % Recovery										
Perfluoroalkane sulfonamides (PFAS) - Trace										
Perfluorooctane sulfonamide (FOSA)				%	86			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)				%	92			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)				%	95			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)				%	98			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)				%	99			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)				%	102			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)				%	85			50-150	Pass	
LCS - % Recovery										
n:2 Fluorotelomer sulfonic acids - Trace										
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)				%	93			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)				%	94			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)				%	96			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)				%	67			50-150	Pass	
Test		Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Perfluoroalkyl carboxylic acids (PFC) - Trace					Result 1					
Perfluorobutanoic acid (PFBA)	B17-De04919	NCP	%	86				50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B17-De04919	NCP	%	100				50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B17-De04919	NCP	%	93				50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-De04919	NCP	%	91				50-150	Pass	
Perfluorooctanoic acid (PFOA)	B17-De04919	NCP	%	85				50-150	Pass	
Perfluorononanoic acid (PFNA)	B17-De04919	NCP	%	80				50-150	Pass	
Perfluorodecanoic acid (PFDA)	B17-De04919	NCP	%	81				50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-De04919	NCP	%	79				50-150	Pass	
Perfluorododecanoic acid (PFDoA)	B17-De04919	NCP	%	82				50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	B17-De04919	NCP	%	98				50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-De04919	NCP	%	82				50-150	Pass	
Spike - % Recovery										
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA) - Trace					Result 1					
Perfluorobutanesulfonic acid (PFBS)	B17-De04919	NCP	%	83				50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B17-De04919	NCP	%	81				50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B17-De04919	NCP	%	82				50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B17-De04919	NCP	%	125				50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B17-De04919	NCP	%	86				50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B17-De04919	NCP	%	83				50-150	Pass	
Spike - % Recovery										
Perfluoroalkane sulfonamides (PFAS) - Trace					Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)	B17-De04919	NCP	%	81			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-De04919	NCP	%	76			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-De04919	NCP	%	82			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-De04919	NCP	%	90			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-De04919	NCP	%	109			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-De04919	NCP	%	93			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-De04919	NCP	%	78			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids - Trace				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-De04919	NCP	%	90			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-De04919	NCP	%	89			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-De04919	NCP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-De04919	NCP	%	94			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs) - Trace				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonamides (PFASAs) - Trace				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-De06485	CP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-De06485	CP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids - Trace				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-De06485	CP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-De06485	CP	ug/kg	< 5	< 5	<1	30%	Pass

Quality Control Analyte Summary Compliance

The table below is the actual occurrence of QC performed on the batch of samples within this report and as defined below

Analysis	Samples Analysed	Laboratory Duplicates Reported	Laboratory Matrix Spikes Reported	Method Blanks Reported	Laboratory Control Samples Reported
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	6	1	1	1	1
Perfluoroalkane sulfonic acids & Perfluoroalkane	6	1	1	1	1
Perfluoroalkane sulfonamides (PFASAs) - Trace	6	1	1	1	1
n:2 Fluorotelomer sulfonic acids - Trace	6	1	1	1	1

Quality Control Parameter Frequency Compliance follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure April 2011, Schedule B3, Guideline on Laboratory Analysis of Potentially Contaminated Soils and US EPA SW-846 Chapter 1: 'Quality Control'.

It comprises the following when a laboratory process batch is deemed to consist of up to 20 samples that are similar in terms of matrix and test procedure, and are processed as one unit for QC purposes. If more than 20 samples are being processed, they are considered as more than one batch.

Method blank

One method blank per process batch.

Laboratory duplicate

There should be at least one duplicate per process batch, or two duplicates if the process batch exceeds 10 samples.

Laboratory control sample (LCS)

There should be at least one LCS per process batch.

Matrix spikes

There should be one matrix spike per matrix type per process batch.

Comments

Sample Integrity

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

Comments

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

Ryan Gilbert	Analytical Services Manager
Jonathon Angell	Senior Analyst-Organic (QLD)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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

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Certificate of Analysis

Ecological Service Professionals
PO BOX 5815
Manly
QLD 4179



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: Rebecca King

Report 575887-W
Project name PFAS IN BIOTA
Project ID 1755
Received Date Dec 05, 2017

Client Sample ID			BO002_RE_R2	BO007_RB_R2	BO007_RS_R2	BO007_FB_R2
Sample Matrix			Water	Water	Water	Water
Eurofins I mgt Sample No.			B17-De06478	B17-De06479	B17-De06480	B17-De06481
Date Sampled			Dec 01, 2017	Dec 01, 2017	Dec 01, 2017	Dec 01, 2017
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05	0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01	0.05	0.03	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	90	12	10	100
13C5-PFPeA (surr.)	1	%	108	INT	INT	122
13C5-PFHxA (surr.)	1	%	80	INT	INT	81
13C4-PFHpA (surr.)	1	%	72	INT	INT	76
13C8-PFOA (surr.)	1	%	83	71	51	78
13C5-PFNA (surr.)	1	%	64	93	81	72
13C6-PFDA (surr.)	1	%	70	98	83	83
13C2-PFUnDA (surr.)	1	%	53	66	57	59
13C2-PFDoDA (surr.)	1	%	37	40	29	33
13C2-PFTeDA (surr.)	1	%	17	INT	INT	12
Perfluoroalkane sulfonamides (PFASAs)						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	35	45	40	39
D3-N-MeFOSA (surr.)	1	%	11	10	12	13
D5-N-EtFOSA (surr.)	1	%	INT	10	INT	10

Client Sample ID			BO002_RE_R2	BO007_RB_R2	BO007_RS_R2	BO007_FB_R2
Sample Matrix			Water	Water	Water	Water
Eurofins I mgt Sample No.			B17-De06478	B17-De06479	B17-De06480	B17-De06481
Date Sampled			Dec 01, 2017	Dec 01, 2017	Dec 01, 2017	Dec 01, 2017
Test/Reference	LOR	Unit				
Perfluoroalkane sulfonamides (PFASAs)						
D7-N-MeFOSE (surr.)	1	%	17	16	21	22
D9-N-EtFOSE (surr.)	1	%	17	13	15	20
D5-N-EtFOSAA (surr.)	1	%	48	68	45	46
D3-N-MeFOSAA (surr.)	1	%	52	85	55	51
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAAs)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01	^{NO9} 0.09	^{NO9} 0.12	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 0.01	^{NO9} 0.19	^{NO9} 0.09	< 0.01
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	101	37	35	104
18O2-PFHxS (surr.)	1	%	98	89	66	97
13C8-PFOS (surr.)	1	%	77	82	74	83
n:2 Fluorotelomer sulfonic acids						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	48	INT	INT	48
13C2-6:2 FTS (surr.)	1	%	34	39	30	33
13C2-8:2 FTS (surr.)	1	%	33	72	49	35
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	0.28	0.21	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	0.24	0.12	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	0.33	0.24	< 0.01
Sum of WA DER PFAS (n=10)*	0.05	ug/L	< 0.05	0.38	0.24	< 0.05
Sum of PFASs (n=28)*	0.1	ug/L	< 0.1	0.38	0.24	< 0.1

Sample History

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

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

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Dec 05, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Dec 05, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Dec 05, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Dec 05, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			

Company Name: Ecological Service Professionals Pty Ltd
Address: PO BOX 5815
Manly
QLD 4179
Project Name: PFAS IN BIOTA
Project ID: 1755

Order No.: 5815
Report #: 575887
Phone: 0428 118 496
Fax:

Received: Dec 5, 2017 3:30 PM
Due: Dec 19, 2017
Priority: 10 Day
Contact Name: INFO

Eurofins | mgt Analytical Services Manager : Ryan Gilbert

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	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 # 23736							
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	BO002_BF3_R3	Dec 01, 2017		Fish	B17-De06476		X
2	BO007_CF3_R3	Dec 01, 2017		Fish	B17-De06477		X
3	BO002_RE_R2	Dec 01, 2017		Water	B17-De06478	X	
4	BO007_RB_R2	Dec 01, 2017		Water	B17-De06479	X	
5	BO007_RS_R2	Dec 01, 2017		Water	B17-De06480	X	
6	BO007_FB_R	Dec 01, 2017		Water	B17-De06481	X	

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Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	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 # 23736							
	2						
7	BO012_CF1_R3	Dec 02, 2017		Fish	B17-De06482		X
8	BO012_QF1_R3	Dec 02, 2017		Fish	B17-De06483		X
9	BO012_MF1_R3	Dec 02, 2017		Fish	B17-De06484		X
10	BO012_GF1_R3	Dec 02, 2017		Fish	B17-De06485		X
Test Counts						4	6

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/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 (PFTTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkane sulfonamides (PFASAs)							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	97			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	89			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	95			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	93			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	97			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	97			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	93			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	96			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	101			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	64			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	96			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)				%	95			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)				%	100			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)				%	110			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)				%	88			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)				%	91			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)				%	92			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)				%	95			50-150	Pass	
LCS - % Recovery										
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)										
Perfluorobutanesulfonic acid (PFBS)				%	96			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)				%	108			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)				%	95			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)				%	116			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)				%	95			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)				%	77			50-150	Pass	
LCS - % Recovery										
n:2 Fluorotelomer sulfonic acids										
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)				%	100			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)				%	97			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)				%	95			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)				%	53			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Spike - % Recovery										
Perfluoroalkyl carboxylic acids (PFCAs)					Result 1					
Perfluorobutanoic acid (PFBA)	B17-De06481	CP	%	99			50-150	Pass		
Perfluoropentanoic acid (PFPeA)	B17-De06481	CP	%	106			50-150	Pass		
Perfluorohexanoic acid (PFHxA)	B17-De06481	CP	%	101			50-150	Pass		
Perfluoroheptanoic acid (PFHpA)	B17-De06481	CP	%	94			50-150	Pass		
Perfluorooctanoic acid (PFOA)	B17-De06481	CP	%	100			50-150	Pass		
Perfluorononanoic acid (PFNA)	B17-De06481	CP	%	99			50-150	Pass		
Perfluorodecanoic acid (PFDA)	B17-De06481	CP	%	95			50-150	Pass		
Perfluoroundecanoic acid (PFUnA)	B17-De06481	CP	%	96			50-150	Pass		
Perfluorododecanoic acid (PFDoA)	B17-De06481	CP	%	127			50-150	Pass		
Perfluorotridecanoic acid (PFTTrDA)	B17-De06481	CP	%	61			50-150	Pass		
Perfluorotetradecanoic acid (PFTeDA)	B17-De06481	CP	%	79			50-150	Pass		
Spike - % Recovery										
Perfluoroalkane sulfonamides (PFASAs)					Result 1					
Perfluorooctane sulfonamide (FOSA)	B17-De06481	CP	%	102			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-De06481	CP	%	99			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-De06481	CP	%	106			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-De06481	CP	%	108			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-De06481	CP	%	80			50-150	Pass		
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-De06481	CP	%	93			50-150	Pass		
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-De06481	CP	%	98			50-150	Pass		
Spike - % Recovery										
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)					Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanesulfonic acid (PFBS)	B17-De06481	CP	%	90			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B17-De06481	CP	%	116			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B17-De06481	CP	%	93			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B17-De06481	CP	%	118			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B17-De06481	CP	%	96			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B17-De06481	CP	%	69			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-De06481	CP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-De06481	CP	%	98			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-De06481	CP	%	112			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-De06481	CP	%	57			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M17-De15971	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M17-De15971	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-De15971	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-De15971	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-De15971	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-De15971	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M17-De15971	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M17-De15971	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA's)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-De15971	NCP	ug/L	0.03	0.03	1.0	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M17-De15971	NCP	ug/L	0.01	0.01	16	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M17-De15971	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-De15971	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Quality Control Analyte Summary Compliance

The table below is the actual occurrence of QC performed on the batch of samples within this report and as defined below

Analysis	Samples Analysed	Laboratory Duplicates Reported	Laboratory Matrix Spikes Reported	Method Blanks Reported	Laboratory Control Samples Reported
Perfluoroalkyl carboxylic acids (PFCAs)	4	1	1	1	1
Perfluoroalkane sulfonamides (PFASAs)	4	1	1	1	1
Perfluoroalkane sulfonic acids & Perfluoroalkane	4	1	1	1	1
n:2 Fluorotelomer sulfonic acids	4	1	1	1	1

Quality Control Parameter Frequency Compliance follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure April 2011, Schedule B3, Guideline on Laboratory Analysis of Potentially Contaminated Soils and US EPA SW-846 Chapter 1: 'Quality Control'.

It comprises the following when a laboratory process batch is deemed to consist of up to 20 samples that are similar in terms of matrix and test procedure, and are processed as one unit for QC purposes. If more than 20 samples are being processed, they are considered as more than one batch.

Method blank

One method blank per process batch.

Laboratory duplicate

There should be at least one duplicate per process batch, or two duplicates if the process batch exceeds 10 samples.

Laboratory control sample (LCS)

There should be at least one LCS per process batch.

Matrix spikes

There should be one matrix spike per matrix type per process batch.

Comments

Sample Integrity

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

Comments

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

Ryan Gilbert	Analytical Services Manager
Jonathon Angell	Senior Analyst-Organic (QLD)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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

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Certificate of Analysis

Ecological Service Professionals
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Attention: ALL INVOICES

Report 578027-S
Project name PFAS IN BIOTA
Project ID 1755
Received Date Dec 18, 2017

Client Sample ID			BO002_PO4_R 2	BO002_PF4_R 2	BO012_PO3_R 2	BO012_PF3_R 2
Sample Matrix			Fish	Fish	Fish	Fish
Eurofins I mgt Sample No.			B17-De23503	B17-De23504	B17-De23505	B17-De23506
Date Sampled			Dec 12, 2017	Dec 12, 2017	Dec 13, 2017	Dec 13, 2017
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.5	ug/kg	92.8	45.8	2	0.7
Sum of US EPA PFAS (PFOS + PFOA)*	0.5	ug/kg	91	45	2	0.7
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.5	ug/kg	92.8	45.8	2	0.7
Sum of WA DER PFAS (n=10)*	0.5	ug/kg	92.8	45.8	2	0.7
Sum of PFASs (n=28)*	0.5	ug/kg	98.3	47.4	5.7	1.7
Perfluoroalkyl carboxylic acids (PFCAs) - Trace						
Perfluorobutanoic acid (PFBA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoropentanoic acid (PFPeA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorohexanoic acid (PFHxA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorooctanoic acid (PFOA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorononanoic acid (PFNA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorodecanoic acid (PFDA) ^{N11}	0.5	ug/kg	2.1	1.0	3.7	1.0
Perfluoroundecanoic acid (PFUnA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorododecanoic acid (PFDoA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorotridecanoic acid (PFTeDA)	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C4-PFBA (surr.)	1	%	88	60	85	77
13C5-PFPeA (surr.)	1	%	55	66	57	83
13C5-PFHxA (surr.)	1	%	15	38	16	77
13C4-PFHpA (surr.)	1	%	40	68	47	82
13C8-PFOA (surr.)	1	%	111	67	107	75
13C5-PFNA (surr.)	1	%	149	83	138	96
13C6-PFDA (surr.)	1	%	129	77	126	77
13C2-PFUnDA (surr.)	1	%	121	86	125	70
13C2-PFDoDA (surr.)	1	%	97	88	107	52
13C2-PFTeDA (surr.)	1	%	38	68	65	32
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA) -						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoropentanesulfonic acid (PFPeS)	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.3	ug/kg	1.8	0.8	< 0.3	< 0.3
Perfluoroheptanesulfonic acid (PFHpS)	0.5	ug/kg	^{N09} 3.4	0.6	< 0.5	< 0.5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.3	ug/kg	^{N09} 91	^{N09} 45	^{N09} 2.0	^{N09} 0.7
Perfluorodecanesulfonic acid (PFDS)	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C3-PFBS (surr.)	1	%	172	76	INT	132

Client Sample ID			BO002_PO4_R 2	BO002_PF4_R 2	BO012_PO3_R 2	BO012_PF3_R 2
Sample Matrix			Fish	Fish	Fish	Fish
Eurofins I mgt Sample No.			B17-De23503	B17-De23504	B17-De23505	B17-De23506
Date Sampled			Dec 12, 2017	Dec 12, 2017	Dec 13, 2017	Dec 13, 2017
Test/Reference	LOR	Unit				
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFASs) -						
18O2-PFHxS (surr.)	1	%	101	94	91	82
13C8-PFOS (surr.)	1	%	61	91	84	64
Perfluoroalkane sulfonamides (PFASAs) - Trace						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C8-FOSA (surr.)	1	%	32	63	60	81
D3-N-MeFOSA (surr.)	1	%	INT	12	12	47
D5-N-EtFOSA (surr.)	1	%	10	8.0	15	44
D7-N-MeFOSE (surr.)	1	%	18	27	32	64
D9-N-EtFOSE (surr.)	1	%	11	20	25	38
D5-N-EtFOSAA (surr.)	1	%	135	89	143	86
D3-N-MeFOSAA (surr.)	1	%	93	73	111	83
n:2 Fluorotelomer sulfonic acids - Trace						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C2-4:2 FTS (surr.)	1	%	26	29	31	30
13C2-6:2 FTS (surr.)	1	%	58	33	54	28
13C2-8:2 FTS (surr.)	1	%	107	48	89	36

Client Sample ID			BO012_BF2_R 2	BO012_BL2_R 2	BO012_MJF1_R 2	BO012_MANG L1_R3
Sample Matrix			Fish	Fish	Fish	Plant Material
Eurofins I mgt Sample No.			B17-De23507	B17-De23508	B17-De23509	B17-De23510
Date Sampled			Dec 13, 2017	Dec 13, 2017	Dec 13, 2017	Dec 13, 2017
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Sum of US EPA PFAS (PFOS + PFOA)*	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Sum of WA DER PFAS (n=10)*	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Sum of PFASs (n=28)*	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			BO012_BF2_R 2	BO012_BL2_R 2	BO012_MJF1_ R2	BO012_MANG L1_R3
Sample Matrix			Fish	Fish	Fish	Plant Material
Eurofins I mgt Sample No.			B17-De23507	B17-De23508	B17-De23509	B17-De23510
Date Sampled			Dec 13, 2017	Dec 13, 2017	Dec 13, 2017	Dec 13, 2017
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs) - Trace						
Perfluorobutanoic acid (PFBA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluoropentanoic acid (PFPeA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluorohexanoic acid (PFHxA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluorooctanoic acid (PFOA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluorononanoic acid (PFNA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluorodecanoic acid (PFDA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluoroundecanoic acid (PFUnA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluorododecanoic acid (PFDoA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluorotridecanoic acid (PFTrDA)	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
13C4-PFBA (surr.)	1	%	78	63	81	69
13C5-PFPeA (surr.)	1	%	75	73	94	67
13C5-PFHxA (surr.)	1	%	78	93	93	83
13C4-PFHpA (surr.)	1	%	83	101	96	88
13C8-PFOA (surr.)	1	%	71	101	89	75
13C5-PFNA (surr.)	1	%	63	113	91	89
13C6-PFDA (surr.)	1	%	47	123	66	52
13C2-PFUnDA (surr.)	1	%	32	115	48	42
13C2-PFDoDA (surr.)	1	%	25	82	36	23
13C2-PFTeDA (surr.)	1	%	16	95	21	INT
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA) -						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluoropentanesulfonic acid (PFPeS)	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.3	ug/kg	< 0.3	G02< 5	< 0.3	< 0.3
Perfluoroheptanesulfonic acid (PFHpS)	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.3	ug/kg	< 0.3	G02< 5	< 0.3	< 0.3
Perfluorodecanesulfonic acid (PFDS)	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
13C3-PFBS (surr.)	1	%	118	128	147	121
18O2-PFHxS (surr.)	1	%	76	87	95	81
13C8-PFOS (surr.)	1	%	51	78	66	58
Perfluoroalkane sulfonamides (PFASAs) - Trace						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.5	ug/kg	< 0.5	G02< 10	< 0.5	< 0.5
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.5	ug/kg	< 0.5	G02< 10	< 0.5	< 0.5
13C8-FOSA (surr.)	1	%	44	71	63	52
D3-N-MeFOSA (surr.)	1	%	15	21	22	INT
D5-N-EtFOSA (surr.)	1	%	15	29	19	INT
D7-N-MeFOSE (surr.)	1	%	24	24	30	14
D9-N-EtFOSE (surr.)	1	%	15	14	20	INT
D5-N-EtFOSAA (surr.)	1	%	35	87	60	38
D3-N-MeFOSAA (surr.)	1	%	44	97	68	45

Client Sample ID			BO012_BF2_R 2	BO012_BL2_R 2	BO012_MJF1_ R2	BO012_MANG L1_R3
Sample Matrix			Fish	Fish	Fish	Plant Material
Eurofins I mgt Sample No.			B17-De23507	B17-De23508	B17-De23509	B17-De23510
Date Sampled			Dec 13, 2017	Dec 13, 2017	Dec 13, 2017	Dec 13, 2017
Test/Reference	LOR	Unit				
n:2 Fluorotelomer sulfonic acids - Trace						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS) ^{N11}	0.5	ug/kg	< 0.5	G02< 10	< 0.5	< 0.5
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.5	ug/kg	< 0.5	G02< 5	< 0.5	< 0.5
13C2-4:2 FTS (surr.)	1	%	31	56	41	128
13C2-6:2 FTS (surr.)	1	%	24	92	34	39
13C2-8:2 FTS (surr.)	1	%	19	109	32	25

Client Sample ID			BO012_MANG R3	BO007_CFL1_ R3	BO007_CFF1_ R3	BO007_CODF1_ R3
Sample Matrix			Plant Material	Fish	Plant Material	Plant Material
Eurofins I mgt Sample No.			B17-De23511	B17-De23512	B17-De23513	B17-De23514
Date Sampled			Dec 13, 2017	Dec 14, 2017	Dec 14, 2017	Dec 14, 2017
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.5	ug/kg	< 0.5	57.5	2.6	9.1
Sum of US EPA PFAS (PFOS + PFOA)*	0.5	ug/kg	< 0.5	57	2.6	9.1
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.5	ug/kg	< 0.5	57.5	2.6	9.1
Sum of WA DER PFAS (n=10)*	0.5	ug/kg	< 0.5	57.5	2.6	9.1
Sum of PFASs (n=28)*	0.5	ug/kg	< 0.5	58.2	2.6	9.1
Perfluoroalkyl carboxylic acids (PFCAs) - Trace						
Perfluorobutanoic acid (PFBA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoropentanoic acid (PFPeA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorohexanoic acid (PFHxA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorooctanoic acid (PFOA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorononanoic acid (PFNA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorodecanoic acid (PFDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoroundecanoic acid (PFUnA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorododecanoic acid (PFDoA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorotridecanoic acid (PFTTrDA)	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C4-PFBA (surr.)	1	%	78	40	76	75
13C5-PFPeA (surr.)	1	%	98	71	83	78
13C5-PFHxA (surr.)	1	%	113	74	98	94
13C4-PFHpA (surr.)	1	%	120	85	98	92
13C8-PFOA (surr.)	1	%	118	88	89	103
13C5-PFNA (surr.)	1	%	127	104	95	89
13C6-PFDA (surr.)	1	%	106	114	83	65
13C2-PFUnDA (surr.)	1	%	92	99	66	39
13C2-PFDoDA (surr.)	1	%	74	80	51	22
13C2-PFTeDA (surr.)	1	%	36	33	25	INT

Client Sample ID			BO012_MANG 02_R3	BO007_CFL1_ R3	BO007_CFF1_ R3	BO007_CODF1 _R3
Sample Matrix			Plant Material	Fish	Plant Material	Plant Material
Eurofins I mgt Sample No.			B17-De23511	B17-De23512	B17-De23513	B17-De23514
Date Sampled			Dec 13, 2017	Dec 14, 2017	Dec 14, 2017	Dec 14, 2017
Test/Reference	LOR	Unit				
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA) -						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoropentanesulfonic acid (PFPeS)	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.3	ug/kg	< 0.3	0.5	< 0.3	< 0.3
Perfluoroheptanesulfonic acid (PFHpS)	0.5	ug/kg	< 0.5	0.7	< 0.5	< 0.5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.3	ug/kg	< 0.3	^{N09} 57	^{N09} 2.6	^{N09} 9.1
Perfluorodecanesulfonic acid (PFDS)	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C3-PFBS (surr.)	1	%	149	114	147	140
18O2-PFHxS (surr.)	1	%	104	86	92	91
13C8-PFOS (surr.)	1	%	87	114	72	63
Perfluoroalkane sulfonamides (PFASAs) - Trace						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C8-FOSA (surr.)	1	%	79	23	68	56
D3-N-MeFOSA (surr.)	1	%	26	INT	24	11
D5-N-EtFOSA (surr.)	1	%	21	INT	22	INT
D7-N-MeFOSE (surr.)	1	%	43	INT	42	18
D9-N-EtFOSE (surr.)	1	%	25	INT	27	11
D5-N-EtFOSAA (surr.)	1	%	93	87	89	49
D3-N-MeFOSAA (surr.)	1	%	86	84	87	58
n:2 Fluorotelomer sulfonic acids - Trace						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C2-4:2 FTS (surr.)	1	%	89	38	41	35
13C2-6:2 FTS (surr.)	1	%	68	14	37	36
13C2-8:2 FTS (surr.)	1	%	74	131	40	30

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace			
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	Brisbane	Dec 18, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFASs) - Trace	Brisbane	Dec 18, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs) - Trace	Brisbane	Dec 18, 2017	180 Day
- Method: LTM-ORG-2100 Determination of Per- and Polyfluoro Alkyl Substances (PFAS) in Aqueous and Soil Samples by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids - Trace	Brisbane	Dec 18, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			

Company Name: ESP Laboratories
Address: 2/2B Parker Street
Footscray
VIC 3011

Project Name: PFAS IN BIOATA
Project ID: 1755

Order No.:
Report #: 578027
Phone: 9688 8000
Fax: 9689 6470

Received: Dec 18, 2017 2:45 PM
Due: Dec 27, 2017
Priority: 5 Day
Contact Name: Rebecca King

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						HOLD	Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	BO007_RE_R2	Dec 14, 2017		Water	B17-De23500		X	
2	BO007_RS_R2	Dec 14, 2017		Water	B17-De23501		X	
3	BO007_RB_R2	Dec 14, 2017		Water	B17-De23502		X	
4	BO002_PO4_R2	Dec 12, 2017		Fish	B17-De23503			X
5	BO002_PF4_R2	Dec 12, 2017		Fish	B17-De23504			X
6	BO012_PO3_	Dec 13, 2017		Fish	B17-De23505			X

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Sample Detail						HOLD	Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	R2							
7	BO012_Pf3_R2	Dec 13, 2017		Fish	B17-De23506			X
8	BO012_Bf2_R2	Dec 13, 2017		Fish	B17-De23507			X
9	BO012_Bl2_R2	Dec 13, 2017		Fish	B17-De23508			X
10	BO012_MJF1_R2	Dec 13, 2017		Fish	B17-De23509			X
11	BO012_MANG_L1_R3	Dec 13, 2017		Plant Material	B17-De23510			X
12	BO012_MANG_02_R3	Dec 13, 2017		Plant Material	B17-De23511			X
13	BO007_CFL1_	Dec 14, 2017		Fish	B17-De23512			X

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Sample Detail						HOLD	Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	R3							
14	BO007_CFF1_R3	Dec 14, 2017		Plant Material	B17-De23513			X
15	BO007_CODF1_R3	Dec 14, 2017		Plant Material	B17-De23514			X
16	BAG OF CLAMS	Dec 14, 2017		Plant Material	B17-De23515	X		
Test Counts						1	3	12

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	ug/kg	< 0.5			0.5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 0.5			0.5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 0.5			0.5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 0.5			0.5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 0.5			0.5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 0.5			0.5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 0.5			0.5	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/kg	< 0.5			0.5	Pass	
Perfluorododecanoic acid (PFDoA)	ug/kg	< 0.5			0.5	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/kg	< 0.5			0.5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs) - Trace							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 0.5			0.5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 0.5			0.5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 0.3			0.3	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 0.5			0.5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 0.3			0.3	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkane sulfonamides (PFASAs) - Trace							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 0.5			0.5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 0.5			0.5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 0.5			0.5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 0.5			0.5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 0.5			0.5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 0.5			0.5	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids - Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/kg	< 0.5			0.5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	%	92			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	78			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	88			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	87			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	86			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	90			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	84			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	87			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	91			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	80			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	88			50-150	Pass	
LCS - % Recovery							

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA) - Trace											
Perfluorobutanesulfonic acid (PFBS)				%	88			50-150	Pass		
Perfluoropentanesulfonic acid (PFPeS)				%	107			50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)				%	89			50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)				%	106			50-150	Pass		
Perfluorooctanesulfonic acid (PFOS)				%	89			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)				%	65			50-150	Pass		
LCS - % Recovery											
Perfluoroalkane sulfonamides (PFASAs) - Trace											
Perfluorooctane sulfonamide (FOSA)				%	89			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)				%	95			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)				%	75			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)				%	81			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)				%	94			50-150	Pass		
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)				%	89			50-150	Pass		
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)				%	87			50-150	Pass		
LCS - % Recovery											
n:2 Fluorotelomer sulfonic acids - Trace											
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)				%	130			50-150	Pass		
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)				%	122			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)				%	137			50-150	Pass		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)				%	77			50-150	Pass		
Test			Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery											
Perfluoroalkyl carboxylic acids (PFCAs) - Trace						Result 1					
Perfluorobutanoic acid (PFBA)	B17-De23507	CP	%	94				50-150	Pass		
Perfluoropentanoic acid (PFPeA)	B17-De23507	CP	%	103				50-150	Pass		
Perfluorohexanoic acid (PFHxA)	B17-De23507	CP	%	89				50-150	Pass		
Perfluoroheptanoic acid (PFHpA)	B17-De23507	CP	%	92				50-150	Pass		
Perfluorooctanoic acid (PFOA)	B17-De23507	CP	%	91				50-150	Pass		
Perfluorononanoic acid (PFNA)	B17-De23507	CP	%	89				50-150	Pass		
Perfluorodecanoic acid (PFDA)	B17-De23507	CP	%	111				50-150	Pass		
Perfluoroundecanoic acid (PFUnA)	B17-De23507	CP	%	89				50-150	Pass		
Perfluorododecanoic acid (PFDoA)	B17-De23507	CP	%	116				50-150	Pass		
Perfluorotridecanoic acid (PFTTrDA)	B17-De23507	CP	%	72				50-150	Pass		
Perfluorotetradecanoic acid (PFTeDA)	B17-De23507	CP	%	94				50-150	Pass		
Spike - % Recovery											
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA) - Trace						Result 1					
Perfluorobutanesulfonic acid (PFBS)	B17-De23507	CP	%	90				50-150	Pass		
Perfluoropentanesulfonic acid (PFPeS)	B17-De23507	CP	%	133				50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)	B17-De23507	CP	%	88				50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)	B17-De23507	CP	%	97				50-150	Pass		
Perfluorooctanesulfonic acid (PFOS)	B17-De23507	CP	%	96				50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	B17-De23507	CP	%	55				50-150	Pass		
Spike - % Recovery											
Perfluoroalkane sulfonamides (PFASAs) - Trace						Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)	B17-De23507	CP	%	91			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-De23507	CP	%	85			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-De23507	CP	%	65			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-De23507	CP	%	84			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-De23507	CP	%	103			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-De23507	CP	%	86			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-De23507	CP	%	87			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids - Trace				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-De23507	CP	%	125			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-De23507	CP	%	118			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-De23507	CP	%	130			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-De23507	CP	%	82			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-De23506	CP	ug/kg	1.0	1.3	22	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs) - Trace				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B17-De23506	CP	ug/kg	< 0.3	< 0.3	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B17-De23506	CP	ug/kg	0.7	0.9	27	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonamides (PFASAs) - Trace				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids - Trace				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-De23506	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorononanoic acid (PFNA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluoroundecanoic acid (PFUnA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorododecanoic acid (PFDoA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorotridecanoic acid (PFTTrDA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs) - Trace				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	B17-De23511	CP	ug/kg	< 0.3	< 0.3	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	B17-De23511	CP	ug/kg	< 0.3	< 0.3	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass

Duplicate								
Perfluoroalkane sulfonamides (PFASAs) - Trace				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids - Trace				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-De23511	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass

Comments

Sample Integrity

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

Comments

Qualifier Codes/Comments

Code	Description
G02	The LORs have been raised as there was insufficient sample provided for analysis
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

Ryan Gilbert	Analytical Services Manager
Jonathon Angell	Senior Analyst-Organic (QLD)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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

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

Certificate of Analysis

Ecological Service Professionals
PO BOX 5815
Manly
QLD 4179



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: **Christoph Braun**

Report **578027-W**
Project name PFAS IN BIOTA
Project ID 1755
Received Date Dec 18, 2017

Client Sample ID			BO007_RE_R2 Water B17-De23500 Dec 14, 2017	BO007_RS_R2 Water B17-De23501 Dec 14, 2017	BO007_RB_R2 Water B17-De23502 Dec 14, 2017
Sample Matrix					
Eurofins I mgt Sample No.					
Date Sampled					
Test/Reference	LOR	Unit			
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTTrDA)	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	54	54	66
13C5-PFPeA (surr.)	1	%	58	63	63
13C5-PFHxA (surr.)	1	%	75	79	80
13C4-PFHpA (surr.)	1	%	73	67	75
13C8-PFOA (surr.)	1	%	69	74	74
13C5-PFNA (surr.)	1	%	78	78	70
13C6-PFDA (surr.)	1	%	61	93	86
13C2-PFUnDA (surr.)	1	%	53	74	72
13C2-PFDoDA (surr.)	1	%	77	44	45
13C2-PFTeDA (surr.)	1	%	83	INT	INT
Perfluoroalkane sulfonamides (PFASAs)					
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methylperfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	57	17	39
D3-N-MeFOSA (surr.)	1	%	63	53	63
D5-N-EtFOSA (surr.)	1	%	74	67	68

Client Sample ID			BO007_RE_R2	BO007_RS_R2	BO007_RB_R2
Sample Matrix			Water	Water	Water
Eurofins I mgt Sample No.			B17-De23500	B17-De23501	B17-De23502
Date Sampled			Dec 14, 2017	Dec 14, 2017	Dec 14, 2017
Test/Reference	LOR	Unit			
Perfluoroalkane sulfonamides (PFASAs)					
D7-N-MeFOSE (surr.)	1	%	31	24	34
D9-N-EtFOSE (surr.)	1	%	33	26	27
D5-N-EtFOSAA (surr.)	1	%	95	80	89
D3-N-MeFOSAA (surr.)	1	%	31	75	69
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAAs)					
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 0.01	^{N09} 0.16	^{N09} 0.05
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	92	100	88
18O2-PFHxS (surr.)	1	%	87	77	84
13C8-PFOS (surr.)	1	%	62	96	90
n:2 Fluorotelomer sulfonic acids					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	77	71	78
13C2-6:2 FTS (surr.)	1	%	63	83	70
13C2-8:2 FTS (surr.)	1	%	73	68	66
PFASs Summations					
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	0.16	0.05
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	0.16	0.05
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	0.16	0.05
Sum of WA DER PFAS (n=10)*	0.05	ug/L	< 0.05	0.16	0.05
Sum of PFASs (n=28)*	0.1	ug/L	< 0.1	0.16	< 0.1

Sample History

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

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

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Dec 18, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Dec 18, 2017	14 Day
- Method: LTM-ORG-2100 Determination of Per- and Polyfluoro Alkyl Substances (PFAS) in Aqueous and Soil Samples by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Dec 18, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Dec 18, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			

Company Name: ESP Laboratories
Address: 2/2B Parker Street
Footscray
VIC 3011
Project Name: PFAS IN BIOATA
Project ID: 1755

Order No.:
Report #: 578027
Phone: 9688 8000
Fax: 9689 6470

Received: Dec 18, 2017 2:45 PM
Due: Dec 27, 2017
Priority: 5 Day
Contact Name: Rebecca King

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						HOLD	Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	BO007_RE_R2	Dec 14, 2017		Water	B17-De23500		X	
2	BO007_RS_R2	Dec 14, 2017		Water	B17-De23501		X	
3	BO007_RB_R2	Dec 14, 2017		Water	B17-De23502		X	
4	BO002_PO4_R2	Dec 12, 2017		Fish	B17-De23503			X
5	BO002_PF4_R2	Dec 12, 2017		Fish	B17-De23504			X
6	BO012_PO3_	Dec 13, 2017		Fish	B17-De23505			X

Company Name: ESP Laboratories
Address: 2/2B Parker Street
Footscray
VIC 3011
Project Name: PFAS IN BIOATA
Project ID: 1755

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Sample Detail						HOLD	Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	R2							
7	BO012_Pf3_R2	Dec 13, 2017		Fish	B17-De23506			X
8	BO012_Bf2_R2	Dec 13, 2017		Fish	B17-De23507			X
9	BO012_Bl2_R2	Dec 13, 2017		Fish	B17-De23508			X
10	BO012_MJF1_R2	Dec 13, 2017		Fish	B17-De23509			X
11	BO012_MANG_L1_R3	Dec 13, 2017		Plant Material	B17-De23510			X
12	BO012_MANG_02_R3	Dec 13, 2017		Plant Material	B17-De23511			X
13	BO007_CFL1_	Dec 14, 2017		Fish	B17-De23512			X

Company Name: ESP Laboratories
Address: 2/2B Parker Street
Footscray
VIC 3011
Project Name: PFAS IN BIOATA
Project ID: 1755

Order No.:
Report #: 578027
Phone: 9688 8000
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Received: Dec 18, 2017 2:45 PM
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Contact Name: Rebecca King

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						HOLD	Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	R3							
14	BO007_CFF1_R3	Dec 14, 2017		Plant Material	B17-De23513			X
15	BO007_CODF1_R3	Dec 14, 2017		Plant Material	B17-De23514			X
16	BAG OF CLAMS	Dec 14, 2017		Plant Material	B17-De23515	X		
Test Counts						1	3	12

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/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 (PFTTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkane sulfonamides (PFASAs)							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	95			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	105			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	106			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	100			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	102			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	102			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	95			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	101			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	99			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	101			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	100			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)				%	103			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)				%	108			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)				%	112			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)				%	108			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)				%	102			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)				%	92			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)				%	102			50-150	Pass	
LCS - % Recovery										
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)										
Perfluorobutanesulfonic acid (PFBS)				%	104			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)				%	107			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)				%	88			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)				%	113			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)				%	92			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)				%	98			50-150	Pass	
LCS - % Recovery										
n:2 Fluorotelomer sulfonic acids										
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)				%	99			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)				%	95			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)				%	109			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)				%	80			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Spike - % Recovery										
Perfluoroalkyl carboxylic acids (PFCAs)					Result 1					
Perfluorobutanoic acid (PFBA)	M17-De21967	NCP	%	95			50-150	Pass		
Perfluoropentanoic acid (PFPeA)	M17-De21967	NCP	%	115			50-150	Pass		
Perfluorohexanoic acid (PFHxA)	M17-De21967	NCP	%	100			50-150	Pass		
Perfluoroheptanoic acid (PFHpA)	M17-De21967	NCP	%	90			50-150	Pass		
Perfluorooctanoic acid (PFOA)	M17-De21967	NCP	%	66			50-150	Pass		
Perfluorononanoic acid (PFNA)	M17-De21967	NCP	%	93			50-150	Pass		
Perfluorodecanoic acid (PFDA)	M17-De21967	NCP	%	108			50-150	Pass		
Perfluoroundecanoic acid (PFUnA)	M17-De21967	NCP	%	108			50-150	Pass		
Perfluorododecanoic acid (PFDoA)	M17-De21967	NCP	%	101			50-150	Pass		
Perfluorotridecanoic acid (PFTTrDA)	M17-De21967	NCP	%	103			50-150	Pass		
Perfluorotetradecanoic acid (PFTeDA)	M17-De21967	NCP	%	92			50-150	Pass		
Spike - % Recovery										
Perfluoroalkane sulfonamides (PFASAs)					Result 1					
Perfluorooctane sulfonamide (FOSA)	M17-De21967	NCP	%	91			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-De21967	NCP	%	104			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-De21967	NCP	%	115			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-De21967	NCP	%	92			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-De21967	NCP	%	104			50-150	Pass		
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M17-De21967	NCP	%	99			50-150	Pass		
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M17-De21967	NCP	%	96			50-150	Pass		
Spike - % Recovery										
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)					Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanesulfonic acid (PFBS)	M17-De21967	NCP	%	99			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-De21967	NCP	%	112			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-De21967	NCP	%	126			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-De21967	NCP	%	108			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M17-De21967	NCP	%	98			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-De21967	NCP	%	118			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-De21967	NCP	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M17-De21967	NCP	%	112			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-De21967	NCP	%	107			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-De21967	NCP	%	92			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B17-De11853	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B17-De11853	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-De11853	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-De11853	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-De11853	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-De11853	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-De11853	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-De11853	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA's)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-De11853	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-De11853	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

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

Comments

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

Ryan Gilbert	Analytical Services Manager
Jonathon Angell	Senior Analyst-Organic (QLD)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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

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Attachment C Concentrations of PFOS/PFHxS in all Biota Samples from estuarine sites and all surveys to date



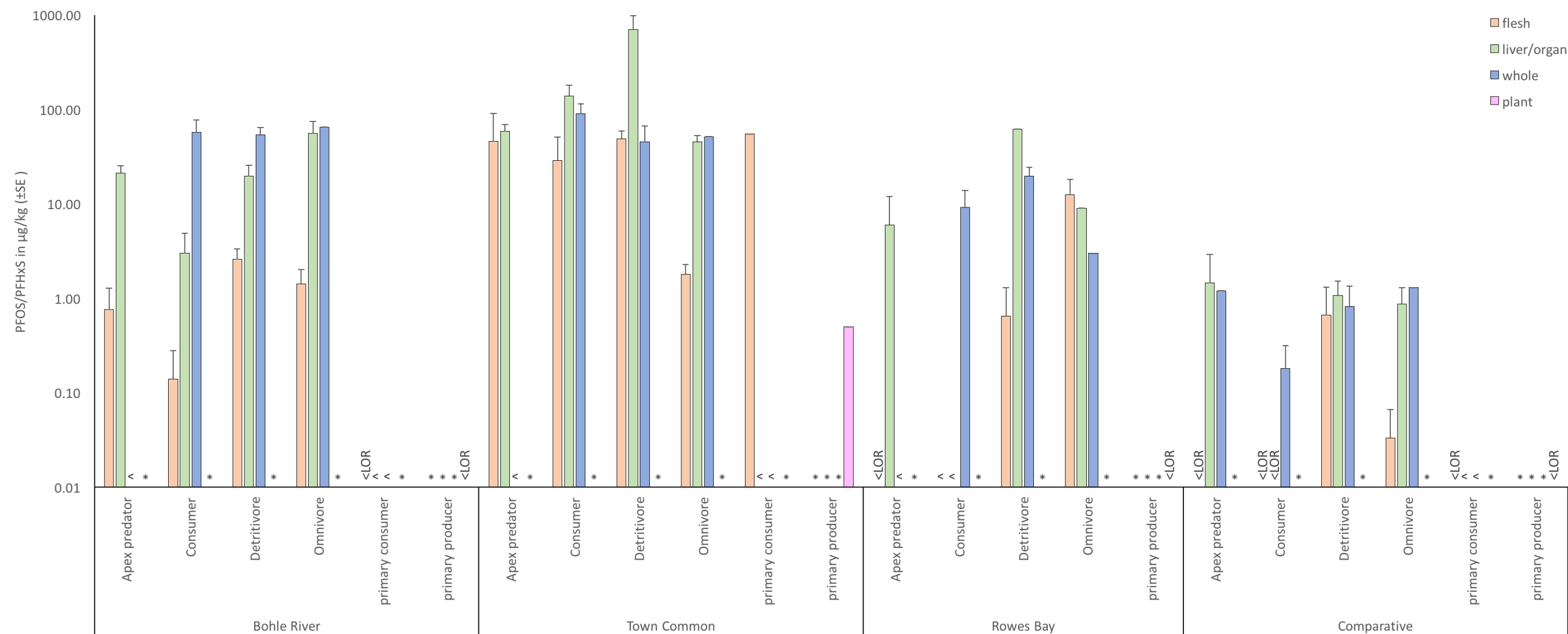


Figure C1 PFOS/PFHxS concentrations in estuarine biota types and trophic levels from the Bohle River, Town Common, Rowes Bay and comparative (Althaus, Mundy, Alligator Creek and Sandfly Creek) creeks. * = indicates sample type does not apply for this biota type; ^ = indicates this biota type was not sampled; <LOR = indicates concentrations below the LOR. Note the vertical axis is on a logarithmic scale.



Table C1 PFOS/PFHxS concentrations in estuarine biota types and trophic levels from the Bohle River, Town Common, Rowes Bay and comparative (Althaus, Mundy, Alligator Creek and Sandfly Creek) creeks. “-” = indicates sample type does not apply for this biota type or this biota type was not sampled; “0” = indicates concentrations below the LOR.

Drainage	flesh					liver					whole					organ					plant					shell					leaves					detritus					Total				
Trophic Level	n	mean	min	max	SE	n	mean	min	max	SE	n	mean	min	max	SE	n	mean	min	max	SE	n	mean	min	max	SE	n	mean	min	max	SE	n	mean	min	max	SE	n	mean	min	max	SE					
Bohle River																																													
Apex predator	5	0.8	0	2.6	0.5	5	21.2	9	31.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10						
Consumer	5	0.1	0	0.7	0.1	5	3	0	9	1.9	7	57.1	7	154	20.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17					
Detritivore	10	2.6	0	9	0.8	10	19.7	3	60	6	4	54	29	80	10.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24					
Omnivore	17	1.4	0	9.4	0.6	-	-	-	-	-	1	65	65	65	-	10	55.7	18	221	19.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28					
Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	0	0	0	0	4	0	0	0	0	8
primary consumer	1	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	2			
primary producer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1			
Town Common																																													
Apex predator	4	45.8	0.0	180.8	45	2	58.5	48	69	10.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6			
Consumer	12	29.1	0.5	267.1	21.9	9	139.2	29.6	407.0	41.9	9	90.1	6.2	199.2	24.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30			
Detritivore	2	49.0	39.0	59.0	10.0	2	702	420	984	282	6	45.43	1.5	125	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10			
Omnivore	22	1.8	0	8	0.5	-	-	-	-	-	1	51.5	51.5	51.5	-	12	45.6	19	103	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35			
Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	0	0	0	0	4	0	0	0	0	8	
primary consumer	1	55	55	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1			
primary producer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.5	0.5	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1		
Rowes Bay																																													
Apex predator	2	0	0	0	0	2	6	0	12	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4			
Consumer	2	8	2	14	6	-	-	-	-	-	8	9.3	0	38	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9			
Detritivore	3	6.8	0	19	6.1	1	62	62	62	-	5	19.8	10	36	4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8			
Omnivore	3	13.2	0	39	12.9	-	-	-	-	-	1	3	3	3	-	1	9	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7			
Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	0	0	0	0	4	0	0	0	0	8	
primary producer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3		
Comparative																																													
Apex predator	3	0	0	0	0	2	1.5	0	2.9	1.5	1	1.2	1.2	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6			
Consumer	11	0	0	0	0	7	0	0	0	0	13	0.2	0	1.7	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30			
Detritivore	12	0.7	0	7.9	0.7	9.0	1.1	0	3.5	0.5	5	0.8	0	2.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26			
Omnivore	30	0	0	1	0	-	-	-	-	-	1	1.3	1.3	1.3	-	16	0.9	0	5	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47			
Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	0	0	0	0	4	0	0	0	0	8	
primary consumer	2	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	4		
primary producer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2		
Grand Total	147	5.9	0	267		54	58	0	984		62	32	0	199		39	28	0	221		7	0	0	0		2	0	0	0		16	0	0	0		16	0	0	0		343				

APPENDIX C-3
MARINE BIOTA SAMPLING AND
ANALYSIS (JULY 2018C)

RAAF Base Townsville - PFAS Investigation

Marine Biota Sampling and Analysis



Prepared for: WSP Australia Pty Ltd (on behalf of the Department of Defence)

Prepared by Ecological Service Professionals Pty Ltd

August 2018

Document Control

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Client: WSP Australia

Client Contact: Phil Schulz, David Harris

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Executive Summary

This report has been prepared by Ecological Service Professionals (ESP) for WSP Australia Pty Ltd (WSP) and presents the results of a survey of the concentration of Per- and Poly-fluoroalkyl Substances (PFAS) in marine biota tissues. This assessment contributes to WSP's *Royal Australian Air Force (RAAF) Base Townsville: Comprehensive Investigation of PFAS* being completed on behalf of the Department of Defence, and builds upon data collected during two surveys of aquatic and estuarine biota in 2017 (WSP 2018a,b). Perfluorooctane sulfonate (PFOS), perfluorohexanesulfonate (PFHxS), and perfluorooctanoic acid (PFOA) are man-made substances belonging to the PFAS group of chemicals, which currently have sufficient toxicological information to assess human health and ecological protection guidelines. PFAS are known to be persistent in the environment and can bioaccumulate in animals from higher trophic levels, resulting in dispersal of the toxicants from an original point source.

The survey of the concentration of PFAS in marine biota tissues was completed in March 2018 and focussed on two sites adjacent to the Investigation Area (IA) and two comparative sites at the mouth of Althaus Creek and on the western side of Magnetic Island. The IA encompasses the estuarine environments within the Townsville Town Common, Bohle River, as well as Rowes Bay in close proximity to the Townsville RAAF Base and Townsville Airport. A variety of aquatic habitats including freshwater and estuarine wetlands and waterways (supporting mangroves, saltmarsh and claypans) occur within the IA and near the comparative sites. These support a diverse community of aquatic biota, including the threatened estuarine / saltwater crocodile and several species of commercial and recreational fisheries importance (e.g. mud crabs, prawns, barramundi, mangrove jack, etc.). The Town Common and adjacent waters are recognised as being of local, State and Commonwealth environmental significance under State and Federal legislation. The shallow waters of Halifax and Rowes Bays between Townsville, the Town Common and Magnetic Island are dominated by sandy substrate and shoals, inshore rocky reefs and fringing coral reefs.

The survey design considered the trophic level of each target biota type. The samples collected comprised:

- primary producers (plants and macroalgae)
- detritivores (mullet) and omnivores (blue swimming crabs)
- a range of marine secondary (whiting, scat and garfish) and tertiary consumer fish species (bream, catfish, and grunter), and
- ten apex predator species (barramundi, four species of snapper, giant trevally, barred queenfish, threadfin salmon, flathead and Spanish mackerel).

PFOS+PFHxS was detected most frequently and on average in higher concentrations in most trophic levels at sites adjacent to the IA than at comparative sites. Seven other components of PFAS were also detected in low concentrations predominantly in samples collected from sites adjacent to the IA.

PFOS+PFHxS was not detected in primary producer tissue (i.e. marine plants or macroalgae) from either the sites adjacent to the IA or comparative sites.



The concentrations of PFOS+PFHxS in crustacean organs were higher than in flesh samples, and generally higher in fish livers than in fish flesh, confirming previous results for estuarine biota (ESP 2018a,b). In contrast to previous surveys, the single highest PFOS+PFHxS concentration in crustacean organs and fish livers were detected at the comparative site at Althaus Creek.

PFOS+PFHxS was detected in a large proportion of fish tissue collected from sites adjacent to the IA and from nearby comparative sites for some trophic groups. Comparatively low concentrations of PFOS+PFHxS were detected in samples from fish tissue and livers at the consumer and apex predator trophic levels from comparative sites. The concentration of PFOS+PFHxS in detritivore liver tissue (mullet) was higher at comparative sites than sites adjacent to the IA.

Generally, the results of this survey demonstrate there is typically higher concentrations of PFOS+PFHxS in liver and reproductive organ tissue than in flesh, and generally higher and more consistent concentrations of PFOS+PFHxS detected at the sites closest to the IA, particularly in larger sized fish. The highest concentration of PFOS+PFHxS was detected in liver tissue of detritivores (diamond scale mullet, *Liza vaigiensis*) from the comparative site BO018MA at the mouth of Althaus Creek. This is in contrast to previous findings where samples from the IA showed the highest concentrations (ESP 2018,b). Whether the high concentration in detritivore liver tissue at this site was due to the presence of PFOS+PFHxS in detritivore food sources (detritus, benthic organisms and micro-algae) or migration of fish from the estuary in IA to the marine environment remains to be assessed fully.

Additional surveys may therefore be warranted to increase the sample size of different size classes of fish, across the various trophic levels to determine whether contamination is more widespread than first anticipated due to migration of some species. The results of this and previous surveys indicate there is limited bioaccumulation in higher trophic levels outside the IA despite apparent local movement of some species between estuaries.



1 Introduction

This report has been prepared by Ecological Service Professionals (ESP) for WSP Australia Pty Ltd (WSP). It contributes to the *Royal Australian Air Force (RAAF) Base Townsville: Comprehensive Investigation of PFAS*, being prepared by WSP, on behalf of the Department of Defence. It presents the results of a marine survey of the uptake of Per- and Poly-Fluoroalkyl Substances (PFAS) in marine biota in the Halifax and Rows Bays adjacent to the RAAF Base and Investigation Area (IA) and comparative locations.

This report builds upon the results of an initial survey of aquatic biota completed in July 2017 and additional surveys completed in November and December 2017 (ESP 2018a,b). This survey is part of a broader investigation into the occurrence of PFAS within and around the Townsville RAAF Base and Townsville Airport. The objectives of the current biota sampling event were to determine whether PFAS was present in species captured from the marine environment offshore of the Base; and if so, to what geographical extent. It contributes information towards the Human Health Risk Assessment and the Ecological Risk Assessment (ERA) being completed as part of the investigation.

1.1 Scope of Works

The aim of the current survey was to supplement previous investigations of PFAS concentrations in aquatic biota (ESP 2018a,b) by targeting marine biota of importance to commercial and recreational fisheries.

Specifically, the scope of works for this investigation were:

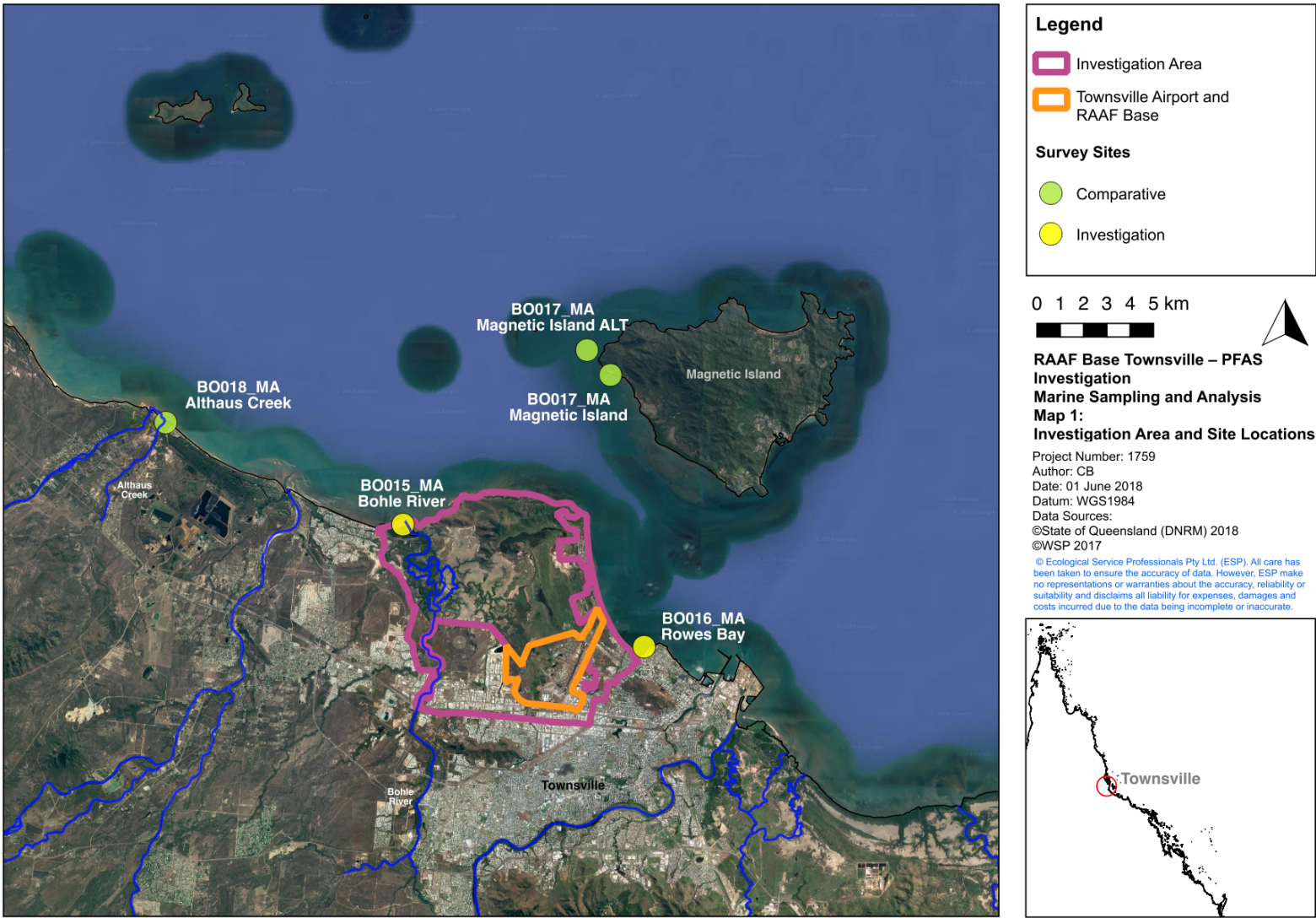
- Sampling of target marine biota (fish, banana prawns and seagrass) from different trophic levels (primary producers / consumers and secondary, tertiary or higher consumers as well as apex predators), at sites adjacent to the IA and comparative sites for the analysis of PFAS in these biota, by a National Association of Testing Authorities (NATA) accredited laboratory.
- Where possible, supplement previous findings by increasing the sample size of target species and extend the existing database on PFAS concentrations in biota from the region.
- Reporting on the findings of the analysis of PFAS in marine biota samples from the survey in March 2018.

1.2 Project Area

The survey sites are located between Magnetic Island to the east of the IA, Rows Bay to the south and Althaus Creek to the north-west. The Town Common area and Bohle River are located north-west of the Townsville RAAF Base and Townsville Airport, in the Bohle River drainage sub-basin of the Ross River drainage basin. Three Mile Creek (also in the Bohle River drainage sub-basin) is located to the east of the Townsville RAAF Base, and drains into Rows Bay. These watercourses collectively form the IA (Map 1). For the marine survey, the sites were located at the mouth of the waterways in a suitable marine park zone where commercial fishing occurs.



Figure 1.1 Investigation Area (IA), showing the location of the marine survey sites



2 Field Survey Methods

2.1 Survey Design and Timing

2.1.1 Survey Design

The survey design was informed by the results of an initial survey focussing on freshwater and estuarine biota in July 2017 (ESP 2018); two estuarine surveys in November and December 2017, and feedback from the Queensland Government Interdepartmental Committee (IDC) and Project Technical Advisor. The marine survey was designed generally in accordance with the *Sampling and Quality Plan (SAQP) – Version 1* (WSP 2017), prepared by WSP as the lead consultant for the investigation.

The survey design focussed on four marine sites in the greater Townsville area (Figure 1.1), with two sites (BO015MA Bohle River at the mouth and BO016MA Rowes Bay) being adjacent to drainages within the IA. Sampling using commercial equipment was restricted in places due to Great Barrier Reef Marine Park zoning use regulations. Two comparative sites were located at Magnetic Island (BO017MA, northeast of the IA) and the Althaus Creek mouth (BO018MA, northwest of the IA). Species likely to be caught and consumed by commercial and recreational methods within the region were targeted in this survey, based on advice from the Queensland Department of Agriculture and Fisheries (DAF). The trophic level of each target biota type was also considered, and seagrass was included in the survey, to inform the ecological risk assessment (ERA) for the project. Target species, their trophic level and target sample types and numbers for the survey are presented in the Sampling and Analysis Plan (SAP, Table 2.1).

Each biota type varied spatially in its availability, so the scale of sampling varied accordingly. For example, sessile biota such as seagrass were sampled at the site scale. In contrast, mobile biota e.g. fish and crustaceans were sampled at several locations within the site (at a scale of 100s of meters). The results were aggregated and analysed at the site scale. Biota caught at sites BO017MA and BO017MA ALT were pooled for analysis and are listed under site BO017MA in all subsequent tables. Despite substantial survey effort, not all of the intended target species were caught, as per the original SAP (Table 2.1), due to the temporal and spatial patchiness in the presence of some of those species.

Table 2.1 Sample and Analysis Program (SAP) detailing target species, sample type and sample numbers planned for the marine survey.

Biota Type	Sample Type	Target no. Samples / Location (maximum)	Max. No. Individuals / Location	Number of Locations	Max. Number of Individuals (Total for Survey)
Threadfin salmon (Polynemidae)	flesh	8	16	4	64
	liver	8		4	
Bream (<i>Acanthopagrus</i> sp.)	flesh	8	16	4	64
	liver	8		4	
Flathead (<i>Platycephalus fuscus</i>)	flesh	4	8	4	32
	liver	4		4	
Other species of flathead (family Platycephalidae)	flesh	4	12	4	48
	liver	4		4	
Barramundi (<i>Lates calcarifer</i>)	flesh	8	8	4	32
	liver	8		4	
Banana prawns (<i>Fenneropenaeus</i> sp.)	head + hindgut	4	40	4	160
	flesh	4		4	
Other species of prawns (<i>Penaeus</i> sp. or <i>Metapenaeus</i> sp.)	head + hindgut	4	40	4	160
	flesh	4		4	
Spotted mackerel (<i>Scomberomorus munroi</i>)	flesh	4	8	4	32
	liver	4		4	
Other mackerel species (family Scombridae)	flesh	4	8	4	32
	liver	4		4	
Seagrass	Composite	8	20 g / sample	4	640 g

Table 2.2 Sites codes, types, locations and the biota type(s) sampled at each site.

Site	Location	Latitude	Longitude	Biota		
				Crustaceans	Fish	Seagrass
Investigation Area (Marine)						
0874_BO015MA	Bohle River Mouth	- 19.1925	146.6994	Yes	Yes	Yes
0874_BO016MA	Rowes Bay	- 19.2397	146.7979	Yes	Yes	Yes
Comparative (Marine)						
0874_BO017MA	Magnetic Island	- 19.1348	146.7841	–	Yes	Yes
0874_BO017MA ALT	Magnetic Island	19.1234	146.7752	–	Yes	–
0874_BO018MA	Althaus Creek Mouth	- 19.1532	146.6025	Yes	Yes	–

– Not present during sampling

2.1.2 Timing

Marine biota were sampled in late March 2018 (21/03/18 – 26/03/18) following significant rainfall events in February & March 2018, in the Townsville area and far north Queensland (Figure 2.1). The weather during this survey was mostly overcast with occasional showers. Rainfall for the region was mostly below average in the 12 months prior to the two surveys (BOM 2018a), with the exception of May and October 2017, and March 2018 which had above average rainfall (Figure 2.1). Air temperatures were average for the time of year, ranging from 20 – 33°C (BOM 2018a).

Tides recorded for Townsville during the survey were in a neap phase transitioning to a spring phase, and ranged between approximately 1.15 m (low) and 3.38 m (high). High tides occurred in late morning to late afternoon as well as late night to early morning during the survey (BOM 2018b) (Table 2.3).

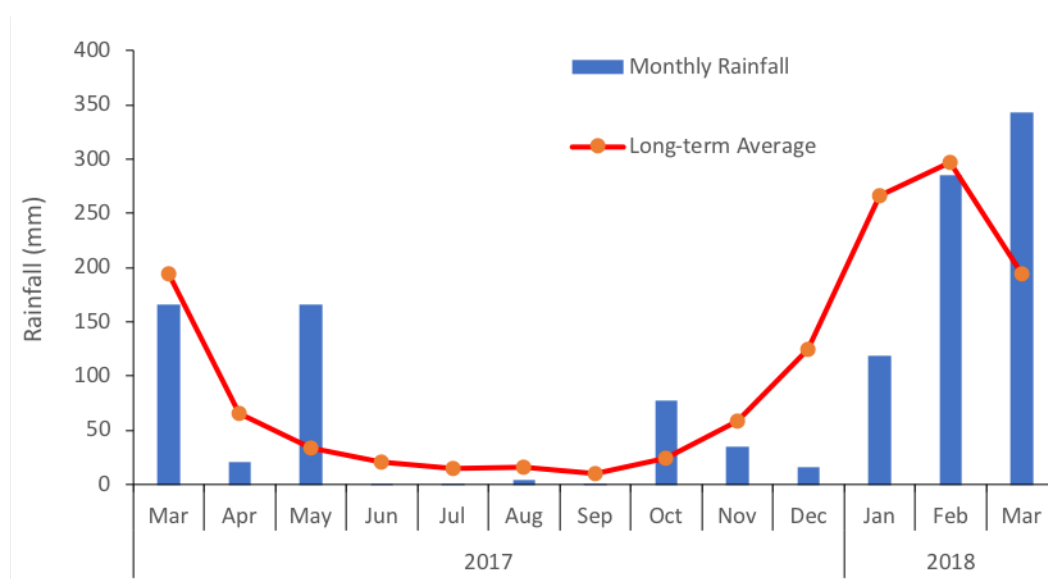


Figure 2.1 Monthly total and average rainfall (mm) over 12 months prior to the survey sourced from BOM station 32040 (Townsville Aero).

Table 2.3 Tidal cycle dates, times (24 hr) and approximate water heights (m).

Tide	21/03	22/03	23/03	24/03	25/03	26/03
Low	04.42 (1.5 m)					
High	11.01 (2.83 m)	00.02 (2.82 m)	01.26 (2.70 m)	03.51 (2.80 m)	05.09 (3.09 m)	05.58 (3.38 m)
Low	17.25 (1.37 m)	06.33 (1.78 m)	08.46 (1.68 m)	10.53 (1.68 m)	11.55 (1.40 m)	12.40 (1.15 m)
High		11.54 (2.52 m)	13.22 (2.25 m)	16.14 (2.25 m)	17.29 (2.48 m)	18.14 (2.73 m)
Low		19.04 (1.51 m)	20.53 (1.53 m)	22.30 (1.38 m)	23.36 (1.14 m)	

Source: BOM 2018.

2.2 Biota Sampling

Estuarine and marine biota were sampled using a variety of methods, depending on the biota type, generally in accordance with the *Monitoring and Sampling Manual* (DES 2018). All biota sampling was completed in accordance with:

- DAF Animal Ethics Committee approval (#CA 2017/06/1072) to ESP;
- DAF General Fisheries Permit #193593 to ESP and DAF General Fisheries Permit #195821 to John Page;
- Great Barrier Reef Marine Park Permit G17/39863.1 to ESP;
- Department of National Parks, Sport and Racing – Queensland Parks and Wildlife Service Permit (#WITK18589217) to ESP; and,
- Department of Environment and Heritage Protection - Scientific Purposes Permit (#WISP14986614) to ESP.

The gear types used for biota surveys included:

- up to three mesh nets, each up to 200 m in length and with a mesh size between 75 mm and 160 mm;
- Four entry point, collapsible, 50 mm mesh crab pots, baited with fresh fish frames;
- 2.4 m radius cast nets (25 and 10 mm mesh); and,
- recreational fishing equipment (rods and reels) using lures and fresh bait (store bought and locally caught).

The gear type and survey effort are presented in Table 2.4.

All biota taken for analysis were euthanised in an ice slurry. Where samples could not be prepared on-site (due to tidal access restrictions), samples were prepared at the nearest boat ramp in accordance with strict sample preparation and quality assurance / quality control (QA/QC) protocols (see Section 2.3.4). The biota retained for analysis at each site and the sample number and tissue type are shown in Table 2.5. Photographs of each species retained are presented in Appendix A.

Table 2.4 Gear type and survey effort (minutes) at marine sites.

Site	Date	Gear Type	Mesh size / Number of shots	Effort (net soak time in mins)
0874_BO015MA (Bohle River Mouth)	21/03/18	net	76 mm (1 shot)	40
	22/03/18	net	76 mm (1 shot)	75
		net	102 mm (2 shots)	155
		line	2	60
0874_BO016MA (Rowes Bay)	24/03/18	net	76 mm	85
		net	102 mm	81
		net	152 mm	75
0874_BO017MA ALT(Magnetic Island)	23/03/18 & 26/03/18	net	102 mm	60
		line	2	90
0874_BO017MA (Magnetic Island)		crab pot	4 pots	480
		cast net	20 casts	–
0874_BO018MA (Althaus Creek Mouth)	25/03/18	net	76 mm (4 shots)	225
		net	152 mm (1 shot)	50

Table 2.5 Number of samples (including replicates) collected for analysis by the primary laboratory from marine sites in March 2018. All biota samples were individual samples, with the exception of composite plant samples as indicated.

Biota Type	Trophic Level	Tissue Type	Impact		Site Comparative		Total
			BO015 MA Bohle River Mouth	BO016 MA Rowes Bay	BO0017 MA Magneti c Island	BO0018 MA Althaus Ck Mouth	
Barramundi ^a (<i>Lates calcarifer</i>)	Apex predator	Flesh	10	–	–	8	18
		Liver	10	–	–	8	18
Barred javelin ^c (grunter) (<i>Pomadasys kakaan</i>)	Consumer	Flesh	1	1	–	–	2
		Liver	1	1	–	–	2
Barred queenfish ^b (<i>Scomberoides tala</i>)	Apex predator	Flesh	6	4	–	4	14
		Liver	5	4	–	4	13
Blue catfish ^c (<i>Neoarius graffei</i>)	Consumer	Flesh	–	4	–	–	4
		Liver	–	4	–	–	4
Blue swimmer crab ^f (<i>Portunus armatus</i>)	Omnivore	Flesh	4	4	–	4	12
		Organ	2	4	–	4	10
Blue threadfin salmon ^a (<i>Eleutheronema tetradactylum</i>)	Apex predator	Flesh	–	5	–	–	5
		Liver	–	4	–	–	4
Crimson snapper ^b (small- mouth nannygai) (<i>Lutjanus erythropterus</i>)	Apex predator	Flesh	–	–	3	–	3
		Liver	–	–	3	–	3
Diamond scale mullet ^f (<i>Liza vaigiensis</i>)	Detritivore	Flesh	–	–	1	5	6
		Liver	–	–	–	4 ^d	4
Garfish ^c (snub nose) (<i>Arrhamphus sclerolepsis</i>)	Consumer	Flesh	–	–	4	–	4
		Liver	–	–	1	–	1
Giant trevally ^b (<i>Caranx ignobilis</i>)	Apex predator	Flesh	4	–	–	–	4
		Liver	4	–	–	–	4
Golden snapper ^b (fingermark) (<i>Lutjanus johnii</i>)	Apex predator	Flesh	–	3	–	–	3
		Liver	–	3	–	–	3
Mangrove jack ^b (<i>Lutjanus argentimaculatus</i>)	Apex predator	Flesh	4	–	–	–	4
		Liver	4	–	–	–	4
Northern sand flathead ^a (<i>Platycephalus endrachtensis</i>)	Apex predator	Flesh	3	3	–	3	9
		Liver	1	1	–	2	4
Pikey bream ^a (<i>Acanthopagrus pacificus</i>)	Consumer	Flesh	2	–	–	3	5
		Liver	2	–	–	1	3
Saddletail snapper ^b (large- mouth nannygai) (<i>Lutjanus malabaricus</i>)	Apex predator	Flesh	–	–	2	–	2
		Liver	–	–	2	–	2
Sea mullet ^f (<i>Mugil cephalus</i>)	Detritivore	Flesh	4	–	3	–	7
		Liver	4	–	1	–	5
Silver javelin ^c (grunter)	Consumer	Flesh	5	3	–	4	12

			Site				
Biota Type	Trophic Level	Tissue Type	Impact		Comparative		Total
			BO015 MA Bohle River Mouth	BO016 MA Rowes Bay	BO0017 MA Magnet ic Island	BO0018 MA Althaus Ck Mouth	
(<i>Pomadasys argenteus</i>)		Liver	3	3	–	4	10
Spanish mackerel ^a (<i>Scomberomorus commerson</i>)	Apex predator	Flesh	–	3	–	3	6
		Liver	–	1	–	2	3
Spotted scat ^c (<i>Scatophagus</i> cf. <i>argus</i>)	Consumer	Flesh	–	4	–	2	6
		Liver	–	4	–	2	6
Whiting ^c (<i>Sillago ciliata</i>)	Consumer	Flesh	–	–	1	–	1
Yellowfin bream ^a (<i>Acanthopagrus australis</i>)	Consumer	Flesh	2	–	–	–	2
		Liver	2	–	–	–	2
Sargassum ^d (Sargassaceae)	Primary Producer	Whole	–	3	4	–	7
Seagrass ^{a,e} (<i>Halodule uninervis</i> , <i>Halophila ovalis</i> and <i>Zostera</i> sp.)	Primary Producer	Whole	4	4	4	–	12
Grand Total			89	70	29	67	255

^a target species as outlined in Table 2.1.

^b species were used as substitute apex predator

^c species were used as substitute consumer

^d species was used as substitute primary producer

^e composite samples of approximately 20 blades and rhizomes

^f not target species in marine SAP (Table 2.1), included to inform analysis of PFOS+PFHxS in different trophic levels

2.2.1 Crustaceans

Blue swimmer crabs (*Portunus armatus*) were collected from sites BO015MA (Bohle River Mouth), BO016MA (Rowes Bay) and the comparative site BO018MA (Althaus Creek Mouth) in nets (Table 2.5). All crabs caught were euthanised in an ice slurry and flesh and organ tissue samples were prepared (for details on sample preparation see section 2.3.1).

No banana prawns (*Fenneropenaeus* sp.) or other prawn species were collected during the marine survey.

2.2.2 Fish

Fish were sampled at all sites using commercial mesh nets (mesh size between 76 and 152 mm). It was not possible to set nets where we had intended at site BO017MA at Magnetic Island, due to restrictions on the placement of nets to within the general use zones of the Marine Park only, and safe operating conditions identified on the ground (i.e. suitable lack of bottom structure to avoid net entanglement). Consequently, a single net was set to the north west of Magnetic Island and the remainder of fish were caught using recreational methods such as bait cast nets along the beach or using a hand line.

Each fish was identified, counted and a representative of each species photographed. Fish were euthanised and kept cool on ice until tissue sample preparation (Section 2.3.2).

A total of 133 fish, representing 21 species from 14 families, were caught at the four sites (Table 2.5). While the aim was to sample the same species from sites adjacent to the IA and comparative sites, the following species were sampled in only one site, as indicated:

- giant trevally, mangrove jack and yellowfin bream were sampled only at site BO015MA (Bohle River Mouth),
- blue catfish, blue threadfin salmon and golden snapper were sampled only at site BO016MA (Rowes Bay), and
- crimson snapper, saddletail snapper, and snub nose garfish were only sampled at site BO017MA (Magnetic Island).

Images of species retained for analysis are provided in Appendix A.

2.2.3 Seagrass and Macroalgae

Four composite samples of seagrass were collected at two sites adjacent to the IA and one comparative site, respectively. Each composite sample of seagrass consisted approximately 20 seagrass leaf blades and rhizomes. Three macroalgae samples (*Sargassum* sp.) were collected from site BO016MA adjacent to the IA, and four samples were collected from the comparative site BO017MA.

2.3 Sample Preparation

A total of 247 individual biota samples (255 including QA/QC replicates) from crustaceans, fish and macroalgae and marine plants were submitted to the primary laboratory for analysis. The species, tissue type (flesh, liver, organ or whole sample), and trophic level collected per site are presented in Table 2.5. Each biota type was rinsed prior to sample preparation in

accordance with the *Monitoring and Sampling Manual* (DES 2018; as described in Section 2.3.4). An additional 86 tissue samples were taken in the field and are being stored frozen pending analysis by the laboratory should this be required. The additional samples were typically of non-target species, seagrass or none target tissue types including fish fat and gonad tissue.

2.3.1 Crustaceans

All crustaceans were rinsed prior to sample preparation in accordance with the *Monitoring and Sampling Manual* (DES 2018).

Crab tissue samples were taken from both claws and legs, using stainless steel scissors and forceps. For organ samples from crabs, the gills were first removed from the branchial chamber, then gonads and digestive gland (hepatopancreas) was collected using stainless steel forceps.

2.3.2 Fish

All fish were rinsed prior to sample preparation in accordance with the *Monitoring and Sampling Manual* (DES 2018). Specimens were carefully dissected using clean stainless-steel knives, scissors or scalpel and forceps to obtain separate samples of either muscle (flesh) or liver. Samples were only collected if sufficient material (e.g. liver) was available. Flesh was extracted first without opening the gut cavity, followed by removal of the liver.

2.3.3 Seagrass and Macroalgae

All plant material collected at a site was rinsed of mud and then retained to provide a composite sample of whole plants (leaf blades and rhizomes) or macroalgae.

2.3.4 Quality Assurance / Quality Control (QA/QC)

Prior to use and sample preparation, all equipment and each organism were rinsed separately in a PFAS-free rinsate. All equipment was cleaned at the beginning of each day, between sites and between tissue sample preparation for each biota type to limit the potential for contamination from external sources and / or cross-contamination between sites and organisms. Other QA/QC procedures, as outlined in the *Monitoring and Sampling Manual* (DES 2018) were followed such as wearing new powder-free nitrile gloves for preparation of each sample. Equipment was dipped in Liquinox (a PFAS-free industrial strength cleaner), rinsed with potable / tap water, then rinsed in de-ionised water before every use. All trays used were stainless steel and stainless-steel scissors, filleting knives, forceps and scalpels were thoroughly cleaned using Liquinox and de-ionised water before use at each site. Scalpel blades were changed between samples.

For quality control and assurance purposes and to determine whether there was sample contamination from the sampling equipment, biota or procedure, the following rinsate samples were collected:

- procedure rinsate (ice slurry) at sites BO015MA, BO016MA and BO018MA
- equipment rinsate from preparation gear (scalpels, forceps, trays) at all sites, and
- biota rinsate at sites BO015MA, BO017MA and BO018MA.

One field blank sample consisting of de-ionised rinsate water provided by the primary laboratory was also collected on sites BO017MA and BO018MA to determine any background contamination or handling errors.

In order to determine variation in PFAS concentrations within a biota sample and between laboratories (Section 2.4), triplicate samples were taken of 50% of the duplicate samples (

Table 2.6) and included both liver and flesh samples. Replicates were taken from the same specimen.

Triplicate biota samples were collected, with two replicates analysed by the primary laboratory (ALS Environmental) and the remaining replicate analysed by a secondary laboratory (Eurofins NATA accreditation 1261). Duplicate samples of equipment rinsate were analysed by the primary laboratory only. One replicate of the procedure (ice slurry) rinsate was analysed by the primary and secondary laboratory each. One equipment rinsate sample (collected at site BO018MA) was analysed by the secondary laboratory.

Table 2.6 Triplicate and duplicate biota samples collected at marine sites in March 2018.

Site	Biota	Component	Sample Type	Replicates
BO015MA (Bohle River Mouth)	Barred queenfish (<i>S. tala</i>)	flesh	individual	3
		liver	individual	2
	Barramundi (<i>L. calcarifer</i>)	flesh	individual	2
		liver	individual	3
	Silver javelin (<i>P. argenteus</i>)	flesh	individual	2
		liver	individual	2
BO016MA (Rowes Bay)	Blue threadfin salmon (<i>E. tetradactylum</i>)	flesh	individual	3
BO018 (Althaus Creek Mouth)	Diamondscale Mullet (<i>L. vaigiensis</i>)	flesh	individual	3

2.4 Laboratory and Data Analysis

Biota and QA/QC rinsate samples were analysed by a primary laboratory (ALS Environmental, NATA accreditation 825) and a secondary laboratory (Eurofins, NATA accreditation 1261) for the full suite of components of PFAS (Laboratory Certificates of Analysis are presented in Appendix C).

The laboratory results were summarised as follows:

- The total concentrations of PFOS and PFHxS were summed for each sample, to provide a value for comparison between biota, sample types, trophic level and sites.
- Where more than one sample of any biota type for each trophic level was collected, the mean, standard error and range of PFOS+PFHxS concentrations were calculated for each trophic level (primary producer and consumer, detritivore, omnivore, consumer and apex predator (where available), pooled among sites (sites as per Table 2.2), and tabulated and graphed. Only the first replicate of each sample was used for this analysis
- Concentrations of PFOS+PFHxS below the laboratory Limit of Reporting (LOR) were halved, in order to include samples in the analysis.
- Where only a single sample was collected at a site (due to low numbers of individuals or composite samples), the total concentrations of PFOS+PFHxS were tabulated and graphed.

Duplicate and triplicate samples (i.e. sample split into two or three, refer to

Table 2.6) were collected to determine the variability in results associated with field sampling and also served as inter-laboratory checks.

The precision of duplicate samples was calculated using the relative percent difference (RPD) between a sample and field duplicate. The precision of triplicate samples was calculated using a measure of relative standard deviation (RSD).

For aqueous samples, i.e. duplicate rinsate samples, an acceptable level of variation between samples according to the quality control methods outlined in the most recent draft of the *Monitoring and Sampling Manual* is less than 20%, where the value is greater than five to ten times the laboratory limit of reporting (DES 2018). In those circumstances where the result is close to the LOR, the acceptable RPD may exceed 20% (DES 2018).

For biota samples, the primary laboratory's guidelines were used (ALS Environmental 2018) which define acceptable ranges of RPDs or RSDs as:

- result < 10 times LOR → no limit
- result 10 – 20 times LOR → 0 – 50%
- result > 20 times LOR → 0 – 20%.

2.5 Limitations

This report presents the results of a single marine sampling event completed immediately after the wet season in March 2018, with no seasonal replication. The survey aimed to collect a range of recreationally and commercially important crustacean and fish species from marine areas adjacent to the IA (Bohle River Mouth and Rowes Bay drainages) and from two comparative marine areas within 10km for the analysis of PFAS in tissue samples. Large predatory fish species of recreational importance such as barramundi and Spanish mackerel were intended to be sampled with priority. Despite substantial effort targeting large predator species (> 24 hours of net fishing), target species could not be caught in all locations or to the intended sample number (see Table 2.1 and Table 2.5). Target species were substituted with other species from the same trophic level (e.g. mangrove jack and snappers as a substitute apex predator for barramundi) when possible.

Seagrass and macroalgae were not located at the mouth of Althaus Creek (site BO018MA), so were not sampled.

For health and safety reasons, the survey methods used for marine biota were limited to those that could be completed safely from a boat, as sampling was in known crocodile habitat. Weather conditions were marginal during sampling, which restricted where sampling could safely occur on certain days.

3 Results

3.1 Concentration of PFOS+PFHxS in Biota from Marine Sites in March 2018

Of the suite of PFAS components, PFOS, PFHxS and their surrogates were the most widespread, and detected (i.e. concentrations were above the laboratory limit of reporting (LOR)) in 52% of the samples from sites adjacent to the IA (79 samples), and 37% of the samples from comparative sites (35 samples, Table 3.1). PFOS+PFHxS was detected in a range biota types from sites adjacent to the IA and from comparative sites (refer to Appendix C for full laboratory results). The following were also detected, though in far fewer samples:

- Perfluorooctanoic acid (PFOA) in seven samples from comparative sites (in one fish liver and in crustacean flesh and organs),
- Perfluoroheptane sulfonic acid (PFHpS) in one comparative sample, and 5 samples from IA adjacent sites (in fish liver tissue),
- Perfluoropentanoic acid (PFPeA) in two comparative samples, and one IA adjacent sample (in fish liver tissue and a seagrass sample),
- Perfluoroundecanoic acid (PFUnDA) from one IA adjacent sample (in a fish liver sample), and
- N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA) from one IA adjacent sample and one comparative sample (in fish flesh).

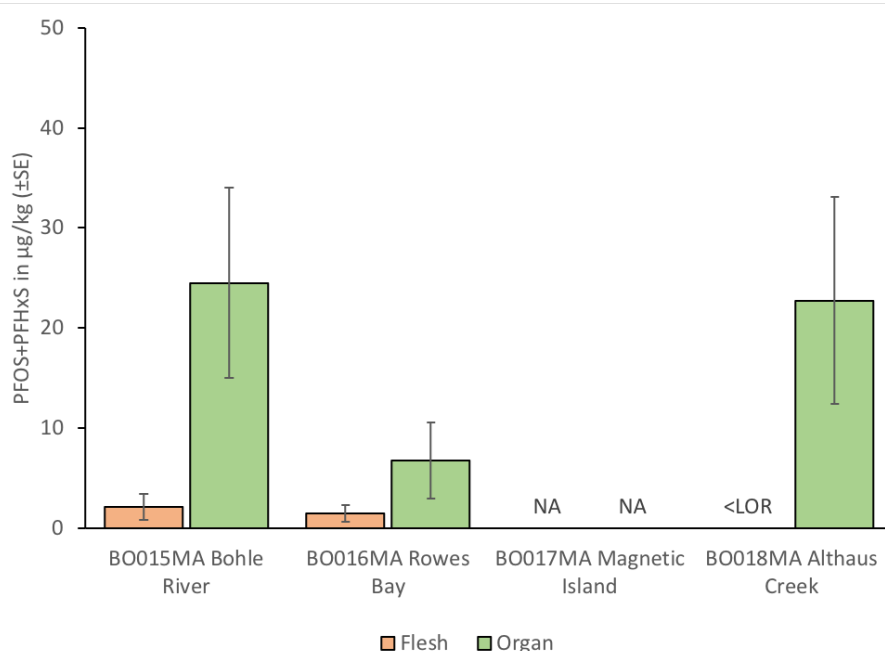
The concentrations of PFOS+PFHxS in crustaceans, different trophic levels of fish and species relevant for commercial and recreational fisheries are discussed below.

Table 3.1 Proportion of all biota samples (excluding replicates) with PFOS+PFHxS concentrations above laboratory limit of reporting (LOR).

Site	Biota	Trophic Level & Tissue Type	Total Number of Samples Analysed	Number of Samples Above LOR	Proportion (%) of Samples Above LOR
BO015MA Bohle River Mouth	crustacean	omnivore flesh	4	3	75
		omnivore organ	2	2	100
	fish	apex predator flesh	26	6	23
		apex predator liver	23	23	100
		consumer flesh	9	2	22
		consumer liver	7	7	100
		detritivore flesh	4	1	25
		detritivore liver	4	4	100
	seagrass	whole	4	0	0
BO016MA Rowes Bay	crustacean	omnivore flesh	4	2	50
		omnivore organ	4	2	50
	fish	apex predator flesh	17	1	6
		apex predator liver	13	13	100
		consumer flesh	12	1	8
		consumer liver	12	12	100
	seagrass	whole	4	0	0
	macroalgae	whole	3	0	0
BO017 Magnetic Island	fish	apex predator flesh	5	0	0
		apex predator liver	5	3	60
		consumer flesh	5	0	0
		consumer liver	1	0	0
		detritivore flesh	4	0	0
		detritivore liver	1	1	100
	seagrass	whole	4	0	0
	macroalgae	whole	4	0	0
BO018 Althaus Creek Mouth	crustacean	omnivore flesh	4	0	0
		omnivore organ	4	4	100
	fish	apex predator flesh	18	5	28
		apex predator liver	16	14	88
		consumer flesh	9	1	11
		consumer liver	7	2	29
		detritivore flesh	4	1	25
		detritivore liver	4	4	100

3.1.1 Crustaceans

The concentration of PFOS+PFHxS in crab flesh was much lower than in the digestive and reproductive organs at all sites (Figure 3.1). PFOS+PFHxS was detected above the LOR in up to 75 % of crab flesh samples from the sites adjacent to the IA, but none of the flesh samples from the comparative site at the mouth of Althaus Creek (Table 3.1). The average concentration of PFOS+PFHxS in crab flesh was 2 µg/kg at the mouth of the Bohle River and 1.5 µg/kg in Rows Bay. In contrast, the concentration of PFOS+PFHxS in crab organs was above the LOR in more than 50% of samples from the sites adjacent to the IA and all samples from the comparative site at the mouth of Althaus Creek (BO018MA). The average concentration of PFOS+PFHxS in crab organs was lowest at the IA adjacent site in Rows Bay (6.8 µg/kg), and higher at the Bohle River mouth (24.5 µg/kg) and the comparative site at Althaus Creek mouth (22.8 µg/kg).



NA: not sampled

<LOR: concentration is below Limit of Reporting (LOR)

Figure 3.1 Concentrations of PFOS+PFHxS (± SE) in blue swimmer crabs at each site.

3.1.2 Fish

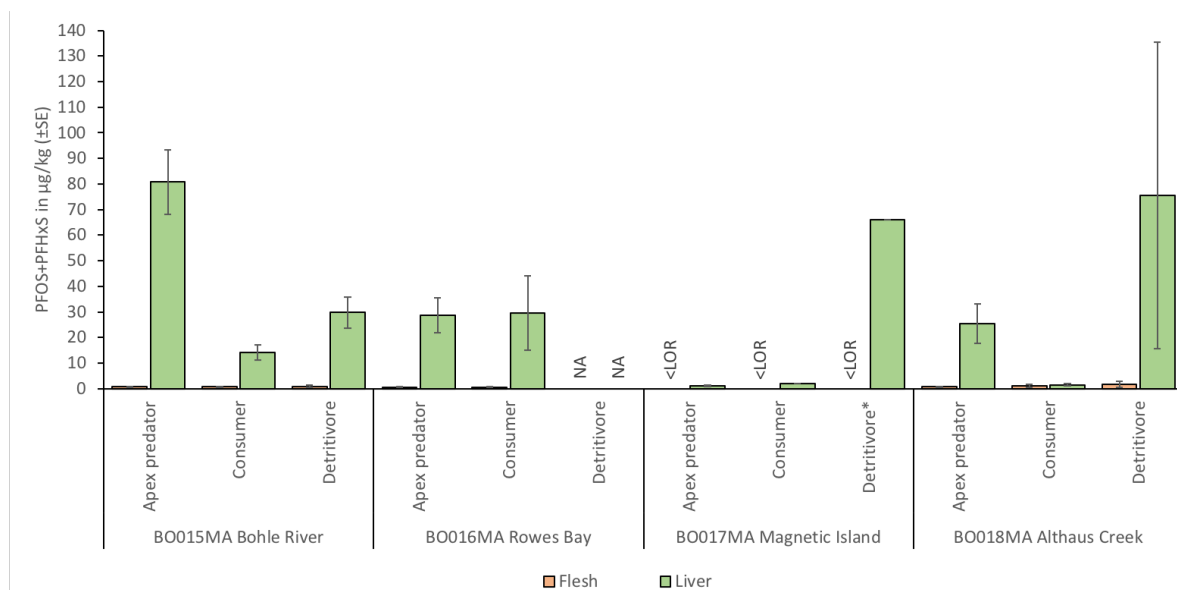
The concentration of PFOS+PFHxS was generally much greater in fish liver than flesh samples (Figure 3.2). Concentrations of PFOS+PFHxS above the LOR were detected in all fish liver samples (100 %) from all trophic levels from the mouth of the Bohle River (Site BO015MA) and in Rows Bay (Site BO016MA) adjacent to the IA (Table 3.1). The detection rates in fish liver samples from comparative sites ranged from 0 to 100 % depending on the different trophic groups (Table 3.1).

When detected, PFOS+PFHxS concentrations from liver samples of apex predators and consumers were generally higher in samples from the sites adjacent to the IA than the comparative sites, with the exception of concentration in liver tissue from detritivores, which was more variable among samples and sites (Figure 3.2). The concentration of

PFOS+PFHxS in detritivore samples was similar among comparative sites and generally higher than in detritivore liver samples from site BO015MA at the Bohle River mouth. The highest concentration of PFOS+PFHxS (255 µg/kg) was recorded in a liver sample from a diamond scale mullet (*Liza vaigiensis*) from site BO018MA at the mouth of Althaus Creek (Table 3.2).

At sites adjacent to the IA, the highest average concentration of PFOS+PFHxS was recorded in liver samples from apex predators (mean 80.8 µg/kg; Table 3.2). Apex predators included barramundi (*L. calcarifer*), snappers (*Lutjanus* sp.), northern sand flathead (*P. endrachtensis*), barred queenfish (*S. tala*) and giant trevally (*C. ignobilis*).

In contrast, the concentrations of PFOS+PFHxS in fish flesh samples above the LOR were generally much lower than for liver samples, with detection rates between 6 and 25 % at sites adjacent to the IA and 0 to 29 % at comparative sites (Table 3.1). No PFOS+PFHxS was detected in fish flesh samples collected at the comparative site BO017MA at Magnetic Island (Table 3.1; Figure 3.2). The concentration of PFOS+PFHxS was on average less than 1 µg/kg in fish flesh from sites in the IA, less than 2 µg/kg at the mouth of Althaus Creek and below LOR in fish flesh from Magnetic Island (Table 3.2).



NA: not sampled

<LOR: concentration is below Limit of Reporting (LOR)

Figure 3.2 Concentrations of PFOS+PFHxS (± SE) in fish and liver samples from all sites.

3.1.3 Seagrass and Macroalgae

The concentration of PFOS+PFHxS in seagrass and macroalgae was below the LOR in all samples from all sites (Table 3.1; Table 3.2).

Table 3.2 The number of samples (n), mean, minimum, maximum and standard error (± S.E.) of PFOS+PFHxS concentrations in biota from different trophic levels per site.

Site	Biota Type	Trophic Level / Tissue	n	Mean (µg/kg)	Minimum (µg/kg)	Maximum (µg/kg)	(± S.E.)
BO015MA Bohle River Mouth	crustacean	crab flesh	4	2.1	<LOR	6	1.3
		crab organ	2	24.5	15	34	9.5
	fish	apex predator flesh	26	0.7	<LOR	2	0.1
		apex predator liver	23	80.8	3	235	12.6
		consumer flesh	9	0.7	<LOR	2	0.2
		consumer liver	7	14.1	3	24	2.9
		detritivore flesh	4	0.9	<LOR	2	0.4
		detritivore liver	4	29.8	14	43	6
	seagrass	whole	4	<LOR	NA	NA	NA
BO016 Rowes Bay	crustacean	crab flesh	4	1.5	<LOR	4	0.8
		crab organ	4	6.8	1	17	4
	fish	apex predator flesh	17	0.6	<LOR	2	0.1
		apex predator liver	13	28.8	5	67	6.8
		consumer flesh	12	0.6	<LOR	2	0.1
		consumer liver	12	29.6	2	184	14.6
	seagrass	whole	4	<LOR	NA	NA	NA
	macroalgae	whole	3	<LOR	NA	NA	NA
BO017MA Magnetic Island	fish	apex predator flesh	5	<LOR	NA	NA	NA
		apex predator liver	5	1.2	<LOR	2	0.3
		consumer flesh	5	<LOR	NA	NA	NA
		consumer liver	1	2.0*	2*	2*	NA
		detritivore flesh	4	<LOR	NA	NA	NA
		detritivore liver	1	66*	66*	66*	NA
	seagrass	whole	4	<LOR	NA	NA	NA
	macroalgae	whole	4	<LOR	NA	NA	NA
BO018MA Althaus Creek Mouth	crustacean	crab flesh	4	<LOR	NA	NA	NA
		crab organ	4	22.8	4	43	10.3
	fish	apex predator flesh	18	0.8	<LOR	2	0.1
		apex predator liver	16	25.3	1	121	7.7
		consumer flesh	9	1.1	<LOR	6	0.6
		consumer liver	7	1.4	<LOR	4	0.5
		detritivore flesh	4	1.6	<LOR	5	1.1
		detritivore liver	4	75.5	14	255	59.8

* total values presented where only one sample collected

NA Minimum, Maximum and Standard Error not calculated where only a single sample was collected or where all results were <LOR

3.2 Concentration of PFOS+PFHxS in Commercially and Recreationally Important Fisheries Species

The mean, minimum and maximum concentration of PFOS+PFHxS as well their standard error (SE) are listed for all species caught in March 2018 in Table B 1. We refer to this table when discussing mean, maximum or minimum concentrations for commercially and recreationally important species and families in the sections below.

3.2.1 Barramundi (*Lates calcarifer*)

The average concentrations of PFOS+PFHxS was higher in barramundi liver than in flesh for all samples (Figure 3.3a) and the average concentrations were above the LOR. The average concentration of PFOS+PFHxS in flesh was 0.8 µg/kg at site BO015MA and 0.9 µg/kg at site BO018MA (Table B 1).

The average concentration in barramundi liver tissue from site BO015MA at the Bohle River mouth was 111.6 µg/kg (Figure 3.3a). In comparison, the average concentration of PFOS+PFHxS in liver tissue from the comparative site at the mouth of Althaus Creek was ten times lower (9.9 µg/kg) than that found at the mouth of the Bohle River.

3.2.2 Javelin fish / Grunter (*Pomadasys* sp.)

Samples of javelin fish (*Pomadasys* sp.) included both the silver javelin fish (*P. argenteus*) and barred javelin fish (*P. kakaan*). The concentration of PFOS+PFHxS was typically higher in liver than flesh samples only at sites adjacent to the IA. However, at the comparative site at the mouth of Althaus Creek, the average concentration of PFOS+PFHxS was higher in flesh (< 2 µg/kg) than liver samples (0.9 µg/kg), although remained low overall.

The mean concentrations of 17 and 12.5 µg/kg in liver samples from sites BO015MA and BO016MA, respectively, were much higher than concentrations in liver samples from site BO018MA (0.9 µg/kg) at Althaus Creek mouth (Figure 3.3b).

3.2.3 Snapper (*Lutjanidae*)

Several species of snapper were caught during this survey. Mangrove jack (*L. argentimaculatus*) and golden snapper / fingermark (*L. johnii*) were caught at sites BO015MA and BO016MA adjacent to the IA, respectively. Two species of snapper (*L. malabaricus* and *L. erythropterus*) were caught at the comparative site BO017MA at Magnetic Island.

The average concentrations of PFOS+PFHxS from flesh samples were below the LOR at all sites. The mean concentrations of liver samples were higher, ranging from 0.8 µg/kg at site BO017MA at Magnetic Island to 25.3 µg/kg at site BO015MA.

The highest concentration (61 µg/kg) was measured in a liver sample from mangrove jack (*L. argentimaculatus*) at the mouth Bohle River (site BO015MA; Table B 1). The concentration of PFOS+PFHxS in liver samples from the IA adjacent sites were on average ten to 30 times higher than from the comparative site (Figure 3.3c).

3.2.4 Mullet (*Mugilidae*)

Samples for mullet included flesh and liver samples from two species of the *Mugilidae* family, the diamond scale mullet (*L. vaigiensis*, caught at sites BO017MA and BO018MA) and the sea mullet (*M. cephalus*, caught at sites BO015MA and BO017MA).

Similar to other fish species, the average concentration of PFOS+PFHxS in liver samples was much greater (33 to 130 times higher) than in flesh samples. The average concentration of PFOS+PFHxS in flesh samples ranged from 0.5 to 1.6 µg/kg, while average concentration in liver samples ranged from 14 to 255 µg/kg.

The average concentration of PFOS+PFHxS in liver samples was higher at comparative sites (66 and 75.5 µg/kg at sites BO017MA and BO018MA, respectively) than the site adjacent to the IA BO015MA (29.8 µg/kg, Figure 3.3d). The highest concentration of PFOS+PFHxS overall (255 µg/kg) was detected in a liver sample of a large diamond scale mullet (*L. vaigiensis*) caught from site BO018MA at the mouth of Althaus Creek.

3.2.5 Northern sand flathead (*P. endrachtensis*)

Northern sand flathead were caught at sites BO015MA, BO016MA and BO018MA and had higher average concentrations of PFOS+PFHxS in liver than flesh samples (Figure 3.4a), as found in other species.

The highest average PFOS+PFHxS concentration in liver samples (33 µg/kg, Table B 1) was measured in fish caught at the site adjacent to the IA at the Bohle River mouth (site BO015MA). The concentration was much lower in fish from site BO016MA in Rowes Bay (6 µg/kg, Table B 1) and the comparative site BO018MA at Althaus Creek mouth (3.5 µg/kg, Table B 1). The average PFOS+PFHxS concentration in flesh samples from the mouth of the Bohle River at site BO015MA was 1 µg/kg, which is slightly above the LOR of 0.5 µg/kg. The concentration in flesh samples from Rowes Bay and Althaus Creek mouth were all below the LOR.

3.2.6 Blue threadfin salmon (*E. tetradactylum*)

Blue threadfin salmon were only collected at site BO016MA in Rowes Bay, and had higher average concentrations of PFOS+PFHxS in liver samples (26.5 µg/kg, Table B 1) than flesh samples, which were below the LOR (Figure 3.4b; Table B 1).

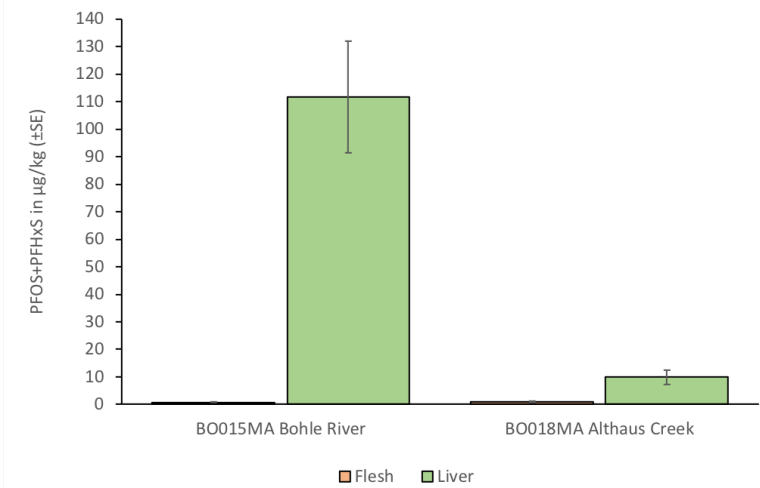
3.2.7 Bream (*Acanthopagrus* spp.)

Two species of bream, the pikey bream (*A. pacificus*) and the yellowfin bream (*A. australis*) were caught at the site adjacent to the IA BO015MA at the Bohle River mouth. Yellowfin bream was not caught at the comparative site BO018MA at the mouth of Althaus Creek.

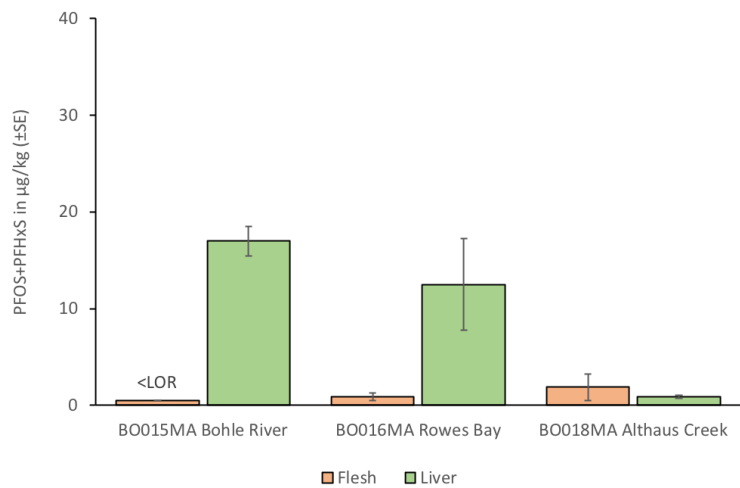
The average concentration of PFOS+PFHxS in bream liver samples was 12 µg/kg at site BO015MA and 4 µg/kg at site BO018MA (Figure 3.4c). The concentration of PFOS+PFHxS in liver samples was much higher than in flesh samples, which were only 1 µg/kg at site BO015MA at the Bohle River mouth and less than the LOR (0.5 µg/kg) at the comparative site at Althaus Creek mouth (BO018MA).

Figure 3.3 Concentrations of PFOS+PFHxS in flesh and liver samples of commercial and recreationally important species of fish.

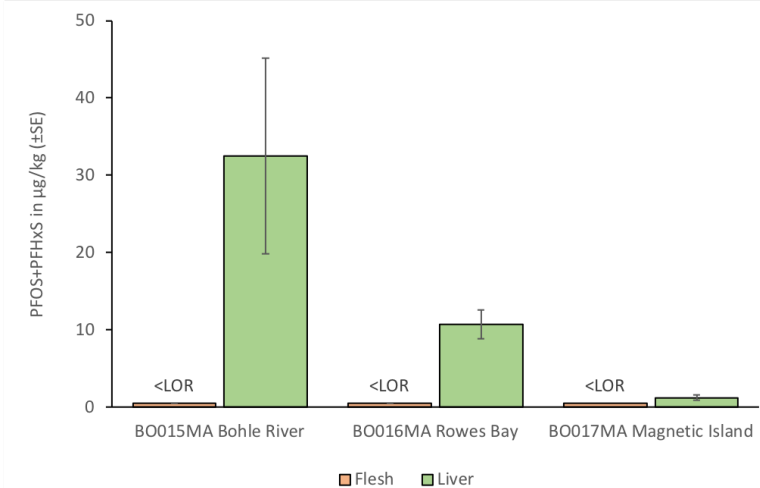
a) Barramundi (*Lates calcarifer*)



b) Javelin fish / Grunter (*Pomadasys* sp.)



c) Snappers (*Lutjanus* sp.)



d) Mullet (*Mugilidae*)

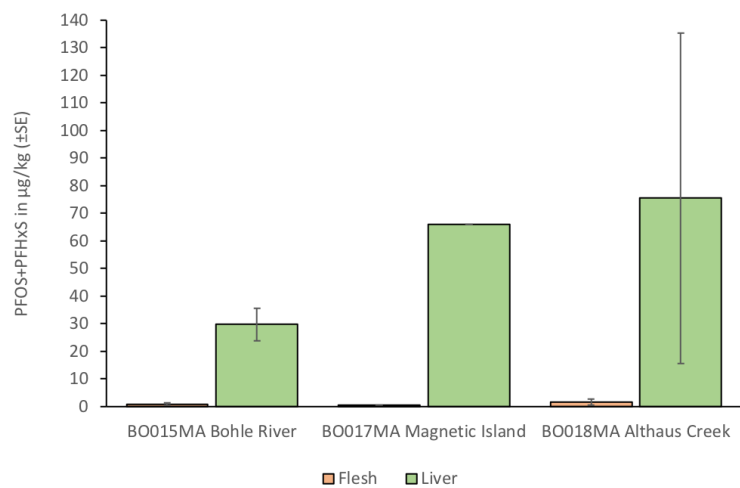
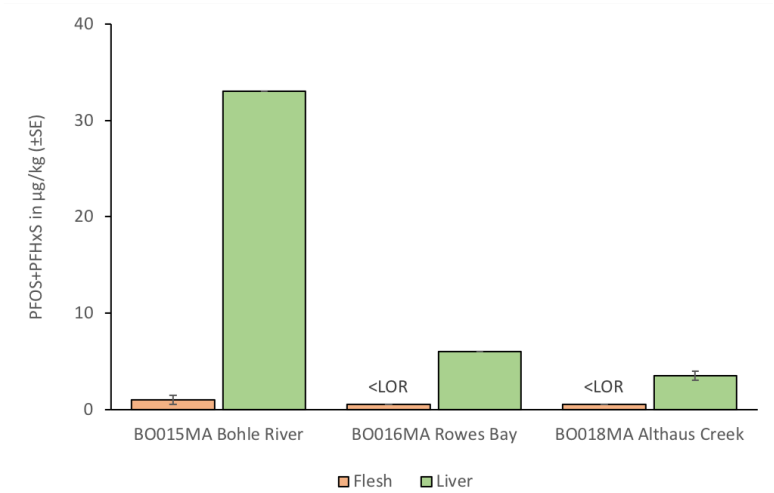
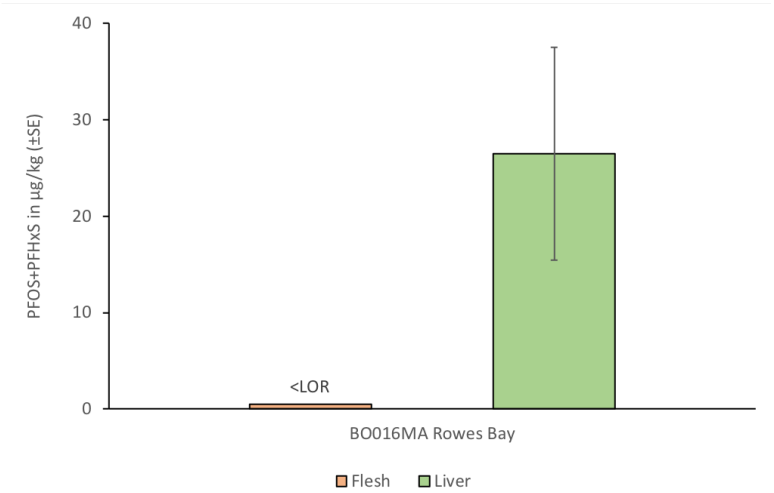


Figure 3.4 Concentrations of PFOS+PFHxS in flesh and liver samples of commercial and recreationally important species of fish

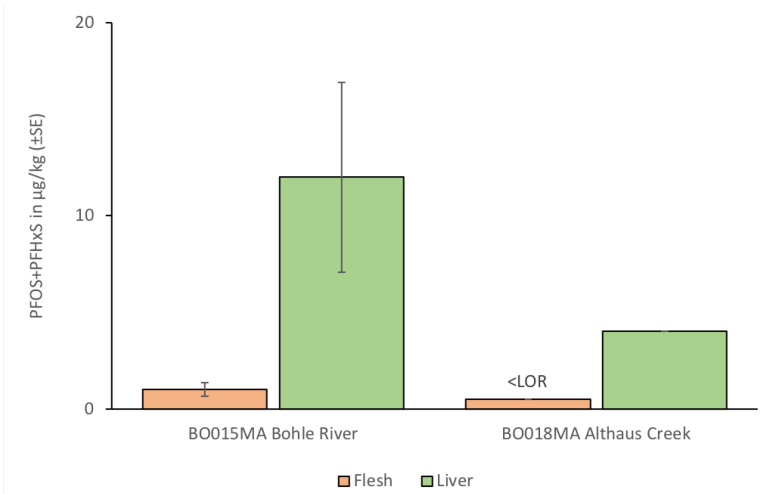
a) Flathead (*Platycephalus endrachtensis*)



b) Threadfin salmon (*Eleutheronema tetradactylum*)



c) Bream (*Acanthopagrus* spp.)



3.2.8 Spanish mackerel (*S. commerson*)

The average concentration of PFOS+PFHxS in Spanish mackerel liver samples was higher than the average concentration in flesh samples at both sites (BO016MA Rowes Bay and BO018 Althaus Creek mouth; Figure 3.5a). The average concentration of PFOS+PFHxS in Spanish mackerel liver samples was twice as high at the site BO016MA adjacent to the IA in Rowes Bay (63 µg/kg) than the comparative site BO018MA at Althaus Creek mouth (32.5 µg/kg, Table B 1). In contrast, the average concentration of PFOS+PFHxS in flesh samples from the two sites did not differ (1 µg/kg, Table B 1).

3.2.9 Blue catfish (*N. graffi*)

Blue catfish were only caught at site BO016MA in Rowes Bay. The average PFOS+PFHxS concentration of liver samples was 73 µg/kg, which was much higher than in flesh samples that were all less than the LOR (Figure 3.5b; Table B 1).

3.2.10 Barred queenfish (*S. tala*)

Barred queenfish were caught at sites adjacent to the IA (BO015MA Bohle River mouth and BO016MA Rowes Bay), and the comparative site BO018MA at Althaus Creek mouth.

This apex predator had a relatively high average concentration of PFOS+PFHxS in liver samples, ranging from 41.8 to 106.3 µg/kg, compared with the average concentration of PFOS+PFHxS in flesh samples, which were all less than 1 µg/kg (Figure 3.5c; Table B 1).

The lowest average concentration of PFOS+PFHxS in barred queenfish liver samples was measured at site BO016MA at Rowes Bay (41.8 µg/kg), followed by BO018MA at the mouth of Althaus Creek (63.5 µg/kg) and the highest concentration (106.3 µg/kg) was measured at site BO015MA at the mouth of the Bohle River (Table B 1). The average concentration in flesh was much lower than in liver samples and did not differ substantially among sites BO015MA (0.8 µg/kg), BO018MA (0.6 µg/kg) and less than the LOR (0.5 µg/kg) at site BO016MA in Rowes Bay.

3.2.11 Giant trevally (*C. ignobilis*)

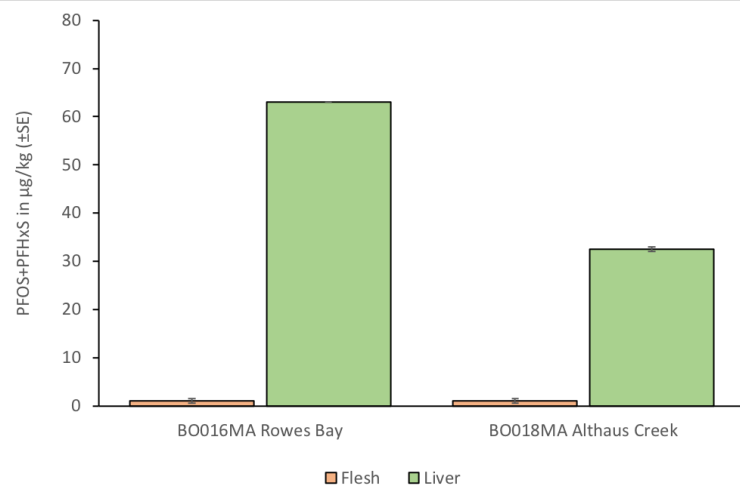
Giant trevally were only caught at one site adjacent to the IA, BO015MA Bohle River mouth. The average concentration of PFOS+PFHxS was higher in liver samples (38.8 µg/kg) than flesh samples, which were all below the LOR (0.5 µg/kg; Figure 3.5d; Table B 1).

3.2.12 Other species

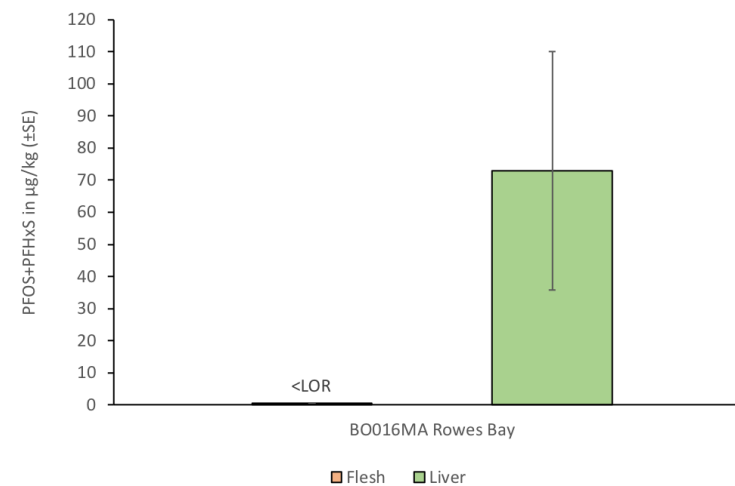
Several other species were collected that contributed to the overall analysis of PFOS+PFHxS in different trophic levels, including the spotted scat (*Scatophagus cf. argus*), garfish (*Arrhamphus sclerolepsis*) and whiting (*Sillago ciliata*) (Table 3.1, Table 3.2 and Figure 3.2). These species were not assessed further because they were either not important fisheries species (spotted scat) or caught in very low sample numbers (i.e. garfish and whiting).

Figure 3.5 Concentrations of PFOS+PFHxS in flesh and liver samples of commercial and recreationally important species of fish

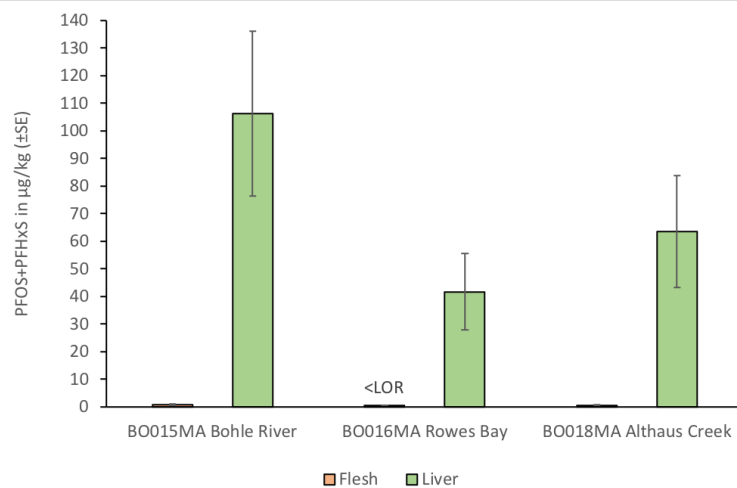
a) Spanish mackerel (*Scomberomorus commerson*)



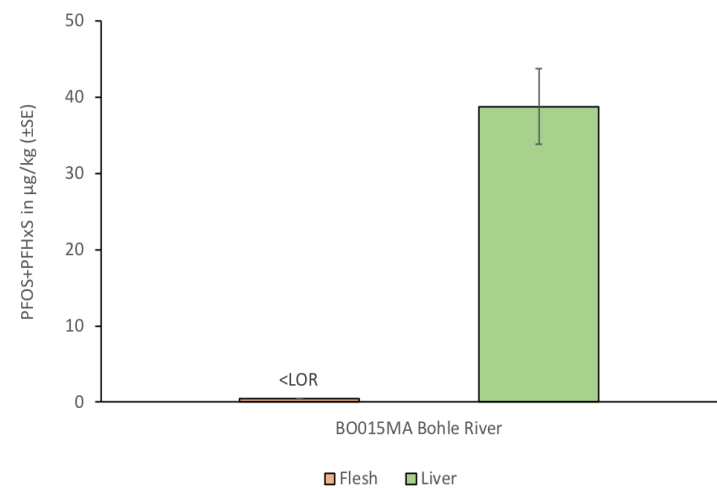
b) Catfish (*Neoarius graffei*)



c) Barred queenfish (*Scomberoides tala*)



d) Giant trevally (*Caranx ignobilis*)



3.3 Quality Assurance /Quality Control

3.3.1 Rinsate samples

The analysed QA/QC rinsate samples confirmed that the potential for sample contamination was low (Table 3.3). Specifically:

- The two field blanks collected showed only marginal concentrations of PFOS+PFHxS.
- PFOS+PFHxS was detected in all samples from ice slurry, which was used to euthanise fauna. These samples of slurry were collected while biota was in the slurry, suggesting PFOS+PFHxS is present on the surface of biota or in surface waters (ESP 2018a,b).
- PFOS+PFHxS was detected in low concentrations ($<0.017 \mu\text{g/L}$) in four out of five equipment rinsate samples. One sample of equipment rinsate was below the LOR, and three out of four equipment rinsate had a maximum measurable PFOS+PFHxS concentration of $0.001 \mu\text{g/L}$ above the LOR.
- PFOS+PFHxS was detected in biota rinsate samples at all sites prior to sample preparation. These were generally equal to or in lower concentrations than in ice slurry samples. This suggests that PFOS+PFHxS was present on the surface of biota prior to sample preparation.
- All inter-lab and internal QA/QC samples (duplicates) of rinsate were within the acceptable limits for relative percent difference (RPD).

While PFOS+PFHxS was detected at most QA/QC procedural points, it is considered likely that the source of the PFOS+PFHxS was the environment (e.g. water or the surface of biota), and the rinsing procedures likely removed most or all of this contamination prior to sample preparation. Samples were carefully dissected to remove skin from flesh and avoid potential contamination of tissue types. As the concentrations in equipment rinsate samples were very low, and generally lower than biota or ice slurry samples, contamination of biota samples from equipment is considered unlikely. There were no consistent trends to suggest that contamination of the biota samples from sampling equipment or sample handling had occurred.

Table 3.3 Concentrations of PFOS+PFHxS in QA/QC rinsate samples.

Rinsate Type	Site	LOR (µg/L)	PFOS+PFHxS (µg/L)	RPD (%)	Criteria
procedure (ice slurry)	BO015MA Bohle River mouth	0.002	0.102	31	sample concentrations are <10x highest LOR
	BO015MA Bohle River mouth*†	0.010	0.140		
	BO016MA Rowes Bay	0.002	0.080	—	—
	BO018MA Althaus Creek mouth	0.002	0.115	—	—
equipment	BO015MA Bohle River mouth	0.002	0.017	140	sample concentrations are <10x LOR
	BO015MA Bohle River mouth†	0.002	0.003		
	BO016MA Rowes Bay	0.002	0.003	—	—
	BO017MA Magnetic Island	0.002	0.002	—	—
	BO018MA Althaus Creek mouth*	0.010	<LOR	—	—
biota prior to sample preparation	BO015MA Bohle River mouth	0.002	0.029	—	—
	BO017MA Magnetic Island	0.002	0.007	—	—
	BO018MA Althaus Creek mouth	0.002	0.008	—	—
Field Blank	BO017MA Magnetic Island	0.002	0.004	—	—
	BO018MA Althaus Creek mouth	0.002	0.002	—	—

* sample analysed by the secondary laboratory with higher LOR

† duplicate sample

green cells: RPD within acceptable range

3.3.2 Biota duplicate and triplicate samples

The analysed duplicate and triplicate QA/QC biota samples confirmed that the variation in samples analysed either twice by the same laboratory (duplicate) or between the primary and secondary laboratory (triplicate samples) was generally within acceptable levels of variation (Table 3.4) particularly when values were less than 10 times the LOR. However, two duplicate samples had higher than acceptable RPDs (Table 3.4). In these cases, there was higher than expected variation in liver tissue, which may indicate insufficient homogenisation of these tissue types and / or local accumulation of contaminants in different parts of the organ. Internal QAQC analysis of the same sample completed in the laboratory (ALS Environmental) did not exceed RPDs, so the repeatability of a single sample was considered good (Appendix C).

Table 3.4 Relative percent difference (RPD) and relative standard deviation (RSD in %) of biota QAQC samples.

Site	Biota	Component	Replicates	RPD/RSD	Criteria
BO015MA (Bohle River mouth)	Barred queenfish (<i>S. tala</i>)	flesh	3	80	sample concentrations are <10x highest LOR
		liver	2	53	sample concentrations are >20x LOR
	Barramundi (<i>L. calcarifer</i>)	flesh	2	110	sample concentrations are <10x LOR
		liver	3	11	sample concentrations are >20x highest LOR
	Silver javelin (<i>P. argenteus</i>)	flesh	2	0	sample concentrations are <10x LOR
		liver	2	39	sample concentrations are >20x LOR
BO016MA (Rowes Bay)	Blue threadfin salmon (<i>E. tetradactylum</i>)	flesh	3	20	sample concentrations are <10x highest LOR
BO018 (Althaus Creek mouth)	Diamondscale mullet (<i>L. vaigiensis</i>)	flesh	3	67	sample concentrations are <10x highest LOR

green cells: RPD/RSD within acceptable range

orange cells: RPD outside acceptable range

4 Conclusions

The marine survey confirmed the presence of PFOS+PFHxS in most trophic levels at sites adjacent to the IA and comparative sites. PFOS, PFHxS and their surrogates were the most widespread, but five other components of PFAS were detected in low concentrations in samples from sites adjacent to the IA and comparative sites. PFOA, which has been identified as being of concern in the PFAS National Environment Management Plan (NEMP, DEE 2018), was only present in samples from comparative sites at low concentrations.

PFOS+PFHxS were detected in all biota types except primary producers (plants and macroalgae) at sites adjacent to the IA and comparative sites, although were detected more frequently in samples from sites adjacent to the IA than comparative sites. No PFOS+PFHxS was detected in fish samples from the consumer trophic level at Magnetic Island (Site BO017MA), similar to samples collected from comparative estuarine sites (ESP 2018b).

In crustaceans the concentration of PFOS+PFHxS in organs was much higher than in flesh samples, confirming previous results (ESP 2018a,b). The average concentration in flesh samples was less than 2 µg/kg. The average concentration of PFOS+PFHxS in crustacean organs from sites adjacent to the IA was similar to those from comparative sites and remained less than 25 µg/kg.

In fish, the concentration of PFOS+PFHxS in flesh and liver tissue was often above the LOR from samples adjacent to the IA. Liver samples consistently had higher concentrations of PFOS+PFHxS than tissue samples. This trend is consistent with previous survey from freshwater and estuarine environments in this region (ESP 2018a,b) and other studies assessing contamination of marine and estuarine biota (Faxneld et al. 2014).

In commercially and recreationally important species such as barramundi, grunters, snappers, flathead, bream, queenfish and Spanish mackerel, liver samples had consistently higher concentrations of PFOS+PFHxS at sites adjacent to the IA compared with sites at the mouth of Althaus Creek or Magnetic Island. Liver samples from grunter, snapper, flathead and queenfish caught at the mouth of the Bohle River had higher concentrations of PFOS+PFHxS than samples from Rowes Bay and elsewhere.

In contrast, the highest concentration of PFOS+PFHxS was detected in liver tissue of a detritivore, a large diamond scale mullet (*Liza vaigiensis*) from the comparative site BO018MA at the mouth of Althaus Creek. High concentrations of PFOS+PFHxS in liver samples of detritivores have been recorded previously in samples collected during estuarine surveys from sites in the IA (ESP 2018b). Mature mullet are known for migrating long distances along the shore between estuaries (Smith & Deguara 2002; Pusey et al. 2004), therefore the exact source of PFOS+PFHxS contamination in this individual is difficult to determine.

PFOS+PFHxS was detected in a large proportion of fish tissue collected from sites adjacent to the IA and from nearby comparative sites for some trophic groups. Additional surveys may therefore be warranted to increase the sample size of different fish size classes, across the various trophic levels to determine whether contamination is more widespread than first anticipated. However, the results of this and previous surveys indicate there is limited bioaccumulation in higher trophic levels outside the IA, despite apparent local movement of some species between estuaries with higher than expected concentrations of PFOS+PFHxS.

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Appendix A Photographs of Species Retained for Laboratory Analysis

Table A 1 Photographs of species collected in the marine survey.



Barramundi (*Lates calcarifer*).



Barred javelin (*Pomadasys kakaan*).



Barred queenfish (*Scomberoides tala*).



Blue catfish (*Neoarius graeffi*).



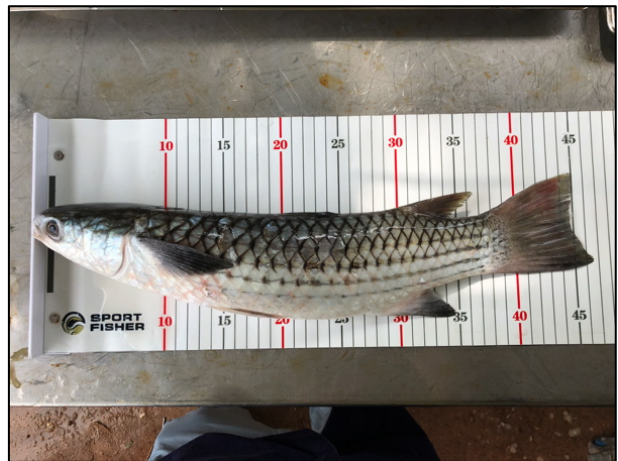
Blue swimmer crab (*Portunus armatus*).



Blue threadfin salmon (*Eleutheronema tetradactylum*).



Crimson snapper / smallmouth nannygai (*Lutjanus erythropterus*).



Diamond scale mullet (*Liza vaigiensis*).



Snub nose Garfish (*Arrhamphus sclerolepsis*).



Golden snapper (*Lutjanus johnii*).



Giant trevally (*Caranx ignobilis*).



Mangrove jack (*Lutjanus argentimaculatus*).



Northern sand flathead (*Platycephalus endrachtensis*).



Pikey bream (*Acanthopagrus pacificus*).



Saddletail snapper / Largemouth nannygai (*Lutjanus malabaricus*).



Sargassum macroalgae (Sargassaceae).



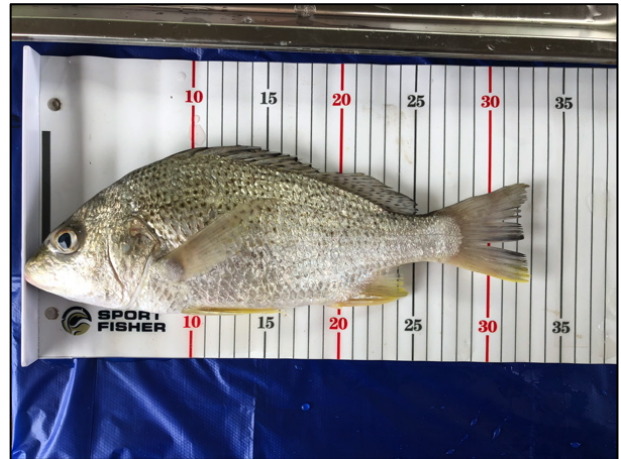
Sea mullet (*Mugil cephalus*).



Seagrass (*Halodule uninervis*).



Seagrass (*Halophila ovalis*).



Silver javelin (*Pomadasys argenteus*).



Spanish mackerel (*Scomberomorus commerson*).



Spotted scat (*Scatophagus cf. argus*).



Whiting (*Sillago ciliata*).



Yellowfin bream (*Acanthopagrus australis*).

Appendix B Concentrations of PFOS+PFHxS in all biota samples from marine sites collected in March 2018

Table B 1 Concentrations of PFOS+PFHxS (µg/kg) including standard error (± SE) from all biota collected in March 2018 in the marine survey.

		Site																			
		BO015MA					BO016MA					BO017MA					BO018MA				
		PFHxS+PFOS Concentration					PFHxS+PFOS Concentration					PFHxS+PFOS Concentration					PFHxS+PFOS Concentration				
Species	Component	n	Mean	Min	Max	SE	n	Mean	Min	Max	SE	n	Mean	Min	Max	SE	n	Mean	Min	Max	SE
Barramundi (<i>Lates calcarifer</i>)	Flesh	10	0.8	<LOR	2	0.15	0	–	–	–	–	0	–	–	–	–	8	0.9	<LOR	2	0.2
	Liver	10	111.6	43	235	20.3	0	–	–	–	–	0	–	–	–	–	8	9.9	1	23	2.7
Barred javelin (grunter) (<i>Pomadasys kakaan</i>)	Flesh	1	<LOR	<LOR	<LOR	NA	1	<LOR	<LOR	<LOR	NA	0	–	–	–	–	0	–	–	–	–
	Liver	1	18	18	18	NA	1	2	2	2	NA	0	–	–	–	–	0	–	–	–	–
Barred queenfish (<i>Scomberoides tala</i>)	Flesh	5	0.8	<LOR	2	0.3	4	<LOR	<LOR	<LOR	NA	0	0	0	0	NA	4	0.6	<LOR	1	0.13
	Liver	4	106.3	40	162	29.8	4	41.8	10	67	13.9	0	0	0	0	NA	4	63.5	26	121	20.3
Blue catfish (<i>Neoarius graffei</i>)	Flesh	0	–	–	–	–	4	<LOR	<LOR	<LOR	NA	0	–	–	–	–	0	–	–	–	–
	Liver	0	–	–	–	–	4	73	28	184	37.1	0	–	–	–	–	0	–	–	–	–
Blue swimmer crab (<i>Portunus armatus</i>)	Flesh	4	2.1	<LOR	6	1.3	4	1.5	<LOR	4	0.8	0	–	–	–	–	4	<LOR	<LOR	<LOR	NA
	Organ	2	24.5	15	34	9.5	4	6.8	1	17	3.8	0	–	–	–	–	4	22.8	4	43	10.3
Blue threadfin salmon (<i>Eleutheronema tetradactylum</i>)	Flesh	0	–	–	–	–	4	<LOR	<LOR	<LOR	NA	0	–	–	–	–	0	–	–	–	–
	Liver	0	–	–	–	–	4	26.5	5	51	11.03	0	–	–	–	–	0	–	–	–	–
Crimson snapper (small-mouth nannygai) (<i>Lutjanus erythropterus</i>)	Flesh	0	–	–	–	–	0	–	–	–	–	3	<LOR	<LOR	<LOR	–	–	–	–	–	–
	Liver	0	–	–	–	–	0	–	–	–	–	3	1.2	0.5	2	0.44	0	–	–	–	–
Diamond scale mullet (<i>Liza vaigiensis</i>)	Flesh	0	–	–	–	–	0	–	–	–	–	1	<LOR	<LOR	<LOR	NA	4	1.6	<LOR	5	1.1
	Liver	0	–	–	–	–	0	–	–	–	–	0	–	–	–	–	4	75.5	14	255	59.8
Garfish (snub nose) (<i>Arrhamphus sclerolepsis</i>)	Flesh	0	–	–	–	–	0	–	–	–	–	4	0.5	0.5	0.5	–	–	–	–	–	–
	Liver	0	–	–	–	–	0	–	–	–	–	1	2	2	2	–	–	–	–	–	–
Giant trevally (<i>Caranx ignobilis</i>)	Flesh	4	<LOR	<LOR	<LOR	NA	0	–	–	–	–	0	–	–	–	–	0	–	–	–	–
	Liver	4	38.8	27	47	4.97	0	–	–	–	–	0	–	–	–	–	0	–	–	–	–
Golden snapper (fingermark) (<i>Lutjanus johnii</i>)	Flesh	0	–	–	–	–	3	<LOR	<LOR	<LOR	NA	0	–	–	–	–	0	–	–	–	–
	Liver	0	–	–	–	–	3	10.7	7	13	1.9	0	–	–	–	–	0	–	–	–	–
Mangrove jack (<i>Lutjanus argentimaculatus</i>)	Flesh	4	<LOR	<LOR	<LOR	NA	0	–	–	–	–	0	–	–	–	–	0	–	–	–	–
	Liver	4	32.5	3	61	12.67	0	–	–	–	–	0	–	–	–	–	0	–	–	–	–
Northern sand flathead (<i>Platycephalus endrachtensis</i>)	Flesh	3	1	<LOR	2	0.5	3	<LOR	<LOR	<LOR	NA	0	–	–	–	–	3	<LOR	<LOR	<LOR	NA
	Liver	1	33	33	33	NA	1	6	6	6	NA	0	–	–	–	–	2	3.5	3	4	0.5
Pikey bream (<i>Acanthopagrus pacificus</i>)	Flesh	2	1.5	1	2	0.5	0	–	–	–	–	0	–	–	–	–	3	<LOR	<LOR	<LOR	NA
	Liver	2	20	16	24	4	0	–	–	–	–	0	–	–	–	–	1	4	4	4	NA
Saddletail snapper (large-mouth nannygai) (<i>Lutjanus malabaricus</i>)	Flesh	0	–	–	–	–	0	–	–	–	–	2	<LOR	<LOR	<LOR	NA	0	–	–	–	–
	Liver	0	–	–	–	–	0	–	–	–	–	2	1.3	0.5	2	0.8	0	–	–	–	–
Sargassum (<i>Sargassaceae</i>)	Whole	0	–	–	–	–	3	<LOR	<LOR	<LOR	NA	4	<LOR	<LOR	<LOR	NA	0	–	–	–	–
Sea mullet (<i>Mugil cephalus</i>)	Flesh	4	0.9	<LOR	2	0.4	0	–	–	–	–	3	<LOR	<LOR	<LOR	NA	0	–	–	–	–
	Liver	4	29.8	14	43	6	0	–	–	–	–	1	66	66	66	NA	0	–	–	–	–

Species	Component	Site																			
		BO015MA					BO016MA					BO017MA					BO018MA				
		PFHxS+PFOS Concentration					PFHxS+PFOS Concentration					PFHxS+PFOS Concentration					PFHxS+PFOS Concentration				
		n	Mean	Min	Max	SE	n	Mean	Min	Max	SE	n	Mean	Min	Max	SE	n	Mean	Min	Max	SE
Seagrass (<i>Halodule uninervis</i> and <i>Halophila ovalis</i>)	Whole	4	<LOR	<LOR	<LOR	NA	4	<LOR	<LOR	<LOR	NA	4	0.5	0.5	0.5	NA	0	–	–	–	–
Silver javelin (grunter) (<i>Pomadasys argenteus</i>)	Flesh	4	<LOR	<LOR	<LOR	NA	3	1	<LOR	2	0.5	0	–	–	–	–	4	1.9	<LOR	6	1.4
	Liver	2	16.5	14	19	2.5	3	16	7	21	4.5	0	–	–	–	–	4	0.9	<LOR	1	0.1
Spanish mackerel (<i>Scomberomorus commerson</i>)	Flesh	0	–	–	–	–	3	1	<LOR	2	0.5	0	–	–	–	–	3	1	<LOR	2	0.5
	Liver	0	–	–	–	–	1	63	63	63	NA	0	–	–	–	–	2	32.5	32	33	0.5
Spotted scat (<i>Scatophagus cf. argus</i>)	Flesh	0	–	–	–	–	4	<LOR	<LOR	<LOR	NA	0	–	–	–	–	2	<LOR	<LOR	<LOR	NA
	Liver	0	–	–	–	–	4	3.3	2	5	0.6	0	–	–	–	–	2	1.3	<LOR	2	0.8
Whiting (<i>Sillago ciliata</i>)	Flesh	0	–	–	–	–	0	–	–	–	–	1	<LOR	<LOR	<LOR	NA	0	–	–	–	–
Yellowfin bream (<i>Acanthopagrus australis</i>)	Flesh	2	<LOR	<LOR	<LOR	NA	0	–	–	–	–	0	–	–	–	–	0	–	–	–	–
	Liver	2	4	3	5	1	0	–	–	–	–	0	–	–	–	–	0	–	–	–	–

– : No samples have been collected for a species at a site, hence no mean, minimum, maximum or SE can be calculated
NA: No SE could be calculated for locations where all samples had the same concentrations or only one sample was collected
<LOR: PFOS+PFHxS were below the Laboratory Limit of Reporting (LOR)

Appendix C Laboratory Certificates of Analysis

CERTIFICATE OF ANALYSIS

Work Order : **ES1808994**
Client : **ECOLOGICAL SERVICE PROFESSIONALS**
Contact : LAUREN THORBURN
Address : PO BOX 5935
 MANLY NSW, AUSTRALIA 4179
Telephone : ----
Project : 1755 PFAS IN BIOTA
Order number :
C-O-C number : ----
Sampler : SIMON WALKER
Site : ----
Quote number : SY/115/17 V4
No. of samples received : 63
No. of samples analysed : 63

Page : 1 of 29
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 27-Mar-2018 08:00
Date Analysis Commenced : 03-Apr-2018
Issue Date : 26-Apr-2018 15:29



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
Franco Lentini		Sydney Organics, Smithfield, NSW



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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS 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.

- EP231: PFAS results for sample #65 confirmed by re-extraction and re-analysis
- EP231: Positive PFAS results for samples #4,6,7,8,10 confirmed by re-extraction and re-analysis
- EP231X: Surrogate recovery bias low due to sample matrix interferences.
- EP231: Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP231X (Biota): ALS NATA accreditation for PFAS in Biota covers all Perfluoroalkyl Sulfonic Acids, Perfluoroalkyl Carboxylic Acids and (n:2) Fluorotelomer Sulfonic Acids in fish (whole and muscle), plants and vegetable matrices, with the exception PFBA (fish only), EtFOSA, MeFOSE, EtFOSE, MeFOSAA, EtFOSAA.



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_FF1_18032 5	BO018MA_FF2_18032 5	BO018MA_FF3_18032 5	BO018MA_SCF1_1803 25	BO018MA_SCF2_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-001	ES1808994-002	ES1808994-003	ES1808994-004	ES1808994-005
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	Fish Meat	Fish Meat	Fish Meat	Fish Meat	Fish Meat
ø Weight of Sample Prepared	----	0.1	g	42.9	30.7	43.4	6.0	15.4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	4	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTeDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_FF1_18032 5	BO018MA_FF2_18032 5	BO018MA_FF3_18032 5	BO018MA_SCF1_1803 25	BO018MA_SCF2_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-001	ES1808994-002	ES1808994-003	ES1808994-004	ES1808994-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	79.0	104	80.5	91.0	98.5
13C8-PFOA	----	1	%	99.5	99.0	100	102	99.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_SCF3_1803 25	BO018MA_SCF4_1803 25	BO018MA_SCH1_180 325	BO018MA_SCH2_180 325	BO018MA_SCH3_180 325
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-006	ES1808994-007	ES1808994-008	ES1808994-009	ES1808994-010
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	Fish Meat	Fish Meat	Meat Mix	Meat Mix	Meat Mix
ø Weight of Sample Prepared	----	0.1	g	9.6	5.4	6.9	7.9	5.4

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<2	<2	<2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<2	<2	<2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	1	3	32	<2	29
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<2	<2	<2
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	5	4	12
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<4	<4	<4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	6	4	14
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<2	<2	<2
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<2	<2	<2
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	2	1	3	<2	6
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<2	<2	<2
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<2	<2	<2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<2	<2	<2
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<5	<5	<5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_SCF3_1803 25	BO018MA_SCF4_1803 25	BO018MA_SCH1_180 325	BO018MA_SCH2_180 325	BO018MA_SCH3_180 325
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-006	ES1808994-007	ES1808994-008	ES1808994-009	ES1808994-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<5	<5	<5
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<5	<5	<5
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<5	<5	<5
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<2	<2	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	99.5	92.0	110	70.0	95.0
13C8-PFOA	----	1	%	106	111	110	75.0	85.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BAF5_1803 25	BO018MA_BAF6_1803 25	BO018MA_BAF7_1803 25	BO018MA_BAF8_1803 25	BO018MA_BAL6_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-012	ES1808994-013	ES1808994-014	ES1808994-015	ES1808994-016
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	Fish Meat	Fish Meat	Fish Meat	Fish Meat	Liver
ø Weight of Sample Prepared	----	0.1	g	42.9	33.1	28.5	24.7	4.5

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<2
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	2	1	2	<1	22
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	2	1	2	<1	23
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<2
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<2
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<2
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<2
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BAF5_1803 25	BO018MA_BAF6_1803 25	BO018MA_BAF7_1803 25	BO018MA_BAF8_1803 25	BO018MA_BAL6_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-012	ES1808994-013	ES1808994-014	ES1808994-015	ES1808994-016
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<5
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<2
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	93.0	100	98.5	79.0	130
13C8-PFOA	----	1	%	100	100	107	85.5	115



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BAL7_1803 25	BO018MA_BAL8_1803 25	BO018MA_SMF1_180 325	BO018MA_SMF3_180 325	BO018MA_SML1_180 325
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-017	ES1808994-018	ES1808994-019	ES1808994-020	ES1808994-021
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	Liver/Gut	Liver/Gut	Fish Meat	Fish Meat	Liver
ø Weight of Sample Prepared	----	0.1	g	6.0	5.7	33.8	15.2	2.3
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	<1	<1	<2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	<1	<1	<2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<2	<2	<1	<1	<2
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	<1	<1	<2
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	12	16	<1	2	32
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<4	<4	<1	<1	<4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	13	16	<1	2	33
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<2	<1	<1	<2
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<2	<1	<1	<2
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<2	<1	<1	<2
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<2	<1	<1	<2
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<2	<1	<1	<2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<2	<1	<1	<2
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTeDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<5	<2	<2	<5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BAL7_1803 25	BO018MA_BAL8_1803 25	BO018MA_SMF1_180 325	BO018MA_SMF3_180 325	BO018MA_SML1_180 325
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-017	ES1808994-018	ES1808994-019	ES1808994-020	ES1808994-021
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	<2	<2	<5
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	<1	<1	<2
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	<1	<1	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	125	125	92.0	91.5	125
13C8-PFOA	----	1	%	100	70.0	95.5	106	115



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_FL1_18032 5	BO018MA_FL2_18032 5	BO018MA_GL2_18032 5	BO018MA_GL3_18032 5	BO018MA_GL4_18032 5
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-022	ES1808994-023	ES1808994-024	ES1808994-025	ES1808994-026
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	Liver	Liver	Liver	Liver	Liver
Ø Weight of Sample Prepared	----	0.1	g	1.7	1.5	6.8	4.1	3.4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<2	<2	<2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<2	<2	<2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<2	<2	<2
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<2	<2	<2
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	3	4	<4	<4	<4
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<4	<4	<4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	3	4	<2	<2	<2
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<2	<2	<2
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<2	<2	<2
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<2	<2	<2
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<2	<2	<2
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<2	<2	<2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<2	<2	<2
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<5	<5	<5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_FL1_18032 5	BO018MA_FL2_18032 5	BO018MA_GL2_18032 5	BO018MA_GL3_18032 5	BO018MA_GL4_18032 5
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-022	ES1808994-023	ES1808994-024	ES1808994-025	ES1808994-026
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<5	<5	<5
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<5	<5	<5
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<5	<5	<5
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<2	<2	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	81.5	76.5	130	120	115
13C8-PFOA	----	1	%	97.5	88.0	80.0	75.0	85.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BAF1_1803 25	BO018MA_BAF2_1803 25	BO018MA_BAF3_1803 25	BO018MA_BAF4_1803 25	BO018MA_BAL1_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-027	ES1808994-028	ES1808994-029	ES1808994-030	ES1808994-031
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	Fish Meat	Fish Meat	Fish Meat	Fish Meat	Liver/Gut
ø Weight of Sample Prepared	----	0.1	g	29.8	39.5	61.8	38.4	10.9

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<2
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	<4
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<2
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<2
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<2
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<2
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<2
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BAF1_1803 25	BO018MA_BAF2_1803 25	BO018MA_BAF3_1803 25	BO018MA_BAF4_1803 25	BO018MA_BAL1_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-027	ES1808994-028	ES1808994-029	ES1808994-030	ES1808994-031
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<5
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<2
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	83.0	78.5	81.0	90.0	125
13C8-PFOA	----	1	%	76.0	88.5	80.0	83.5	80.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BAL2_1803 25	BO018MA_BAL3_1803 25	BO018MA_BAL4_1803 25	BO018MA_BAL5_1803 25	BO016MA_FML2_1803 24
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-032	ES1808994-033	ES1808994-034	ES1808994-035	ES1808994-036
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	Liver/Gut	Liver/Gut	Liver/Gut	Liver/Gut	Liver/Gut
ø Weight of Sample Prepared	----	0.1	g	14.4	10.3	8.0	10.7	5.9
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	<2	<2	<2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	<2	<2	<2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<2	<2	<2	<2	<2
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	<2	<2	<2
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<4	5	8	10	11
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<4	<4	<4	<4	<4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<2	5	9	11	12
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<2	<2	<2	<2
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<2	<2	<2	<2
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<2	<2	<2	<2
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<2	<2	<2	<2
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<2	<2	<2	<2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<2	<2	<2	<2
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTeDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<5	<5	<5	<5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BAL2_1803 25	BO018MA_BAL3_1803 25	BO018MA_BAL4_1803 25	BO018MA_BAL5_1803 25	BO016MA_FML2_1803 24
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-032	ES1808994-033	ES1808994-034	ES1808994-035	ES1808994-036
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	<2	<2	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	120	95.0	110	95.0	115
13C8-PFOA	----	1	%	85.0	50.0	70.0	70.0	100



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_FML1_1803 24	BO016MA_FML3_1803 24	BO016MA_FMF1_1803 24	BO016MA_FMF2_1803 24	BO016MA_FMF3_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-037	ES1808994-038	ES1808994-039	ES1808994-040	ES1808994-041
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	Liver/Gut	Liver/Gut	Fish Meat	Fish Meat	Fish Meat
ø Weight of Sample Prepared	----	0.1	g	6.2	4.7	32.5	29.5	30.2

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<2	<2	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	7	12	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<4	<4	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	7	13	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<2	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<2	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<2	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<2	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<2	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<2	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<5	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_FML1_1803 24	BO016MA_FML3_1803 24	BO016MA_FMF1_1803 24	BO016MA_FMF2_1803 24	BO016MA_FMF3_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-037	ES1808994-038	ES1808994-039	ES1808994-040	ES1808994-041
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	115	110	79.5	69.0	71.5
13C8-PFOA	----	1	%	65.0	95.0	82.5	66.5	69.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_SMF3_180 324	BO018MA_GF1_18032 5	BO018MA_GF2_18032 5	BO018MA_GF3_18032 5	BO018MA_GF4_18032 5
Client sampling date / time				24-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-042	ES1808994-043	ES1808994-044	ES1808994-045	ES1808994-046
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	fish fillet	fish liver	fish fillet	fish fillet	fish fillet
ø Weight of Sample Prepared	----	0.1	g	29.9	5.0	28.1	29.8	25.1

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	2	6	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	2	6	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_SMF3_180 324	BO018MA_GF1_18032 5	BO018MA_GF2_18032 5	BO018MA_GF3_18032 5	BO018MA_GF4_18032 5
Client sampling date / time				24-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-042	ES1808994-043	ES1808994-044	ES1808994-045	ES1808994-046
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	58.0	99.0	59.5	49.5	44.5
13C8-PFOA	----	1	%	70.5	124	54.0	49.5	38.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_GL1_18032 5	BO016MA_GF2_18032 4	BO016MA_PFF1_1803 24	BO016MA_PFF2_1803 24	BO016MA_PFF3_1803 24
Client sampling date / time				25-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-047	ES1808994-048	ES1808994-049	ES1808994-050	ES1808994-051
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	fish fillet	fish fillet	fish fillet	fish fillet	fish fillet
ø Weight of Sample Prepared	----	0.1	g	26.4	30.4	53.8	67.1	61.6

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	2	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	2	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_GL1_18032 5	BO016MA_GF2_18032 4	BO016MA_PFF1_1803 24	BO016MA_PFF2_1803 24	BO016MA_PFF3_1803 24
Client sampling date / time				25-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-047	ES1808994-048	ES1808994-049	ES1808994-050	ES1808994-051
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	71.0	66.5	58.0	67.0	84.5
13C8-PFOA	----	1	%	65.0	65.0	61.0	63.5	76.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_PFF4_1803 24	BO016MA_PFL1_1803 24	BO016MA_PFL3_1803 24	BO016MA_PFL4_1803 24	BO016MA_PFL2_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-052	ES1808994-053	ES1808994-054	ES1808994-055	ES1808994-056
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	fish fillet	fish liver	fish liver	fish liver	fish liver
ø Weight of Sample Prepared	----	0.1	g	51.8	3.3	2.4	2.6	2.7

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	2	3	3	5
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	2	3	3	5
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTeDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_PFF4_1803 24	BO016MA_PFL1_1803 24	BO016MA_PFL3_1803 24	BO016MA_PFL4_1803 24	BO016MA_PFL2_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-052	ES1808994-053	ES1808994-054	ES1808994-055	ES1808994-056
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	52.5	79.0	88.5	100	91.0
13C8-PFOA	----	1	%	50.5	88.5	95.5	119	120



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_QFL3_1803 24	BO016MA_QFL4_1803 24	BO016MA_QFF3_1803 24	BO016MA_QFL1_1803 24	BO016MA_QFL2_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-057	ES1808994-058	ES1808994-059	ES1808994-060	ES1808994-061
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	fish liver	fish liver	fish fillet	liver	liver
ø Weight of Sample Prepared	----	0.1	g	2.1	2.3	59.7	6.9	2.5

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	5	1	<1	4	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	58	26	<1	63	10
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	58	26	<1	63	10
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_QFL3_1803 24	BO016MA_QFL4_1803 24	BO016MA_QFF3_1803 24	BO016MA_QFL1_1803 24	BO016MA_QFL2_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808994-057	ES1808994-058	ES1808994-059	ES1808994-060	ES1808994-061
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	101	93.5	59.5	99.0	110
13C8-PFOA	----	1	%	116	110	58.0	122	128



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_SMF1_180 324	BO016MA_SMF2_180 324	BO016MA_GL1_18032 4	----	----
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1808994-062	ES1808994-063	ES1808994-065	-----	-----
				Result	Result	Result	----	----
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	fish fillet	fish fillet	liver	----	----
Ø Weight of Sample Prepared	----	0.1	g	18.9	24.7	8.0	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	----	----
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	2	----	----
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	2	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	----	----
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	----	----



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_SMF1_180 324	BO016MA_SMF2_180 324	BO016MA_GL1_18032 4	----	----
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1808994-062	ES1808994-063	ES1808994-065	-----	-----
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	55.5	77.5	81.5	----	----
13C8-PFOA	----	1	%	72.0	67.0	87.5	----	----



Surrogate Control Limits

Sub-Matrix: **BIOTA**

		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	50	130
13C8-PFOA	----	50	130

CERTIFICATE OF ANALYSIS

Work Order : **ES1808995**
Client : **ECOLOGICAL SERVICE PROFESSIONALS**
Contact : LAUREN THORBURN
Address : PO BOX 5935
 MANLY NSW, AUSTRALIA 4179
Telephone : ----
Project : 1755 PFAS IN BIOTA
Order number : ----
C-O-C number : ----
Sampler : SIMON WALKER
Site : ----
Quote number : SY/115/17 V4
No. of samples received : 63
No. of samples analysed : 63

Page : 1 of 29
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 27-Mar-2018 09:00
Date Analysis Commenced : 03-Apr-2018
Issue Date : 04-May-2018 14:08



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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW



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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS 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.

- EP231: Surrogate recovery bias low due to matrix interference. Confirmed by re-extraction and re-analysis
- EP231: Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP231X (Biota): ALS NATA accreditation for PFAS in Biota covers all Perfluoroalkyl Sulfonic Acids, Perfluoroalkyl Carboxylic Acids and (n:2) Fluorotelomer Sulfonic Acids in fish (whole and muscle), plants and vegetable matrices, with the exception PFBA (fish only), EtFOSA, MeFOSE, EtFOSE, MeFOSAA, EtFOSAA.



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_GL2_18032 4	BO016MA_GL3_18032 4	BO016MA_GL4_18032 4	BO016MA_GF1_18032 4	BO016MA_GF4_18032 4
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-001	ES1808995-002	ES1808995-003	ES1808995-004	ES1808995-005
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	Fish liver/guts	Fish liver/guts	Fish liver/guts	Fish fillet/meat	Fish fillet/meat
ø Weight of Sample Prepared	----	0.1	g	5.9	2.9	5.0	39.3	57.3

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	<2	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	<2	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<2	<2	<2	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	<2	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	19	19	7	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<4	<4	<4	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	21	20	7	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<2	<2	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<2	<2	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<2	<2	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<2	<2	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<2	<2	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<2	<2	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<5	<5	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_GL2_18032 4	BO016MA_GL3_18032 4	BO016MA_GL4_18032 4	BO016MA_GF1_18032 4	BO016MA_GF4_18032 4
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-001	ES1808995-002	ES1808995-003	ES1808995-004	ES1808995-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	<5	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	<5	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	<5	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	<2	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	<2	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	115	120	120	56.5	77.0
13C8-PFOA	----	1	%	110	65.0	100	71.0	94.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_GF3_18032 4	BO016MA_FF1_18032 4	BO016MA_FF2_18032 4	BO016MA_FF3_18032 4	BO016MA_TSF1_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-006	ES1808995-007	ES1808995-008	ES1808995-009	ES1808995-010
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	Fish fillet/meat	Fish fillet/meat	Fish fillet/meat	Fish fillet/meat	Fish fillet/meat
ø Weight of Sample Prepared	----	0.1	g	50.2	59.4	59.0	45.9	41.3

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_GF3_18032 4	BO016MA_FF1_18032 4	BO016MA_FF2_18032 4	BO016MA_FF3_18032 4	BO016MA_TSF1_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-006	ES1808995-007	ES1808995-008	ES1808995-009	ES1808995-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	63.5	53.5	54.0	57.5	58.0
13C8-PFOA	----	1	%	77.0	65.0	71.5	66.5	71.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_TSF1_1803 24B	BO016MA_TSF2_1803 24	BO016MA_TSF3_1803 24	BO016MA_TSF4_1803 24	BO016MA_TSL1_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-011	ES1808995-012	ES1808995-013	ES1808995-014	ES1808995-015
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	Fish fillet/meat	Fish fillet/meat	Fish fillet/meat	Fish fillet/meat	Fish liver/guts
ø Weight of Sample Prepared	----	0.1	g	31.6	45.7	47.1	61.7	17.8

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<2
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	5
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	5
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<2
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<2
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<2
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<2
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_TSF1_1803 24B	BO016MA_TSF2_1803 24	BO016MA_TSF3_1803 24	BO016MA_TSF4_1803 24	BO016MA_TSL1_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-011	ES1808995-012	ES1808995-013	ES1808995-014	ES1808995-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<5
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<2
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	50.5	56.0	76.5	63.5	120
13C8-PFOA	----	1	%	53.5	68.0	86.0	74.0	90.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_TSL2_1803 24	BO016MA_TSL3_1803 24	BO016MA_TSL4_1803 24	BO016MA_CFF1_1803 24	BO016MA_CFF2_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-016	ES1808995-017	ES1808995-018	ES1808995-019	ES1808995-020
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	Fish liver/guts	Fish liver/guts	Fish liver/guts	Fish fillet/meat	Fish fillet/meat
ø Weight of Sample Prepared	----	0.1	g	14.7	6.1	7.6	31.2	90.2

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	<2	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	<2	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<2	<2	<2	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	<2	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	10	49	37	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<4	<4	<4	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	11	51	39	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<2	<2	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<2	<2	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<2	<2	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<2	<2	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<2	<2	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<2	<2	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTeDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<5	<5	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_TSL2_1803 24	BO016MA_TSL3_1803 24	BO016MA_TSL4_1803 24	BO016MA_CFF1_1803 24	BO016MA_CFF2_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-016	ES1808995-017	ES1808995-018	ES1808995-019	ES1808995-020
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	<5	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	<5	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	<5	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	<2	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	<2	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	120	125	120	50.0	71.0
13C8-PFOA	----	1	%	90.0	80.0	100	61.0	93.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_CFF3_1803 24	BO016MA_CFF4_1803 24	BO016MA_CFL1_1803 24	BO016MA_CFL2_1803 24	BO016MA_CFL3_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-021	ES1808995-022	ES1808995-023	ES1808995-024	ES1808995-025
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	fish fillet	fish fillet	fish guts	fish guts	fish guts
ø Weight of Sample Prepared	----	0.1	g	87.0	75.5	2.4	6.2	5.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	2	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	162	39	37
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	22	1	3
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	184	40	40
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	4
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTeDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_CFF3_1803 24	BO016MA_CFF4_1803 24	BO016MA_CFL1_1803 24	BO016MA_CFL2_1803 24	BO016MA_CFL3_1803 24
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-021	ES1808995-022	ES1808995-023	ES1808995-024	ES1808995-025
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	58.5	108	66.5	83.0	86.0
13C8-PFOA	----	1	%	73.0	84.5	98.5	105	104



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_CFL4_1803 24	BO016MA_QFF1_1803 24	BO016MA_QFF2_1803 24	BO016MA_QFF4_1803 24	BO015MA_BF1_18032 2
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-026	ES1808995-027	ES1808995-028	ES1808995-030	ES1808995-031
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	fish guts	fish fillet	fish fillet	fish fillet	fish fillet
ø Weight of Sample Prepared	----	0.1	g	6.9	36.7	72.9	65.6	26.8

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	26	<1	<1	<1	2
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	2	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	28	<1	<1	<1	2
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTeDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_CFL4_1803 24	BO016MA_QFF1_1803 24	BO016MA_QFF2_1803 24	BO016MA_QFF4_1803 24	BO015MA_BF1_18032 2
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-026	ES1808995-027	ES1808995-028	ES1808995-030	ES1808995-031
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	77.0	34.5	56.5	60.0	73.5
13C8-PFOA	----	1	%	104	48.0	63.0	57.5	92.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BF2_18032 2	BO015MA_BF3_18032 2	BO015MA_BF4_18032 2	BO015MA_BL1_18032 2	BO015MA_BL2_18032 2
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-032	ES1808995-033	ES1808995-034	ES1808995-035	ES1808995-036
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	fish fillet	fish fillet	fish fillet	guts	guts
ø Weight of Sample Prepared	----	0.1	g	30.3	27.6	34.1	2.5	0.9
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	1	<1	<1	23	14
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	1	2
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	1	<1	<1	24	16
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BF2_18032 2	BO015MA_BF3_18032 2	BO015MA_BF4_18032 2	BO015MA_BL1_18032 2	BO015MA_BL2_18032 2
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-032	ES1808995-033	ES1808995-034	ES1808995-035	ES1808995-036
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	60.5	58.5	86.5	76.5	110
13C8-PFOA	----	1	%	79.0	79.5	93.5	92.5	100



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BL3_18032 2	BO015MA_BL4_18032 2	BO015MA_FHF1_1803 22	BO015MA_FHF2_1803 22	BO015MA_FHF3_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-037	ES1808995-038	ES1808995-039	ES1808995-040	ES1808995-041
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	guts	organs	fish flesh	fish flesh	fish flesh
Ø Weight of Sample Prepared	----	0.1	g	1.6	2.7	41.8	37.2	43.4

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	3	5	<1	1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	3	5	<1	2	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BL3_18032 2	BO015MA_BL4_18032 2	BO015MA_FHF1_1803 22	BO015MA_FHF2_1803 22	BO015MA_FHF3_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-037	ES1808995-038	ES1808995-039	ES1808995-040	ES1808995-041
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	78.0	101	78.0	70.5	58.0
13C8-PFOA	----	1	%	100	111	73.0	104	76.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_FHL1_1803 22	BO015MA_BAF2_1803 22	BO015MA_GF4_18032 2	BO016MA_SCF1_1803 24	BO016MA_SCF2_1803 24
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-042	ES1808995-043	ES1808995-045	ES1808995-046	ES1808995-047
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	liver	fish	fish	fish	fish
Ø Weight of Sample Prepared	----	0.1	g	3.6	44.8	27.0	24.2	11.8

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<2	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	31	1	<1	<1	4
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<4	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	33	1	<1	<1	4
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_FHL1_1803 22	BO015MA_BAF2_1803 22	BO015MA_GF4_18032 2	BO016MA_SCF1_1803 24	BO016MA_SCF2_1803 24
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-042	ES1808995-043	ES1808995-045	ES1808995-046	ES1808995-047
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	110	70.0	62.0	104	92.0
13C8-PFOA	----	1	%	105	80.5	79.5	98.0	81.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_SCF3_1803 24	BO016MA_SCF4_1803 24	BO016MA_SCH1_180 324	BO016MA_SCH2_180 324	BO016MA_SCH3_180 324
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-048	ES1808995-049	ES1808995-050	ES1808995-051	ES1808995-052
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	fish	fish	liquid	sludge	organ
Ø Weight of Sample Prepared	----	0.1	g	13.0	17.0	15.0	10.6	1.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<2	<1	<2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<2	<1	<2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<2	<1	6
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<2	<1	<2
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	1	<1	<4	8	10
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<4	<1	<4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	1	<1	<2	8	11
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<2	<1	<2
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<2	<1	<2
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<2	<1	<2
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<2	<1	<2
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<2	<1	<2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<2	<1	<2
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<5	<2	<5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_SCF3_1803 24	BO016MA_SCF4_1803 24	BO016MA_SCH1_180 324	BO016MA_SCH2_180 324	BO016MA_SCH3_180 324
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-048	ES1808995-049	ES1808995-050	ES1808995-051	ES1808995-052
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<5	<2	<5
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<5	<2	<5
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<5	<2	<5
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<2	<1	<2
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<2	<1	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	78.5	74.5	95.0	100	105
13C8-PFOA	----	1	%	68.0	72.0	75.0	94.5	95.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_SCH4_180 324	BO016MA_FL1_18032 4	BO017MA_GAF1_1803 23	BO017MA_GAF2_1803 23	BO017MA_GAF3_1803 23
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-053	ES1808995-054	ES1808995-055	ES1808995-056	ES1808995-057
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	organ	liver	fish	fish	fish
ø Weight of Sample Prepared	----	0.1	g	6.6	4.1	14.3	13.1	4.4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<2	<2	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<4	5	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<4	<4	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<2	6	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<2	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<2	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<2	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<2	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<2	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<2	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<5	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO016MA_SCH4_180 324	BO016MA_FL1_18032 4	BO017MA_GAF1_1803 23	BO017MA_GAF2_1803 23	BO017MA_GAF3_1803 23
Client sampling date / time				24-Mar-2018 00:00	24-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-053	ES1808995-054	ES1808995-055	ES1808995-056	ES1808995-057
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	100	100	102	74.5	83.5
13C8-PFOA	----	1	%	55.0	95.0	94.5	67.5	79.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_GAF4_1803 23	BO017MA_GAL1_1803 23	BO017MA_MF1_18032 1	BO017MA_MF2_18032 1	BO017MA_MF3_18032 1
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-058	ES1808995-059	ES1808995-060	ES1808995-061	ES1808995-062
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	fish	organ	fish	fish	fish
ø Weight of Sample Prepared	----	0.1	g	5.8	0.4	12.4	9.8	9.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<4	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<4	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<4	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<4	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<8	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<8	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<4	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<4	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<4	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<4	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<4	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<4	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<4	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<4	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<4	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<4	<2	<2	<2
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	2	µg/kg	<2	<4	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<10	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_GAF4_1803 23	BO017MA_GAL1_1803 23	BO017MA_MF1_18032 1	BO017MA_MF2_18032 1	BO017MA_MF3_18032 1
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1808995-058	ES1808995-059	ES1808995-060	ES1808995-061	ES1808995-062
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<10	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<10	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<10	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<10	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<4	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<4	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<4	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<4	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<4	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<4	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	79.0	85.0	54.0	76.0	63.0
13C8-PFOA	----	1	%	73.5	75.0	50.5	72.0	53.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_MF4_18032 1	BO015MA_GF3_18032 2	BO015MA_GF4_18032 2B	----	----
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	22-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1808995-063	ES1808995-064	ES1808995-065	-----	-----
				Result	Result	Result	----	----
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	fish	fish	fish	----	----
Ø Weight of Sample Prepared	----	0.1	g	6.0	68.0	43.8	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	----	----
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	----	----
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	----	----
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	----	----



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_MF4_18032 1	BO015MA_GF3_18032 2	BO015MA_GF4_18032 2B	----	----
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	22-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1808995-063	ES1808995-064	ES1808995-065	-----	-----
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	95.5	97.0	67.0	----	----
13C8-PFOA	----	1	%	87.0	83.5	91.5	----	----



Surrogate Control Limits

Sub-Matrix: **BIOTA**

		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	50	130
13C8-PFOA	----	50	130

CERTIFICATE OF ANALYSIS

Work Order : **ES1809001**
Client : **ECOLOGICAL SERVICE PROFESSIONALS**
Contact : LAUREN THORBURN
Address : PO BOX 5935
 MANLY NSW, AUSTRALIA 4179
Telephone : ----
Project : 1755 PFAS IN BIOTA
Order number : ----
C-O-C number : ----
Sampler : SIMON WALKER
Site : ----
Quote number : SY/115/17 V4
No. of samples received : 66
No. of samples analysed : 66

Page : 1 of 31
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 27-Mar-2018 09:00
Date Analysis Commenced : 09-Apr-2018
Issue Date : 07-May-2018 08:18



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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW



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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS 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.

- EP231X: Surrogate recovery bias low due to sample matrix interferences.
- EP231X (Biota): ALS NATA accreditation for PFAS in Biota covers all Perfluoroalkyl Sulfonic Acids, Perfluoroalkyl Carboxylic Acids and (n:2) Fluorotelomer Sulfonic Acids in fish (whole and muscle), plants and vegetable matrices, with the exception PFBA (fish only), EtFOSA, MeFOSE, EtFOSE, MeFOSAA, EtFOSAA.



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_QFF1_1803 21	BO015MA_QFF2_1803 21	BO015MA_QFF3_1803 21	BO015MA_QFF4_1803 21	BO015MA_QFL1_1803 21
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-001	ES1809001-002	ES1809001-003	ES1809001-004	ES1809001-005
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	fish fillet	fish fillet	fish fillet	fish fillet	organ
Ø Weight of Sample Prepared	----	0.1	g	44.2	33.4	36.5	53.6	2.8

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	6
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	2	<1	<1	<1	156
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	2	<1	<1	<1	156
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_QFF1_1803 21	BO015MA_QFF2_1803 21	BO015MA_QFF3_1803 21	BO015MA_QFF4_1803 21	BO015MA_QFL1_1803 21
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-001	ES1809001-002	ES1809001-003	ES1809001-004	ES1809001-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	79.5	61.8	62.5	55.0	82.0
13C8-PFOA	----	1	%	83.5	70.4	63.5	44.5	104



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_QFL2_1803 21	BO015MA_QFL3_1803 21	BO015MA_QFL4_1803 21	BO015MA_QFL4_1803 21B	BO015MA_QFF5_1803 21
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-006	ES1809001-007	ES1809001-008	ES1809001-009	ES1809001-010
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	organ	organ	liver	organ	fish fillet
Ø Weight of Sample Prepared	----	0.1	g	4.0	7.2	4.4	6.6	48.0

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	4	3	2	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	69	38	27	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	147	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	147	69	38	27	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_QFL2_1803 21	BO015MA_QFL3_1803 21	BO015MA_QFL4_1803 21	BO015MA_QFL4_1803 21B	BO015MA_QFF5_1803 21
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-006	ES1809001-007	ES1809001-008	ES1809001-009	ES1809001-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	120	76.0	65.0	92.0	56.5
13C8-PFOA	----	1	%	100	102	90.5	102	75.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_QFF5_180321B	BO016MA_S1_180324	BO016MA_S2_180324	BO016MA_S3_180324	BO016MA_S4_180324
Client sampling date / time				21-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-011	ES1809001-012	ES1809001-013	ES1809001-014	ES1809001-015
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	fish fillet	grass	grass	grass	grass
Ø Weight of Sample Prepared	----	0.1	g	50.6	4.9	8.4	7.4	5.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_QFF5_180321B	BO016MA_S1_180324	BO016MA_S2_180324	BO016MA_S3_180324	BO016MA_S4_180324
Client sampling date / time				21-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-011	ES1809001-012	ES1809001-013	ES1809001-014	ES1809001-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	63.0	69.0	73.5	59.5	55.5
13C8-PFOA	----	1	%	77.0	78.0	79.0	59.0	60.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_SARG1_18 0323	BO017MA_SARG2_18 0323	BO017MA_SARG3_18 0323	BO016MA_SARG1_18 0324	BO016MA_SARG2_18 0324
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-016	ES1809001-017	ES1809001-018	ES1809001-019	ES1809001-020
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	seaweed	seaweed	seaweed	seaweed	seaweed
Ø Weight of Sample Prepared	----	0.1	g	22.6	48.9	43.2	4.8	7.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_SARG1_18 0323	BO017MA_SARG2_18 0323	BO017MA_SARG3_18 0323	BO016MA_SARG1_18 0324	BO016MA_SARG2_18 0324
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	24-Mar-2018 00:00	24-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-016	ES1809001-017	ES1809001-018	ES1809001-019	ES1809001-020
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	54.0	68.0	63.0	51.0	47.0
13C8-PFOA	----	1	%	75.0	95.0	81.5	70.0	48.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_QFF1_1803 25	BO018MA_QFF2_1803 25	BO018MA_QFF3_1803 25	BO018MA_QFF4_1803 25	BO018MA_QFL1_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-021	ES1809001-022	ES1809001-023	ES1809001-024	ES1809001-025
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	fish fillet	fish fillet	fish fillet	fish fillet	organ
Ø Weight of Sample Prepared	----	0.1	g	42.4	33.8	21.9	29.8	10.9
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	1	<1	26
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	1	<1	26
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA (Matrix: BIOTA)				Client sample ID	BO018MA_QFF1_1803 25	BO018MA_QFF2_1803 25	BO018MA_QFF3_1803 25	BO018MA_QFF4_1803 25	BO018MA_QFL1_1803 25
Client sampling date / time					25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		ES1809001-021	ES1809001-022	ES1809001-023	ES1809001-024	ES1809001-025
				Result	Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%	56.5	68.0	62.0	72.5	55.0	
13C8-PFOA	----	1	%	58.0	68.5	66.0	65.5	68.5	



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_QFL2_1803 25	BO018MA_QFL3_1803 25	BO018MA_QFL4_1803 25	BO016MA_SARG3_18 0324	BO017MA_S1_180323
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	24-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-026	ES1809001-027	ES1809001-028	ES1809001-029	ES1809001-030
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	liver	liver	liver	seaweed	seaweed/small shells
Ø Weight of Sample Prepared	----	0.1	g	3.6	2.7	3.3	3.0	7.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	1	3	2	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	57	118	47	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	57	118	47	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	1	1	1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_QFL2_1803 25	BO018MA_QFL3_1803 25	BO018MA_QFL4_1803 25	BO016MA_SARG3_18 0324	BO017MA_S1_180323
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	24-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-026	ES1809001-027	ES1809001-028	ES1809001-029	ES1809001-030
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	56.0	74.0	57.0	57.5	60.5
13C8-PFOA	----	1	%	58.5	84.5	56.5	74.0	66.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_S2_180323	BO017MA_S3_180323	BO017MA_S4_180323	BO017MA_WF1_180323	BO017MA_SARG4_180323
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-031	ES1809001-032	ES1809001-033	ES1809001-034	ES1809001-035
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	seaweed/small shells	seaweed/small shells	seaweed/small shells	fish	seaweed
Ø Weight of Sample Prepared	----	0.1	g	14.2	15.5	13.9	23.8	9.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	4	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_S2_180323	BO017MA_S3_180323	BO017MA_S4_180323	BO017MA_WF1_180323	BO017MA_SARG4_180323
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-031	ES1809001-032	ES1809001-033	ES1809001-034	ES1809001-035
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	64.5	60.0	63.0	59.0	58.5
13C8-PFOA	----	1	%	55.0	66.5	79.0	51.0	69.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_ML1_1803 22	BO018MA_MF1_18032 5	BO018MA_MF1_18032 5B	BO018MA_MF2_18032 5	BO018MA_MF3_18032 5
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-040	ES1809001-041	ES1809001-042	ES1809001-043	ES1809001-044
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	organ	fish	fish	fish	fish
Ø Weight of Sample Prepared	----	0.1	g	1.0	36.3	34.1	32.8	38.0

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	2	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	64	<1	<1	<1	5
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	64	<1	<1	<1	5
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_ML1_1803 22	BO018MA_MF1_18032 5	BO018MA_MF1_18032 5B	BO018MA_MF2_18032 5	BO018MA_MF3_18032 5
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-040	ES1809001-041	ES1809001-042	ES1809001-043	ES1809001-044
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	64.0	62.5	68.0	65.5	56.0
13C8-PFOA	----	1	%	68.5	71.0	74.5	54.5	83.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_MF4_18032 5	BO018MA_ML1_1803 25	BO018MA_ML2_1803 25	BO015MA_TF1_18032 1	BO015MA_TF2_18032 1
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-045	ES1809001-046	ES1809001-047	ES1809001-048	ES1809001-049
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	Fish fillet/meat	Fish liver/guts	Fish liver/guts	Fish fillet/meat	Fish fillet/meat
Ø Weight of Sample Prepared	----	0.1	g	42.4	5.7	11.9	59.0	64.1

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	14	15	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	14	15	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_MF4_18032 5	BO018MA_ML1_1803 25	BO018MA_ML2_1803 25	BO015MA_TF1_18032 1	BO015MA_TF2_18032 1
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-045	ES1809001-046	ES1809001-047	ES1809001-048	ES1809001-049
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	54.0	59.5	60.5	72.5	60.5
13C8-PFOA	----	1	%	66.5	95.0	94.5	107	82.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_TF3_18032 1	BO015MA_TF4_18032 1	BO015MA_TL1_18032 1	BO015MA_TL2_18032 1	BO015MA_TL3_18032 1
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-050	ES1809001-051	ES1809001-052	ES1809001-053	ES1809001-054
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	Fish fillet/meat	Fish fillet/meat	Fish liver/guts	Fish liver/guts	Fish liver/guts
Ø Weight of Sample Prepared	----	0.1	g	55.2	51.8	9.9	8.7	11.0

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	2	2
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	27	45	45
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	27	45	45
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_TF3_18032 1	BO015MA_TF4_18032 1	BO015MA_TL1_18032 1	BO015MA_TL2_18032 1	BO015MA_TL3_18032 1
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-050	ES1809001-051	ES1809001-052	ES1809001-053	ES1809001-054
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	52.5	52.0	67.0	82.5	64.0
13C8-PFOA	----	1	%	67.5	65.5	118	117	102



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_TL4_18032 1	BO015MA_ML1_1803 21	BO015MA_ML2_1803 21	BO015MA_ML3_1803 21	BO015MA_ML4_1803 21
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-055	ES1809001-056	ES1809001-057	ES1809001-058	ES1809001-059
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	Fish liver/guts	Fish liver/guts	Fish liver/guts	Fish liver/guts	Fish liver/guts
Ø Weight of Sample Prepared	----	0.1	g	11.0	14.8	11.0	9.0	8.2

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	33	43	30	14	32
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	33	43	30	14	32
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_TL4_18032 1	BO015MA_ML1_1803 21	BO015MA_ML2_1803 21	BO015MA_ML3_1803 21	BO015MA_ML4_1803 21
Client sampling date / time				21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-055	ES1809001-056	ES1809001-057	ES1809001-058	ES1809001-059
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	54.5	53.0	45.5	37.5	53.5
13C8-PFOA	----	1	%	89.0	79.0	70.5	62.0	85.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_MJF1_1803 22	BO015MA_MJF2_1803 22	BO015MA_MJF3_1803 22	BO015MA_MJF4_1803 22	BO015MA_MJL1_180 322
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-060	ES1809001-061	ES1809001-062	ES1809001-063	ES1809001-064
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	Fish fillet/meat	Fish fillet/meat	Fish fillet/meat	Fish fillet/meat	Fish liver/guts
Ø Weight of Sample Prepared	----	0.1	g	72.0	28.1	56.1	49.5	8.6

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	61
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	61
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_MJF1_1803 22	BO015MA_MJF2_1803 22	BO015MA_MJF3_1803 22	BO015MA_MJF4_1803 22	BO015MA_MJL1_180 322
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-060	ES1809001-061	ES1809001-062	ES1809001-063	ES1809001-064
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	56.5	60.5	46.5	77.5	60.0
13C8-PFOA	----	1	%	83.5	81.5	80.0	100	91.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_MJL2_180 322	BO015MA_MJL3_180 322	BO015MA_MJL4_180 322	BO015MA_SQ4_1803 22	BO015MA_GF2_18032 2
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-065	ES1809001-066	ES1809001-067	ES1809001-068	ES1809001-069
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	Fish liver/guts	organ	organ	seaweed	Fish fillet
Ø Weight of Sample Prepared	----	0.1	g	5.2	1.8	1.7	10.5	33.8

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	19	3	41	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	3	<1	3	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	22	3	44	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_MJL2_180 322	BO015MA_MJL3_180 322	BO015MA_MJL4_180 322	BO015MA_SQ4_1803 22	BO015MA_GF2_18032 2
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809001-065	ES1809001-066	ES1809001-067	ES1809001-068	ES1809001-069
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	86.5	71.5	74.5	59.0	61.0
13C8-PFOA	----	1	%	84.0	64.0	78.0	61.0	69.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

BO015MA_GL2_18032
2

Client sampling date / time

22-Mar-2018 00:00

Compound	CAS Number	LOR	Unit	ES1809001-070	-----	-----	-----	-----
				Result	----	----	----	----

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	organ	----	----	----	----
ø Weight of Sample Prepared	----	0.1	g	6.0	----	----	----	----

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	----	----	----	----
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	15	----	----	----	----
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	4	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	19	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	----	----	----	----

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg	<2	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	----	----	----	----



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_GL2_18032 2	----	----	----	----
Client sampling date / time				22-Mar-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1809001-070	-----	-----	-----	-----
Result					----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	68.0	----	----	----	----
13C8-PFOA	----	1	%	68.0	----	----	----	----



Surrogate Control Limits

Sub-Matrix: BIOTA		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	50	130
13C8-PFOA	----	50	130

CERTIFICATE OF ANALYSIS

Work Order : **ES1809004**
Client : **ECOLOGICAL SERVICE PROFESSIONALS**
Contact : LAUREN THORBURN
Address : PO BOX 5935
 MANLY NSW, AUSTRALIA 4179
Telephone : ----
Project : 1755 PFAS IN BIOTA
Order number : ----
C-O-C number : ----
Sampler : SIMON WALKER
Site : ----
Quote number : SY/115/17 V4
No. of samples received : 75
No. of samples analysed : 75

Page : 1 of 35
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 27-Mar-2018 09:00
Date Analysis Commenced : 28-Mar-2018
Issue Date : 11-May-2018 14:09



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
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW



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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS 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.

- EP231: Surrogate recoveries bias low due to matrix interference. Confirmed by re-extraction and re-analysis
- EP231: Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP231X (Biota): ALS NATA accreditation for PFAS in Biota covers all Perfluoroalkyl Sulfonic Acids, Perfluoroalkyl Carboxylic Acids and (n:2) Fluorotelomer Sulfonic Acids in fish (whole and muscle), plants and vegetable matrices, with the exception PFBA (fish only), EtFOSA, MeFOSE, EtFOSE, MeFOSAA, EtFOSAA.



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BAL2_1803 22	BO015MA_BAL1_1803 22	BO015MA_GF3_18032 2	BO015MA_SCF1_1803 22	BO015MA_SCF2_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-001	ES1809004-002	ES1809004-003	ES1809004-004	ES1809004-005
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	organ	organ	fish fillet	organ	organ
Ø Weight of Sample Prepared	----	0.1	g	9.0	8.8	36.4	24.5	16.1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<2	<2	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<2	<2	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	5	4	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<2	<2	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	40	35	<1	1	1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	5	4	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	45	39	<1	1	1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<2	<2	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<2	<2	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<2	<2	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<2	<2	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<2	<2	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<2	<2	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<5	<5	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA (Matrix: BIOTA)				Client sample ID	BO015MA_BAL2_1803 22	BO015MA_BAL1_1803 22	BO015MA_GF3_18032 2	BO015MA_SCF1_1803 22	BO015MA_SCF2_1803 22
Client sampling date / time					22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		ES1809004-001	ES1809004-002	ES1809004-003	ES1809004-004	ES1809004-005
				Result	Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<5	<5	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<5	<5	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<5	<5	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<2	<2	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<2	<2	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%	80.0	55.0	60.0	71.0	70.0	
13C8-PFOA	----	1	%	55.0	50.0	61.5	74.5	66.0	



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_SCF3_1803 22	BO015MA_SCF4_1803 22	BO015MA_SCH1_180 322	BO015MA_SCH2_180 322	BO015MA_SQ1_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-006	ES1809004-007	ES1809004-008	ES1809004-009	ES1809004-010
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	organ	organ	brown liquid	brown liquid	grass/twigs
ø Weight of Sample Prepared	----	0.1	g	11.7	23.1	5.0	3.0	13.6

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<2	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<2	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	3	2	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<2	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	6	<1	29	12	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<4	1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	6	<1	31	13	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<2	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<2	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<2	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<2	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<2	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<2	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<5	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_SCF3_1803 22	BO015MA_SCF4_1803 22	BO015MA_SCH1_180 322	BO015MA_SCH2_180 322	BO015MA_SQ1_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-006	ES1809004-007	ES1809004-008	ES1809004-009	ES1809004-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<5	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<5	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<5	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<2	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<2	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	68.5	47.5	65.0	73.0	55.5
13C8-PFOA	----	1	%	61.5	49.0	65.0	64.5	65.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_SQ2_1803 22	BO015MA_SQ3_1803 22	BO015MA_BAF1_1803 22	BO015MA_BAF3_1803 22	BO015MA_BAF4_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-011	ES1809004-012	ES1809004-013	ES1809004-015	ES1809004-016
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	grass/twigs	grass/twigs	fish fillet	fish fillet	fish fillet
Ø Weight of Sample Prepared	----	0.1	g	10.5	12.4	46.8	71.2	50.3

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_SQ2_1803 22	BO015MA_SQ3_1803 22	BO015MA_BAF1_1803 22	BO015MA_BAF3_1803 22	BO015MA_BAF4_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-011	ES1809004-012	ES1809004-013	ES1809004-015	ES1809004-016
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	67.0	56.0	47.0	60.5	55.0
13C8-PFOA	----	1	%	71.5	61.0	45.5	59.0	59.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BAF5_1803 22	BO015MA_BAF6_1803 22	BO015MA_BAF7_1803 22	BO015MA_BAF8_1803 22	BO015MA_BAL3_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-017	ES1809004-018	ES1809004-019	ES1809004-020	ES1809004-021
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	fish fillet	fish fillet	fish fillet	fish fillet	organ
Ø Weight of Sample Prepared	----	0.1	g	42.6	42.8	41.5	31.1	5.3
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	3
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<2
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	1	<1	78
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	1	1	4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	2	1	82
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<2
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<2
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<2
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<2
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTeDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BAF5_1803 22	BO015MA_BAF6_1803 22	BO015MA_BAF7_1803 22	BO015MA_BAF8_1803 22	BO015MA_BAL3_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-017	ES1809004-018	ES1809004-019	ES1809004-020	ES1809004-021
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<5
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<5
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<2
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<2
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	60.0	66.0	60.5	51.0	65.0
13C8-PFOA	----	1	%	63.5	64.5	79.5	58.0	60.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BAL3_1803 22	BO015MA_BAF9_1803 22	BO015MA_BAF10_180 322	BO015MA_BAL6_1803 22	BO015MA_BAL7_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-022	ES1809004-023	ES1809004-024	ES1809004-025	ES1809004-026
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	organ	fish	fish	organ	organ
Ø Weight of Sample Prepared	----	0.1	g	4.5	64.6	41.8	10.8	7.5

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	2	<1	<1	2	4
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	61	<1	1	51	71
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	7	<1	<1	6	7
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	68	<1	1	57	78
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BAL3_1803 22	BO015MA_BAF9_1803 22	BO015MA_BAF10_180 322	BO015MA_BAL6_1803 22	BO015MA_BAL7_1803 22
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-022	ES1809004-023	ES1809004-024	ES1809004-025	ES1809004-026
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	52.5	53.5	56.0	52.5	50.5
13C8-PFOA	----	1	%	61.5	53.5	54.5	54.5	53.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BAL5_1803 22	BO015MA_BAL8_1803 22	BO015MA_BAL9_1803 22	BO015MA_BAL10_180 322	BO015MA_GF1_18032 2
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-027	ES1809004-028	ES1809004-029	ES1809004-030	ES1809004-031
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	organ	organ	organ	organ	fish
Ø Weight of Sample Prepared	----	0.1	g	22.4	4.0	2.8	4.1	49.1

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	3	6	5	4	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	2	<1	2	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	67	163	137	140	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	8	9	6	14	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	75	172	143	154	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	5	1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	3	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_BAL5_1803 22	BO015MA_BAL8_1803 22	BO015MA_BAL9_1803 22	BO015MA_BAL10_180 322	BO015MA_GF1_18032 2
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-027	ES1809004-028	ES1809004-029	ES1809004-030	ES1809004-031
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	50.5	76.0	66.0	62.0	81.5
13C8-PFOA	----	1	%	58.0	80.5	75.5	73.5	84.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_GL1_18032 2	BO015MA_GL3_18032 2	BO015MA_BAL4_1803 22	BO015MA_BAF3_1803 22C	BO017MA_N1_180326
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	26-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-032	ES1809004-033	ES1809004-035	ES1809004-036	ES1809004-037
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	organ	organ	organ	fish	fish
Ø Weight of Sample Prepared	----	0.1	g	6.2	2.8	4.6	74.6	51.6

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	7	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	3	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	16	13	208	2	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	2	1	20	1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	18	14	228	3	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	3	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_GL1_18032 2	BO015MA_GL3_18032 2	BO015MA_BAL4_1803 22	BO015MA_BAF3_1803 22C	BO017MA_N1_180326
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	26-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-032	ES1809004-033	ES1809004-035	ES1809004-036	ES1809004-037
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	2	1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	61.0	58.5	59.5	85.5	63.5
13C8-PFOA	----	1	%	70.0	82.0	72.5	86.5	74.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_N2_180326	BO017MA_N3_180326	BO017MA_N4_180326	BO017MA_N5_180326	BO017MA_NL1_180326
								6
Client sampling date / time				26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-038	ES1809004-039	ES1809004-040	ES1809004-041	ES1809004-042
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
Ø Sample Description	----	-	--	fish	fish	fish	fish	organ
Ø Weight of Sample Prepared	----	0.1	g	26.2	33.8	30.6	20.2	2.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	2
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	2
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_N2_180326	BO017MA_N3_180326	BO017MA_N4_180326	BO017MA_N5_180326	BO017MA_NL1_180326
				26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-038	ES1809004-039	ES1809004-040	ES1809004-041	ES1809004-042
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	85.0	62.5	60.5	58.5	120
13C8-PFOA	----	1	%	96.0	64.5	62.0	59.5	54.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_NL2_18032 6	BO017MA_NL3_18032 6	BO017MA_NL4_18032 6	BO017MA_NL5_18032 6	BO018MA_BF1_18032 5
Client sampling date / time				26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-043	ES1809004-044	ES1809004-045	ES1809004-046	ES1809004-059
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	fish liver/guts	fish liver/guts	fish liver/guts	fish liver/guts	fish fillet/meat
Ø Weight of Sample Prepared	----	0.1	g	1.6	1.2	0.9	2.0	12.5

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	1	2	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	1	2	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO017MA_NL2_18032 6	BO017MA_NL3_18032 6	BO017MA_NL4_18032 6	BO017MA_NL5_18032 6	BO018MA_BF1_18032 5
Client sampling date / time				26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00	26-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-043	ES1809004-044	ES1809004-045	ES1809004-046	ES1809004-059
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	58.5	63.0	55.0	62.0	52.0
13C8-PFOA	----	1	%	52.5	75.5	54.5	59.0	50.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BF2_18032 5	BO018MA_BF3_18032 5	BO018MA_BL1_18032 5	BO018MA_PFF2_1803 25	BO018MA_PFF1_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-060	ES1809004-061	ES1809004-062	ES1809004-063	ES1809004-064
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	fish fillet/meat	fish fillet/meat	liver/guts	fillet/meat	fillet/meat
Ø Weight of Sample Prepared	----	0.1	g	9.2	10.2	3.8	23.0	22.3

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	4	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	4	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_BF2_18032 5	BO018MA_BF3_18032 5	BO018MA_BL1_18032 5	BO018MA_PFF2_1803 25	BO018MA_PFF1_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-060	ES1809004-061	ES1809004-062	ES1809004-063	ES1809004-064
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	65.5	69.5	53.0	51.5	59.0
13C8-PFOA	----	1	%	75.0	67.5	55.5	60.0	59.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_PFL1_1803 25	BO018MA_PFL2_1803 25	BO018MA_SML2_180 325	BO015MA_MF1_18032 1	BO015MA_MF2_18032 1
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-065	ES1809004-066	ES1809004-067	ES1809004-068	ES1809004-069
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	liver/guts	liver/guts	liver/guts	fillet/meat	fillet/meat
Ø Weight of Sample Prepared	----	0.1	g	0.6	0.2	1.3	68.3	66.0

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<2	<1	32	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<2	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	2	<1	32	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<3	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_PFL1_1803 25	BO018MA_PFL2_1803 25	BO018MA_SML2_180 325	BO015MA_MF1_18032 1	BO015MA_MF2_18032 1
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-065	ES1809004-066	ES1809004-067	ES1809004-068	ES1809004-069
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<3	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<3	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<3	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	63.5	57.5	57.5	58.5	66.5
13C8-PFOA	----	1	%	63.5	63.5	55.5	61.0	64.5



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_MF3_18032 1	BO015MA_MF4_18032 1	BO016MA_SML1_180 324	BO018MA_ML3_1803 25	BO018MA_ML4_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-070	ES1809004-071	ES1809004-072	ES1809004-073	ES1809004-074
				Result	Result	Result	Result	Result

Biota Sample Pre-Preparation

Ø Sample Description	----	-	--	fillet/meat	fillet/meat	liver /guts	liver /guts	liver /guts
Ø Weight of Sample Prepared	----	0.1	g	50.6	46.6	1.2	9.3	3.8

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	2	12	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	4	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	61	228	18
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	2	<1	15	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	2	61	243	18
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	4	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	2	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO015MA_MF3_18032 1	BO015MA_MF4_18032 1	BO016MA_SML1_180 324	BO018MA_ML3_1803 25	BO018MA_ML4_1803 25
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-070	ES1809004-071	ES1809004-072	ES1809004-073	ES1809004-074
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	52.0	54.5	53.0	55.0	54.0
13C8-PFOA	----	1	%	56.0	58.5	62.0	72.0	76.0



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_SMF2_180 325	BO016MA_SCH4_180 325	BO015MA_GL3_18032 2B	----	----
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	22-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1809004-075	ES1809004-076	ES1809004-077	-----	-----
				Result	Result	Result	----	----

Biota Sample Pre-Preparation

ø Sample Description	----	-	--	fish liver/guts	fish liver/guts	fish liver/guts	----	----
ø Weight of Sample Prepared	----	0.1	g	12.8	4.2	6.4	----	----

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	3	<1	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	----	----
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	7	22	----	----
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	2	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	3	24	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	----	----

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	2	<1	----	----
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	----	----



Analytical Results

Sub-Matrix: BIOTA
 (Matrix: BIOTA)

Client sample ID

				BO018MA_SMF2_180 325	BO016MA_SCH4_180 325	BO015MA_GL3_18032 2B	----	----
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	22-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1809004-075	ES1809004-076	ES1809004-077	-----	-----
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	80.5	64.5	70.0	----	----
13C8-PFOA	----	1	%	72.5	51.0	70.5	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO015_RS_180322	BO015MA_RB_180322	BO015_RE_180322	BO015_RE_180322	BO017MA_FB_180323
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-047	ES1809004-048	ES1809004-049	ES1809004-050	ES1809004-051
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.002	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.005	0.002	<0.002	<0.002	<0.002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.097	0.027	0.017	0.003	0.004
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	0.09	0.07	0.04	0.04	0.04
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.011	0.051	0.018	0.015	0.007
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.008	0.036	0.013	0.011	0.006
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.010	0.055	0.020	0.006	0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.008	0.021	0.011	0.005	0.004
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.010	0.004	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.003	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO015_RS_180322	BO015MA_RB_180322	BO015_RE_180322	BO015_RE_180322	BO017MA_FB_180323
Client sampling date / time				22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	22-Mar-2018 00:00	23-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-047	ES1809004-048	ES1809004-049	ES1809004-050	ES1809004-051
				Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	0.038	0.018	0.009	0.007	0.008
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.267	0.295	0.132	0.087	0.071
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.102	0.029	0.017	0.003	0.004
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.229	0.277	0.123	0.080	0.063
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	84.8	85.0	89.8	88.8	92.9
13C8-PFOA	----	0.002	%	70.9	83.1	84.4	85.8	79.7



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO017MA_RE_180323	BO017MA_RB_180323	BO016MA_RS_180324	BO016MA_RE_180325	BO018MA_RS_180325
Client sampling date / time				23-Mar-2018 00:00	23-Mar-2018 00:00	24-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	ES1809004-052	ES1809004-053	ES1809004-054	ES1809004-055	ES1809004-056
				Result	Result	Result	Result	Result
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.002	0.004	<0.002	0.007
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.002	0.005	0.076	0.003	0.108
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	0.04	0.07	0.03	0.05	0.04
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.010	0.107	0.020	0.022	0.008
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.005	0.101	0.016	0.014	0.006
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.003	0.014	0.004	0.016	0.006
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.004	0.006	0.010	0.008	0.009
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.003	<0.002	0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BO017MA_RE_180323	BO017MA_RB_180323	BO016MA_RS_180324	BO016MA_RE_180325	BO018MA_RS_180325
Client sampling date / time					23-Mar-2018 00:00	23-Mar-2018 00:00	24-Mar-2018 00:00	25-Mar-2018 00:00	25-Mar-2018 00:00
Compound	CAS Number	LOR	Unit		ES1809004-052	ES1809004-053	ES1809004-054	ES1809004-055	ES1809004-056
				Result	Result	Result	Result	Result	Result
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	0.009	0.006	0.007	0.009	0.009	0.009
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
EP231_TOP_P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L	0.073	0.311	0.170	0.124	0.195	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.002	0.007	0.080	0.003	0.115	
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.064	0.305	0.163	0.115	0.186	
EP231_TOP_S: PFAS Surrogate									
13C4-PFOS	----	0.002	%	80.3	81.6	83.9	77.4	87.9	
13C8-PFOA	----	0.002	%	84.5	80.8	82.8	84.6	80.2	



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO018MA_RB_180325	BO018MA_FB_180325	----	----	----
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1809004-057	ES1809004-058	-----	-----	-----
				Result	Result	----	----	----
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.008	0.002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	----	----	----
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	0.04	0.03	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.023	0.002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.014	<0.002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.016	<0.002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.009	0.004	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	0.003	<0.002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BO018MA_RB_180325	BO018MA_FB_180325	----	----	----
Client sampling date / time				25-Mar-2018 00:00	25-Mar-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1809004-057	ES1809004-058	-----	-----	-----
				Result	Result	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	----	----	----
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	0.006	0.008	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	----	----	----
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.119	0.046	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.008	0.002	----	----	----
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.002	µg/L	0.113	0.038	----	----	----
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	98.0	81.2	----	----	----
13C8-PFOA	----	0.002	%	86.0	82.9	----	----	----



Surrogate Control Limits

Sub-Matrix: BIOTA		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	50	130
13C8-PFOA	----	50	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231_TOP_S: PFAS Surrogate			
13C4-PFOS	----	60	130
13C8-PFOA	----	60	130

Certificate of Analysis

Ecological Service Professionals
PO BOX 5815
Manly
QLD 4179



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: **SIMON WALKER**

Report **591731-S**
Project name PFAS IN BIOTA
Project ID 1755
Received Date Mar 29, 2018

Client Sample ID			BO015MA_BA L3_180322C	BO015MA_QF F5_180321C	BO015MA_BA 3_180322C	BO018MA_MFI 180325C
Sample Matrix			Fish	Fish	Fish	Fish
Eurofins I mgt Sample No.			B18-Ma34128	B18-Ma34129	B18-Ma34130	B18-Ma34131
Date Sampled			Mar 22, 2018	Mar 22, 2018	Mar 22, 2018	Mar 22, 2018
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoropentanoic acid (PFPeA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorohexanoic acid (PFHxA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorooctanoic acid (PFOA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorononanoic acid (PFNA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorodecanoic acid (PFDA) ^{N11}	0.5	ug/kg	1.4	< 0.5	< 0.5	< 0.5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C4-PFBA (surr.)	1	%	60	69	72	67
13C5-PFPeA (surr.)	1	%	68	127	126	123
13C5-PFHxA (surr.)	1	%	89	130	130	128
13C4-PFHpA (surr.)	1	%	79	129	133	122
13C8-PFOA (surr.)	1	%	63	132	137	123
13C5-PFNA (surr.)	1	%	59	125	129	110
13C6-PFDA (surr.)	1	%	84	143	121	122
13C2-PFUnDA (surr.)	1	%	67	89	103	105
13C2-PFDoDA (surr.)	1	%	67	40	99	102
13C2-PFTeDA (surr.)	1	%	83	131	101	113
Perfluoroalkane sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C8-FOSA (surr.)	1	%	110	64	110	114
D3-N-MeFOSA (surr.)	1	%	23	44	72	81

Client Sample ID			BO015MA_BA L3_180322C	BO015MA_QF F5_180321C	BO015MA_BA 3_180322C	BO018MA_MFI _180325C
Sample Matrix			Fish	Fish	Fish	Fish
Eurofins I mgt Sample No.			B18-Ma34128	B18-Ma34129	B18-Ma34130	B18-Ma34131
Date Sampled			Mar 22, 2018	Mar 22, 2018	Mar 22, 2018	Mar 22, 2018
Test/Reference	LOR	Unit				
Perfluoroalkane sulfonamido substances						
D5-N-EtFOSA (surr.)	1	%	139	10	34	38
D7-N-MeFOSE (surr.)	1	%	26	49	64	69
D9-N-EtFOSE (surr.)	1	%	20	53	54	54
D5-N-EtFOSAA (surr.)	1	%	161	155	105	154
D3-N-MeFOSAA (surr.)	1	%	151	122	102	122
Perfluoroalkane sulfonic acids (PFSA)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.3	ug/kg	^{N09} 2.3	< 0.3	< 0.3	< 0.3
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.5	ug/kg	^{N09} 1.1	< 0.5	< 0.5	< 0.5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.3	ug/kg	^{N09} 84	^{N09} 3.6	^{N09} 12	^{N09} 2.9
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C3-PFBS (surr.)	1	%	95	113	127	121
18O2-PFHxS (surr.)	1	%	84	111	128	111
13C8-PFOS (surr.)	1	%	154	128	100	110
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N15}	0.5	ug/kg	< 0.5	< 0.5	< 0.5	< 0.5
13C2-4:2 FTSA (surr.)	1	%	127	164	117	155
13C2-6:2 FTSA (surr.)	1	%	INT	INT	137	INT
13C2-8:2 FTSA (surr.)	1	%	INT	INT	123	196
PFASs Summations						
Sum (PFHxS + PFOS)*	0.5	ug/kg	86.3	3.6	12	2.9
Sum of US EPA PFAS (PFOS + PFOA)*	0.5	ug/kg	84	3.6	12	2.9
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.5	ug/kg	86.3	3.6	12	2.9
Sum of WA DER PFAS (n=10)*	0.5	ug/kg	86.3	3.6	12	2.9
Sum of PFASs (n=28)*	0.5	ug/kg	88.8	3.6	12	2.9

Client Sample ID			BO016MA_TSF I_180324C	BO017MA_SQ 9_180323C
Sample Matrix			Fish	Plant Material
Eurofins I mgt Sample No.			B18-Ma34132	B18-Ma34133
Date Sampled			Mar 22, 2018	Mar 22, 2018
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCA)				
Perfluorobutanoic acid (PFBA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
Perfluoropentanoic acid (PFPeA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
Perfluorohexanoic acid (PFHxA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
Perfluorooctanoic acid (PFOA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
Perfluorononanoic acid (PFNA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
Perfluorodecanoic acid (PFDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5

Client Sample ID			BO016MA_TSF	BO017MA_SQ
Sample Matrix			I_180324C	9_180323C
Eurofins I mgt Sample No.			Fish	Plant Material
Date Sampled			B18-Ma34132	B18-Ma34133
Test/Reference	LOR	Unit	Mar 22, 2018	Mar 22, 2018
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.5	ug/kg	< 0.5	< 0.5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
13C4-PFBA (surr.)	1	%	73	76
13C5-PFPeA (surr.)	1	%	122	122
13C5-PFHxA (surr.)	1	%	136	136
13C4-PFHpA (surr.)	1	%	131	122
13C8-PFOA (surr.)	1	%	137	144
13C5-PFNA (surr.)	1	%	122	126
13C6-PFDA (surr.)	1	%	131	120
13C2-PFUnDA (surr.)	1	%	108	85
13C2-PFDoDA (surr.)	1	%	105	72
13C2-PFTeDA (surr.)	1	%	110	88
Perfluoroalkane sulfonamido substances				
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
13C8-FOSA (surr.)	1	%	127	100
D3-N-MeFOSA (surr.)	1	%	95	63
D5-N-EtFOSA (surr.)	1	%	47	35
D7-N-MeFOSE (surr.)	1	%	80	61
D9-N-EtFOSE (surr.)	1	%	65	53
D5-N-EtFOSAA (surr.)	1	%	144	78
D3-N-MeFOSAA (surr.)	1	%	125	91
Perfluoroalkane sulfonic acids (PFSA)				
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.5	ug/kg	< 0.5	< 0.5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.3	ug/kg	< 0.3	< 0.3
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.5	ug/kg	< 0.5	< 0.5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.3	ug/kg	^{N09} 1.4	< 0.3
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.5	ug/kg	< 0.5	< 0.5
13C3-PFBS (surr.)	1	%	126	122
18O2-PFHxS (surr.)	1	%	126	122
13C8-PFOS (surr.)	1	%	119	110
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.5	ug/kg	< 0.5	< 0.5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N15}	0.5	ug/kg	< 0.5	< 0.5

Client Sample ID			BO016MA_TSF	BO017MA_SQ
Sample Matrix			I_180324C	9_180323C
Eurofins I mgt Sample No.			Fish	Plant Material
Date Sampled			B18-Ma34132	B18-Ma34133
Test/Reference	LOR	Unit	Mar 22, 2018	Mar 22, 2018
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				
13C2-4:2 FTSA (surr.)	1	%	139	167
13C2-6:2 FTSA (surr.)	1	%	INT	INT
13C2-8:2 FTSA (surr.)	1	%	189	INT
PFASs Summations				
Sum (PFHxS + PFOS)*	0.5	ug/kg	1.4	< 0.5
Sum of US EPA PFAS (PFOS + PFOA)*	0.5	ug/kg	1.4	< 0.5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.5	ug/kg	1.4	< 0.5
Sum of WA DER PFAS (n=10)*	0.5	ug/kg	1.4	< 0.5
Sum of PFASs (n=28)*	0.5	ug/kg	1.4	< 0.5

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Mar 29, 2018	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluoro Alkyl Substances (PFAS)			
Perfluoroalkane sulfonamido substances	Brisbane	Mar 29, 2018	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluoro Alkyl Substances (PFAS)			
Perfluoroalkane sulfonic acids (PFSAs)	Brisbane	Mar 29, 2018	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluoro Alkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Mar 29, 2018	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluoro Alkyl Substances (PFAS)			

Company Name: Ecological Service Professionals Pty Ltd
Address: PO BOX 5815
Manly
QLD 4179
Project Name: PFAS IN BIOTA
Project ID: 1755

Order No.:
Report #: 591731
Phone: 0428 118 496
Fax:

Received: Mar 29, 2018 3:00 PM
Due: Apr 16, 2018
Priority: 10 Day
Contact Name: SIMON WALKER

Eurofins | mgt Analytical Services Manager : Ryan Gilbert

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	BO015MA_RS_180322	Mar 22, 2018		Water	B18-Ma34126	X
2	BO018MA_RE_180325	Mar 25, 2018		Water	B18-Ma34127	X
3	BO015MA_BA_L3_180322C	Mar 22, 2018		Fish	B18-Ma34128	X
4	BO015MA_QF_F5_180321C	Mar 22, 2018		Fish	B18-Ma34129	X
5	BO015MA_BA_3_180322C	Mar 22, 2018		Fish	B18-Ma34130	X
6	BO018MA_MF	Mar 22, 2018		Fish	B18-Ma34131	X

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Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 23736						
	I_180325C					
7	BO016MA_TS FI_180324C	Mar 22, 2018		Fish	B18-Ma34132	X
8	BO017MA_SQ 9_180323C	Mar 22, 2018		Plant Material	B18-Ma34133	X
Test Counts						8

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 0.5			0.5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 0.5			0.5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 0.5			0.5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 0.5			0.5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 0.5			0.5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 0.5			0.5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 0.5			0.5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 0.5			0.5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 0.5			0.5	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/kg	< 0.5			0.5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkane sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 0.5			0.5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 0.5			0.5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 0.5			0.5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 0.5			0.5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 0.5			0.5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 0.5			0.5	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkane sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 0.5			0.5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 0.5			0.5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 0.3			0.3	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 0.5			0.5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 0.3			0.3	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 0.5			0.5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	94			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	84			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	91			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	101			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	91			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	92			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	94			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	86			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	88			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	84			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	85			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamido substances							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)			%	87			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	87			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	82			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)			%	101			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)			%	105			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	96			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	100			50-150	Pass	
LCS - % Recovery									
Perfluoroalkane sulfonic acids (PFSA's)									
Perfluorobutanesulfonic acid (PFBS)			%	90			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	94			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	86			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	94			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	72			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	106			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	109			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	103			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	124			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)									
				Result 1					
Perfluorobutanoic acid (PFBA)	B18-Ma34130	CP	%	95			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B18-Ma34130	CP	%	90			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B18-Ma34130	CP	%	90			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B18-Ma34130	CP	%	98			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B18-Ma34130	CP	%	96			50-150	Pass	
Perfluorononanoic acid (PFNA)	B18-Ma34130	CP	%	95			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B18-Ma34130	CP	%	101			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	B18-Ma34130	CP	%	76			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	B18-Ma34130	CP	%	84			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B18-Ma34130	CP	%	75			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B18-Ma34130	CP	%	97			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonamido substances									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	B18-Ma34130	CP	%	93			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B18-Ma34130	CP	%	76			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B18-Ma34130	CP	%	70			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B18-Ma34130	CP	%	93			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B18-Ma34130	CP	%	109			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B18-Ma34130	CP	%	93			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B18-Ma34130	CP	%	104			50-150	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroalkane sulfonic acids (PFSA)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B18-Ma34130	CP	%	86			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B18-Ma34130	CP	%	101			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B18-Ma34130	CP	%	85			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B18-Ma34130	CP	%	92			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B18-Ma34130	CP	%	100			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B18-Ma34130	CP	%	68			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B18-Ma34130	CP	%	111			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B18-Ma34130	CP	%	120			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B18-Ma34130	CP	%	105			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B18-Ma34130	CP	%	132			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCA)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonic acids (PFASs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	B18-Ma34129	CP	ug/kg	< 0.3	< 0.3	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	B18-Ma34129	CP	ug/kg	3.6	3.6	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B18-Ma34129	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

Ryan Gilbert	Analytical Services Manager
Jonathon Angell	Senior Analyst-Organic (QLD)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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

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

Certificate of Analysis

Ecological Service Professionals
PO BOX 5815
Manly
QLD 4179



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: **SIMON WALKER**

Report **591731-W**
Project name PFAS IN BIOTA
Project ID 1755
Received Date Mar 29, 2018

Client Sample ID			BO015MA_RS_180322	BO018MA_RE_180325
Sample Matrix			Water	Water
Eurofins I mgt Sample No.			B18-Ma34126	B18-Ma34127
Date Sampled			Mar 22, 2018	Mar 25, 2018
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	78	29
13C5-PFPeA (surr.)	1	%	88	83
13C5-PFHxA (surr.)	1	%	83	87
13C4-PFHpA (surr.)	1	%	98	95
13C8-PFOA (surr.)	1	%	99	99
13C5-PFNA (surr.)	1	%	96	78
13C6-PFDA (surr.)	1	%	81	23
13C2-PFUnDA (surr.)	1	%	62	37
13C2-PFDoDA (surr.)	1	%	38	72
13C2-PFTeDA (surr.)	1	%	10	56
Perfluoroalkane sulfonamido substances				
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	42	48
D3-N-MeFOSA (surr.)	1	%	27	45

Client Sample ID			BO015MA_RS_180322	BO018MA_RE_180325
Sample Matrix			Water	Water
Eurofins I mgt Sample No.			B18-Ma34126	B18-Ma34127
Date Sampled			Mar 22, 2018	Mar 25, 2018
Test/Reference	LOR	Unit		
Perfluoroalkane sulfonamido substances				
D5-N-EtFOSA (surr.)	1	%	21	27
D7-N-MeFOSE (surr.)	1	%	24	32
D9-N-EtFOSE (surr.)	1	%	17	32
D5-N-EtFOSAA (surr.)	1	%	71	75
D3-N-MeFOSAA (surr.)	1	%	60	56
Perfluoroalkane sulfonic acids (PFSA's)				
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{N09} 0.14	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	89	100
18O2-PFHxS (surr.)	1	%	87	97
13C8-PFOS (surr.)	1	%	89	41
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N15}	0.01	ug/L	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	75	136
13C2-6:2 FTSA (surr.)	1	%	74	114
13C2-8:2 FTSA (surr.)	1	%	113	42
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	0.14	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.14	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.14	< 0.01
Sum of WA DER PFAS (n=10)*	0.05	ug/L	0.14	< 0.05
Sum of PFASs (n=28)*	0.1	ug/L	0.14	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Mar 29, 2018	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoro Alkyl Substances (PFAS)			
Perfluoroalkane sulfonamido substances	Brisbane	Mar 29, 2018	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoro Alkyl Substances (PFAS)			
Perfluoroalkane sulfonic acids (PFSAs)	Brisbane	Mar 29, 2018	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoro Alkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Mar 29, 2018	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoro Alkyl Substances (PFAS)			

Company Name: Ecological Service Professionals Pty Ltd
Address: PO BOX 5815
Manly
QLD 4179
Project Name: PFAS IN BIOTA
Project ID: 1755

Order No.:
Report #: 591731
Phone: 0428 118 496
Fax:

Received: Mar 29, 2018 3:00 PM
Due: Apr 16, 2018
Priority: 10 Day
Contact Name: SIMON WALKER

Eurofins | mgt Analytical Services Manager : Ryan Gilbert

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	BO015MA_RS_180322	Mar 22, 2018		Water	B18-Ma34126	X
2	BO018MA_RE_180325	Mar 25, 2018		Water	B18-Ma34127	X
3	BO015MA_BA_L3_180322C	Mar 22, 2018		Fish	B18-Ma34128	X
4	BO015MA_QF_F5_180321C	Mar 22, 2018		Fish	B18-Ma34129	X
5	BO015MA_BA_3_180322C	Mar 22, 2018		Fish	B18-Ma34130	X
6	BO018MA_MF	Mar 22, 2018		Fish	B18-Ma34131	X

Company Name: Ecological Service Professionals Pty Ltd
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Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 23736						
	I_180325C					
7	BO016MA_TS FI_180324C	Mar 22, 2018		Fish	B18-Ma34132	X
8	BO017MA_SQ 9_180323C	Mar 22, 2018		Plant Material	B18-Ma34133	X
Test Counts						8

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkane sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkane sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	113			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	113			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	108			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	108			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	104			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	104			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	101			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	111			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	104			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	86			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	107			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamido substances							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)			%	97			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	109			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	97			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)			%	88			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)			%	106			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	104			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	99			50-150	Pass	
LCS - % Recovery									
Perfluoroalkane sulfonic acids (PFSA's)									
Perfluorobutanesulfonic acid (PFBS)			%	99			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	106			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	95			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	108			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	105			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	56			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	104			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	104			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	88			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	60			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)									
				Result 1					
Perfluorobutanoic acid (PFBA)	B18-Ma34165	NCP	%	98			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B18-Ma34165	NCP	%	116			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B18-Ma34165	NCP	%	96			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B18-Ma34165	NCP	%	96			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B18-Ma34165	NCP	%	95			50-150	Pass	
Perfluorononanoic acid (PFNA)	B18-Ma34165	NCP	%	96			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B18-Ma34165	NCP	%	87			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	B18-Ma34165	NCP	%	93			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	B18-Ma34165	NCP	%	85			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B18-Ma34165	NCP	%	77			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B18-Ma34165	NCP	%	77			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonamido substances									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	B18-Ma34165	NCP	%	87			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B18-Ma34165	NCP	%	89			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B18-Ma34165	NCP	%	93			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B18-Ma34165	NCP	%	72			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B18-Ma34165	NCP	%	82			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B18-Ma34165	NCP	%	81			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B18-Ma34165	NCP	%	94			50-150	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroalkane sulfonic acids (PFSA)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B18-Ma34165	NCP	%	90			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B18-Ma34165	NCP	%	111			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B18-Ma34165	NCP	%	92			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B18-Ma34165	NCP	%	93			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B18-Ma34165	NCP	%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B18-Ma34165	NCP	%	56			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B18-Ma34165	NCP	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B18-Ma34165	NCP	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B18-Ma34165	NCP	%	83			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B18-Ma34165	NCP	%	62			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCA)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B18-Ma34166	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B18-Ma34166	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B18-Ma34166	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B18-Ma34166	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B18-Ma34166	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B18-Ma34166	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B18-Ma34166	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B18-Ma34166	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonic acids (PFASs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B18-Ma34166	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B18-Ma34166	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

Ryan Gilbert Analytical Services Manager
Jonathon Angell Senior Analyst-Organic (QLD)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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

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APPENDIX C-4
MEMO – RAAF BASE TOWNSVILLE
KINDERGARTEN SCHOOL BUILDING 154
(NQ0111): SUMMARY OF PFAS
ANALYTICAL RESULTS



MEMO

TO: PFASIM Townsville
FROM: WSP Australia
SUBJECT: RAAF Base Townsville Kindergarten School Building 154 (NQ0111):
Summary of PFAS Analytical Results
OUR REF: 2270642A-CLM-MEM-003 Rev0
DATE: 14 July 2017

WSP Australia Pty Ltd (WSP) undertook a limited PFAS soil investigation at the on-Base Kindergarten School Building 154 (NQ0111) at RAAF Base Townsville on 16 June 2017. The investigation comprised collection of soil samples and included follow-up soil sampling on 10 July 2017 to close out data gaps identified during the first round of sampling. The investigation comprised a total of five surface grab samples (SD992 – SD996) from discrete locations and the advancement of a further three soil bores (BH995 to BH997) to a maximum depth of 1.5 m below grade level (mbgl) (Figure 1). A total of 17 soil samples were collected from the eight sampling locations and all samples were analysed for PFOS + PFHxS (9 µg/kg) and PFOA (100 µg/kg).

The PFAS analytical results from these samples are detailed below and compared against the draft residential land use investigation level (IL) derived by the NSW Office of Environment & Heritage (May 2017).

SAMPLE ID	DESCRIPTION	PFOS + PFHXS (9µG/KG)	PFOA (100µG/KG)
0874_SD992_170710	Surface grab sample	0.6 µg/kg	<0.2 µg/kg
0874_SD993_170710	Surface grab sample	1.5 µg/kg	<0.2 µg/kg
0874_SD994_170710	Surface grab sample	2.0 µg/kg	<0.2 µg/kg
0874_SD995_170710	Surface grab sample	1.1 µg/kg	<0.2 µg/kg
0874_SD996_170616	Surface grab sample	7.8 µg/kg	<0.2 µg/kg
0874_BH995_0.2_170710	Soil bore at 0.2 mbgl	1.6 µg/kg	0.4 µg/kg
0874_BH995_0.5_170710	Soil bore at 0.5 mbgl	<0.2 µg/kg	<0.2 µg/kg
0874_BH995_1.0_170710	Soil bore at 1.0 mbgl	0.5 µg/kg	<0.2 µg/kg

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SAMPLE ID	DESCRIPTION	PFOS + PFHXS (9µG/KG)	PFOA (100µG/KG)
0874_BH995_1.5_170710	Soil bore at 1.5 mbgl	0.2 µg/kg	<0.2 µg/kg
0874_BH996_0.2_170710	Soil bore at 0.2 mbgl	1.7 µg/kg	<0.2 µg/kg
0874_BH996_0.5_170710	Soil bore at 0.5 mbgl	5.2 µg/kg	<0.2 µg/kg
0874_BH996_1.0_170710	Soil bore at 1.0 mbgl	3.0 µg/kg	<0.2 µg/kg
0874_BH996_1.5_170710	Soil bore at 1.5 mbgl	1.2 µg/kg	<0.2 µg/kg
0874_BH997_0.2_170616	Soil bore at 0.2 mbgl	6.2 µg/ kg	<0.2 µg/kg
0874_BH997_0.5_170616	Soil bore at 0.5 mbgl	12.6 µg/ kg	0.6 µg/kg
0874_BH997_1.0_170616	Soil bore at 1.0 mbgl	10.6 µg/ kg	0.4 µg/kg
0874_BH997_1.4_170616	Soil bore at 1.4 mbgl	25.4 µg/kg	0.4 µg/kg
0874_BH997_1.4_170616 ⁽¹⁾	Soil bore at 1.4 mbgl	14.6 µg/kg	0.4 µg/kg

1 Reanalysis of sample

Shaded samples are in exceedance of the guideline.

No surface or near surface (i.e. ≤0.2 mbgl) samples collected across the site reported PFAS (PFOS + PFHxS or PFOA) in excess of the 9 µg/kg or 100 µg/kg ILs. One Borehole (BH997), located adjacent to the cubbyhouse along the eastern boundary fence, reported PFOS + PFHxS in excess of the IL's from samples collected at 0.5 mbgl, 1.0 mbgl and 1.4mbgl (the maximum depth of the investigation).

Based on the limited investigation undertaken, and given that the residential IL for PFOS + PFHxS was not exceeded in any surface or near surface samples, WSP considers that the potential unacceptable exposure via ingestion or dermal contact to children attending the kindergarten is unlikely. Specific controls may be warranted to prevent access to soil at depth, such as a management plan for any minor excavation works or gardening activities the kindergarten may undertake.

These fieldworks form part of the broader Detailed Site Investigation (DSI) and reference is to be made to the DSI report for limitations associated with the investigation.

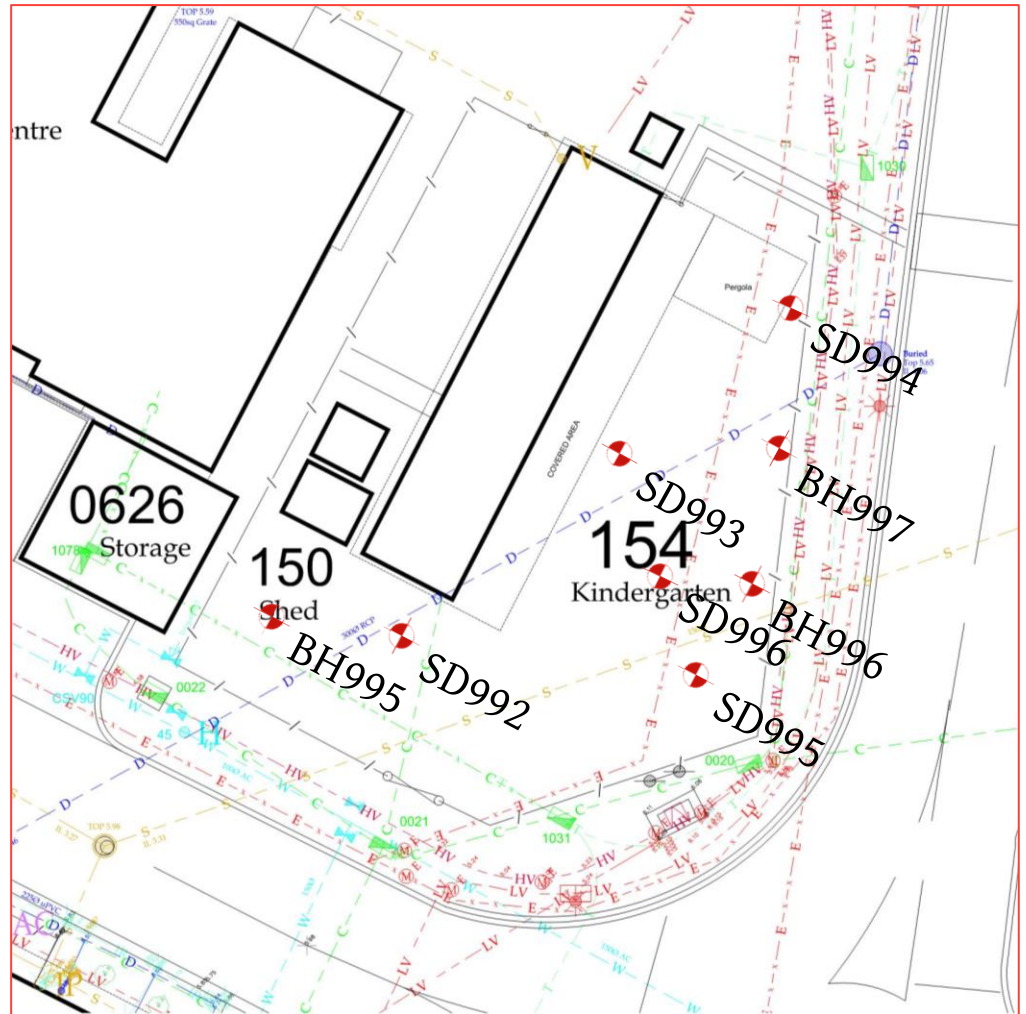


FIGURE 1 - KINDERGARTEN SCHOOL BUILDING 154 SAMPLE LOCATIONS

APPENDIX D

MEAN AND 90TH PERCENTILE EXPOSURE POINT CONCENTRATION TABLES





	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.01	0.01	0.01
ANZECC PFAS FW 95%		0.13		220
FSANZ 2017 PFAS drinking water			0.07	0.56
FSANZ 2017 PFAS recreational water			0.7	5.6

Lab Report Number	on-Base Area	Field ID	Matrix Type	Date				
ET1701079	38 SQN & Domestic Area	0874_MW006_S_170817	Groundwater	17/08/2017	0.19	0.06	0.25	0.005
ET1701079	38 SQN & Domestic Area	0874_MW036_S_170817	Groundwater	17/08/2017	1.37	0.45	1.82	0.12
ES1716526	38 SQN & Domestic Area	0874_MW049_S_170630	Groundwater	30/06/2017	1.69	1.74	3.43	0.29
ET1701079	38 SQN & Domestic Area	0874_MW049_S_170817	Groundwater	17/08/2017	2.26	1.6	3.86	0.16
ET1701071	38 SQN & Domestic Area	0874_MW061_S_170816	Groundwater	16/08/2017	6.83	14.8	21.63	0.72
ET1701079	38 SQN & Domestic Area	0874_MW063_S_170817	Groundwater	17/08/2017	13.3	17.1	30.4	1
ET1701079	38 SQN & Domestic Area	0874_MW224_S_170817	Groundwater	17/08/2017	0.43	0.36	0.79	0.02
ES1716954	38 SQN & Domestic Area	0874_MW232_S_170710	Groundwater	10/07/2017	14.6	10.4	25	0.97
ES1718883	38 SQN & Domestic Area	0874_MW232_S_170727	Groundwater	27/07/2017	11.6	12.9	24.5	0.73
ET1701079	38 SQN & Domestic Area	0874_MW232_S_170817	Groundwater	17/08/2017	13	9.52	22.52	0.58
ES1803162	38 SQN & Domestic Area	0874_MW232_S_180124	Groundwater	24/01/2018	7.88	8.72	16.6	0.59
ES1716526	5 AVN	0874_MW009_S_170630	Groundwater	30/06/2017	9.94	18.8	28.74	0.8
ES1718883	5 AVN	0874_MW009_S_170727	Groundwater	27/07/2017	7.77	12.7	20.47	0.62
ET1701079	5 AVN	0874_MW009_S_170817	Groundwater	17/08/2017	9.31	11.3	20.61	0.97
ET1701079	5 AVN	0874_MW038_S_170817	Groundwater	17/08/2017	4.37	1.96	6.33	0.23
ET1701079	5 AVN	0874_MW043_S_170817	Groundwater	17/08/2017	210	62.6	272.6	13.6
ES1716526	5 AVN	0874_MW114_S_170629	Groundwater	29/06/2017	16.3	10.5	26.8	0.64
ET1701079	5 AVN	0874_MW114_S_170817	Groundwater	17/08/2017	16.2	8.44	24.64	0.87
ES1716526	5 AVN	0874_MW125_D_170630	Groundwater	30/06/2017	37.6	24.6	62.2	0.71
ES1718883	5 AVN	0874_MW125_S_170729	Groundwater	29/07/2017	0.16	0.46	0.62	0.025
ET1701079	5 AVN	0874_MW125_S_170817	Groundwater	17/08/2017	35.9	30.3	66.2	1.41
ET1701079	5 AVN	0874_MW142_S_170817	Groundwater	17/08/2017	0.025	0.025	0.05	0.025
ET1701079	5 AVN	0874_MW247_S_170817	Groundwater	17/08/2017	22.6	79.3	101.9	1.71
ET1701079	5 AVN	0874_MW248_S_170817	Groundwater	17/08/2017	475	693	1168	36.6
ES1803162	5 AVN	0874_MW248_S_180124	Groundwater	24/01/2018	73.7	107	180.7	6.5
ET1701079	5 AVN	0874_MW249_S_170817	Groundwater	17/08/2017	37	118	155	3.88
ET1701071	Eastern Base boundary	0874_MW140_D_170816	Groundwater	16/08/2017	0.025	0.025	0.05	0.025
ES1716526	Former Runway 13/31	0874_MW056_S_170630	Groundwater	30/06/2017	2.24	0.09	2.33	0.025
ES1718883	Former Runway 13/31	0874_MW056_S_170728	Groundwater	28/07/2017	1.93	0.12	2.05	0.025
ET1701079	Former Runway 13/31	0874_MW056_S_170817	Groundwater	17/08/2017	2.05	0.08	2.13	0.025
ET1701071	Former Runway 13/31	0874_MW057_S_170816	Groundwater	16/08/2017	8.06	3.8	11.86	0.18
ET1701071	Former Runway 13/31	0874_MW112_S_170816	Groundwater	16/08/2017	3.64	0.58	4.22	0.08
ET1701079	Former Runway 13/31	0874_MW102_S_170817	Groundwater	17/08/2017	2.23	0.08	2.31	0.025
ET1701079	Former Runway 13/31	0874_MW104_S_170817	Groundwater	17/08/2017	0.025	0.025	0.05	0.025
ET1701079	Former Runway 13/31	0874_MW245_S_170817	Groundwater	17/08/2017	20	4.7	24.7	0.55
ES1803162	Former Runway 13/31	0874_MW245_S_180124	Groundwater	24/01/2018	357	59.1	416.1	32.6
ET1701071	Former Runway 13/31	0874_MW246_S_170816	Groundwater	16/08/2017	8.69	23.7	32.39	0.64
ET1701071	Fuel Farm 2 NQ0099	0874_MW081_S_170816	Groundwater	16/08/2017	4,050	2,310	6360	130
ES1803162	Fuel Farm 2 NQ0099	0874_MW081_S_180124	Groundwater	24/01/2018	8520	3280	11800	348



					Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
					µg/L	µg/L	µg/L	µg/L
EQL					0.02	0.01	0.01	0.01
ANZECC PFAS FW 95%						0.13		220
FSANZ 2017 PFAS drinking water							0.07	0.56
FSANZ 2017 PFAS recreational water							0.7	5.6
ET1701071	Fuel Farm 2 NQ0099	0874_MW090_S_170816	Groundwater	16/08/2017	1.76	5.3	7.06	0.05
ET1701071	Fuel Farm 2 NQ0099	0874_MW005_S_170816	Groundwater	16/08/2017	388	234	622	14.6
ET1701071	Fuel Farm 2 NQ0099	0874_MW046_S_170816	Groundwater	16/08/2017	156	190	346	4.32
ET1701071	Ingham Road Sports Field	0874_MW226_S_170816	Groundwater	16/08/2017	0.06	0.025	0.085	0.025
ET1701071	Ingham Road Sports Field	0874_MW227_S_170816	Groundwater	16/08/2017	0.07	0.01	0.08	0.005
ET1701071	Ingham Road Sports Field	0874_MW228_S_170816	Groundwater	16/08/2017	0.025	0.025	0.05	0.025
ET1701071	Ingham Road Sports Field	0874_MW229_S_170816	Groundwater	16/08/2017	0.025	0.025	0.05	0.025
ET1701071	Mount St John	0874_MW234_S_170816	Groundwater	16/08/2017	0.08	0.05	0.13	0.025
ET1701071	Mount St John	0874_MW235_S_170816	Groundwater	16/08/2017	0.06	0.025	0.085	0.09
ES1803162	Mount St John	0874_MW230_S_180124	Groundwater	24/01/2018	0.19	0.025	0.215	0.005
ES1803162	Mount St John	0874_MW255_S_180124	Groundwater	24/01/2018	0.48	0.34	0.82	0.025
ES1803162	NQ0054	0874_MW126_S_180124	Groundwater	24/01/2018	52.9	313	365.9	16.9
ES1716526	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW013_S_170630	Groundwater	30/06/2017	128	649	777	30.7
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW013_S_170727	Groundwater	27/07/2017	39.5	92.1	131.6	6.06
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW013_S_170817	Groundwater	17/08/2017	45.1	127	172.1	8.57
ES1716526	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW026_S_170630	Groundwater	30/06/2017	10.4	46.4	56.8	1.06
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW026_S_170727	Groundwater	27/07/2017	8.92	31	39.92	0.92
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW026_S_170817	Groundwater	17/08/2017	10.7	24.9	35.6	1.24
ET1701082	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW033_S_170818	Groundwater	18/08/2017	10.6	28	38.6	1.42
ET1701082	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW034_S_170818	Groundwater	18/08/2017	15.4	1.56	16.96	0.36
ET1701082	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW051_S_170818	Groundwater	18/08/2017	0.89	0.9	1.79	0.02
ES1716526	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW116_S_170630	Groundwater	30/06/2017	74.4	83.4	157.8	6.54
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW116_S_170727	Groundwater	27/07/2017	111	103	214	17.1
ET1701055	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW116_S_170815	Groundwater	15/08/2017	169	147	316	28.0
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW118_S_170727	Groundwater	27/07/2017	1.2	5.26	6.46	0.3
ES1718883	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW118_S_170728	Groundwater	28/07/2017	0.81	3.28	4.09	0.21
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW118_S_170817	Groundwater	17/08/2017	0.92	3.23	4.15	0.24
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW120_S_170817	Groundwater	17/08/2017	27	10.9	37.9	1.98
ET1701055	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW126_S_170815	Groundwater	15/08/2017	84.6	367	451.6	24.9
ET1701079	NQ0054 & Fuel Farm 1 (NQ0052)	0874_MW129_S_170817	Groundwater	17/08/2017	7.39	34.4	41.79	2.82
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW015_S_170816	Groundwater	16/08/2017	332	198	530	9.04
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW016_S_170816	Groundwater	16/08/2017	544	384	928	33.5
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW021_S_170816	Groundwater	16/08/2017	229	479	708	9.45
ES1716526	NQ0055 & Former Fire Training Area NQ0107	0874_MW054_S_170630	Groundwater	30/06/2017	27.7	50	77.7	1.19
ES1718883	NQ0055 & Former Fire Training Area NQ0107	0874_MW054_S_170728	Groundwater	28/07/2017	16.5	29.4	45.9	0.76
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW054_S_170815	Groundwater	15/08/2017	16.8	33.7	50.5	1.29
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW055_S_170815	Groundwater	15/08/2017	96.2	194	290.2	12.3
ES1716526	NQ0055 & Former Fire Training Area NQ0107	0874_MW109_S_170629	Groundwater	29/06/2017	911	1,360	2271	68.0
ES1718883	NQ0055 & Former Fire Training Area NQ0107	0874_MW109_S_170728	Groundwater	28/07/2017	15.4	22.9	38.3	0.92
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW109_S_170815	Groundwater	15/08/2017	501	765	1266	38.8
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW110_S_170815	Groundwater	15/08/2017	606	616	1222	36.6



					Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
					µg/L	µg/L	µg/L	µg/L
EQL					0.02	0.01	0.01	0.01
ANZECC PFAS FW 95%						0.13		220
FSANZ 2017 PFAS drinking water							0.07	0.56
FSANZ 2017 PFAS recreational water							0.7	5.6
ES1716526	NQ0055 & Former Fire Training Area NQ0107	0874_MW138_S_170629	Groundwater	29/06/2017	146	309	455	4.82
ES1718883	NQ0055 & Former Fire Training Area NQ0107	0874_MW138_S_170729	Groundwater	29/07/2017	413	426	839	20.1
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW138_S_170815	Groundwater	15/08/2017	113	178	291	7.24
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW139_S_170815	Groundwater	15/08/2017	298	564	862	32.4
ET1701055	NQ0055 & Former Fire Training Area NQ0107	0874_MW250_S_170815	Groundwater	15/08/2017	16	14.2	30.2	0.58
ET1701071	NQ0055 & Former Fire Training Area NQ0107	0874_MW251_S_170816	Groundwater	16/08/2017	1.08	0.1	1.18	0.025
ES1803162	NQ0055 Fire Station	0874_MW109_S_180124	Groundwater	24/01/2018	583	1200	1783	50
ET1701071	NQ0105	0874_MW241_S_170816	Groundwater	16/08/2017	0.025	0.08	0.105	0.025
ET1701071	NQ0105	0874_MW242_S_170816	Groundwater	16/08/2017	0.68	1.06	1.74	0.05
ET1701079	NQ0106 & OLAs	0874_MW004_S_170817	Groundwater	17/08/2017	0.04	0.02	0.06	0.005
ET1701079	NQ0106 & OLAs	0874_MW122_S_170817	Groundwater	17/08/2017	0.11	0.02	0.13	0.005
ET1701079	NQ0106 & OLAs	0874_MW136_S_170817	Groundwater	17/08/2017	0.96	0.81	1.77	0.04
ET1701079	NQ0106 & OLAs	0874_MW243_S_170817	Groundwater	17/08/2017	55.7	1.77	57.47	0.98
ES1718883	NW Base Boundary	0874_MW002_S_170727	Groundwater	27/07/2017	2.79	3.13	5.92	0.16
ES1718883	NW Base Boundary	0874_MW002_S_170728	Groundwater	28/07/2017	3.75	4.04	7.79	0.21
ET1701055	NW Base Boundary	0874_MW002_S_170815	Groundwater	15/08/2017	2.97	2.58	5.55	0.17
ES1803162	OLAs	0874_MW265_S_180123	Groundwater	23/01/2018	0.2	0.005	0.205	0.025
ET1701055	Pad Brahman	0874_MW121_S_170815	Groundwater	15/08/2017	2.13	0.12	2.25	0.005
ES1718883	Pad Brahman	0874_MW135_S_170727	Groundwater	27/07/2017	0.11	0.01	0.12	0.005
ET1701055	Pad Brahman	0874_MW135_S_170815	Groundwater	15/08/2017	10.2	0.97	11.17	0.09
ET1701055	Pad Brahman	0874_MW244_S_170815	Groundwater	15/08/2017	37.6	1.96	39.56	1.1
ES1803162	Pad Brahman	0874_MW244_S_180124	Groundwater	24/01/2018	191	27.3	218.3	7.66

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

Statistics

Number of Results	102	102	102	102
Minimum Concentration	0.03	0.01	0.05	0.01
Maximum Concentration	8,520	3,280	11,800	348
Average Concentration	201	160	361	11
Geometric Average	7.96	6.04	16.57	0.59
Median Concentration	10.50	10.70	24.85	0.72
Standard Deviation	934	447	1,352	38
Geometric Standard Deviation	18	20	22	27
90th Percentile	355	422	770	30
95th Percentile	542	691	1,219	37



Appendix D - Exposure Point Concentration Data: Groundwater off-Base - Dry Season

Department of Defence
RAAF Base Townsville, Queensland (Site ID 0874)

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.01	0.01	0.01
ANZECC PFAS FW 95%		0.13		220
FSANZ 2017 PFAS drinking water			0.07	0.56
FSANZ 2017 PFAS recreational water			0.7	5.6

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
ET1701055	Belgian Gardens	0874_MW214_S_170815	Groundwater	15/08/2017	0.025	0.025	0.05	0.025
ET1701055	Belgian Gardens	0874_MW215_S_170815	Groundwater	15/08/2017	0.02	0.005	0.025	0.005
ET1701055	Belgian Gardens	0874_MW216_S_170815	Groundwater	15/08/2017	0.08	0.27	0.35	0.02
ET1701144	Belgian Gardens	0874_MW216_S_170904	Groundwater	4/09/2017	0.05	0.22	0.27	0.02
ES1803162	Belgian Gardens	0874_MW269_S_180123	Groundwater	23/01/2018	0.01	0.01	0.02	0.005
ET1701055	Bohle	0874_MW237_S_170815	Groundwater	15/08/2017	0.01	0.025	0.035	0.005
ET1701055	Bohle	0874_MW238_S_170815	Groundwater	15/08/2017	0.025	0.025	0.05	0.005
ET1701055	Bohle	0874_MW239_S_170815	Groundwater	15/08/2017	0.04	0.02	0.06	0.01
ET1701055	Bohle	0874_MW240_S_170815	Groundwater	15/08/2017	0.06	0.03	0.09	0.005
ET1701055	Bushland Beach	0874_MW231_S_170815	Groundwater	15/08/2017	0.025	0.025	0.05	0.025
ET1701038	Cleveland Bay	0874_MW209_S_170814	Groundwater	14/08/2017	0.09	0.1	0.19	0.02
ET1701038	Cleveland Bay	0874_MW210_S_170814	Groundwater	14/08/2017	0.01	0.02	0.03	0.005
ET1701038	Cleveland Bay	0874_MW211_S_170814	Groundwater	14/08/2017	0.02	0.05	0.07	0.005
ET1701055	Garbutt Community	0874_MW217_S_170815	Groundwater	15/08/2017	0.025	0.025	0.05	0.025
ET1701055	Garbutt Community	0874_MW218_S_170815	Groundwater	15/08/2017	0.08	0.025	0.105	0.025
ET1701055	Garbutt Community	0874_MW219_S_170815	Groundwater	15/08/2017	0.01	0.005	0.015	0.005
ET1701055	Garbutt Community	0874_MW220_S_170815	Groundwater	15/08/2017	0.03	0.005	0.035	0.005
ET1701055	Garbutt Community	0874_MW221_S_170815	Groundwater	15/08/2017	4.44	1.26	5.7	0.12
ET1701082	Garbutt Community	0874_MW222_S_170818	Groundwater	18/08/2017	0.27	0.07	0.34	0.005
ET1701079	Garbutt Community	0874_MW223_S_170817	Groundwater	17/08/2017	4.94	6.64	11.58	0.23
ET1701055	Garbutt Community	0874_MW225_S_170815	Groundwater	15/08/2017	0.11	0.21	0.32	0.01
ET1701144	Garbutt Community	0874_MW225_S_170904	Groundwater	4/09/2017	0.07	0.2	0.27	0.01
ET1701055	Garbutt Community	0874_MW236_S_170815	Groundwater	15/08/2017	0.01	0.005	0.015	0.005
ET1701771	Garbutt Community	0874_MW257_S_171207	Groundwater	7/12/2017	0.02	0.08	0.1	0.02
ET1701771	Garbutt Community	0874_MW258_S_171207	Groundwater	7/12/2017	0.12	0.52	0.64	0.04
ET1701771	Garbutt Community	0874_MW259_S_171207	Groundwater	7/12/2017	0.04	0.08	0.12	0.02
ET1701771	Garbutt Community	0874_MW260_S_171207	Groundwater	7/12/2017	0.05	0.08	0.13	0.01
ET1701771	Garbutt Community	0874_MW263_S_171207	Groundwater	7/12/2017	0.48	0.68	1.16	0.06
ES1803162	Garbutt Community	0874_MW266_S_180123	Groundwater	23/01/2018	0.025	0.025	0.05	0.025
ET1701771	Garbutt Community	0874_MW267_S_171207	Groundwater	7/12/2017	0.2	0.37	0.57	0.04
ES1803162	Garbutt Community	0874_MW267_S_180123	Groundwater	23/01/2018	0.37	0.32	0.69	0.03
ET1701771	Garbutt Community	0874_MW268_S_171207	Groundwater	7/12/2017	0.01	0.005	0.015	0.005
ET1701771	Garbutt Community	0874_MW270_S_171207	Groundwater	7/12/2017	0.01	0.005	0.015	0.005
ES1803162	Garbutt Community	0874_MW270_S_180123	Groundwater	23/01/2018	0.01	0.005	0.015	0.02
ES1803162	Mount St John	0874_MW255_S_180124	Groundwater	24/01/2018	0.48	0.34	0.82	0.025
ES1803162	Mt St John	0874_MW254_S_180123	Groundwater	23/01/2018	0.025	0.025	0.05	0.025
ES1803162	Mt St John	0874_MW262_S_180123	Groundwater	23/01/2018	0.025	0.025	0.05	0.025



	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.01	0.01	0.01
ANZECC PFAS FW 95%		0.13		220
FSANZ 2017 PFAS drinking water			0.07	0.56
FSANZ 2017 PFAS recreational water			0.7	5.6

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
ET1701069	NE of Townsville Airport	0874_MW401_S_170816	Groundwater	16/08/2017	0.1	0.025	0.125	0.025
ET1701069	NE of Townsville Airport	0874_MW402_S_170816	Groundwater	16/08/2017	0.16	0.17	0.33	0.025
ET1701069	NE of Townsville Airport	0874_MW403_S_170816	Groundwater	16/08/2017	0.09	0.025	0.115	0.025
ET1701069	NE of Townsville Airport	0874_MW405_S_170816	Groundwater	16/08/2017	0.72	0.1	0.82	0.025
ET1701080	NE of Townsville Airport	0874_MW406_S_170818	Groundwater	18/08/2017	1.39	0.1	1.49	0.005
ES1803162	Pallarenda	0874_MW233_S_180123	Groundwater	23/01/2018	0.01	0.05	0.06	0.005
ES1803162	Pallarenda	0874_MW252_S_180123	Groundwater	23/01/2018	0.01	0.02	0.03	0.005
ES1803162	Pallarenda	0874_MW253_S_180123	Groundwater	23/01/2018	0.025	0.025	0.05	0.025
ES1721256	Private Land Extraction Bores	0874_BW001_170823	Groundwater	23/08/2017	0.01	0.005	0.015	0.005
ES1721257	Private Land Extraction Bores	0874_BW002_170823	Groundwater	23/08/2017	0.01	0.03	0.04	0.005
ES1721258	Private Land Extraction Bores	0874_BW003_170823	Groundwater	23/08/2017	0.01	0.01	0.02	0.005
ES1721260	Private Land Extraction Bores	0874_BW004_170823	Groundwater	23/08/2017	0.01	0.02	0.03	0.005
ES1721263	Private Land Extraction Bores	0874_BW005_170823	Groundwater	23/08/2017	0.01	0.04	0.05	0.03
ES1721264	Private Land Extraction Bores	0874_BW006_170823	Groundwater	23/08/2017	0.14	0.1	0.24	0.01
ES1721265	Private Land Extraction Bores	0874_BW007_170823	Groundwater	23/08/2017	0.01	0.02	0.03	0.04
ES1721267	Private Land Extraction Bores	0874_BW008_170823	Groundwater	23/08/2017	0.01	0.005	0.015	0.005
ES1721268	Private Land Extraction Bores	0874_BW009_170823	Groundwater	23/08/2017	0.01	0.01	0.02	0.005
ES1721270	Private Land Extraction Bores	0874_BW010_170823	Groundwater	23/08/2017	0.01	0.02	0.03	0.005
ES1721272	Private Land Extraction Bores	0874_BW011_170823	Groundwater	23/08/2017	0.01	0.02	0.03	0.005
ES1721273	Private Land Extraction Bores	0874_BW012_170823	Groundwater	23/08/2017	0.01	0.01	0.02	0.005
ES1721276	Private Land Extraction Bores	0874_BW013_170823	Groundwater	23/08/2017	0.01	0.02	0.03	0.005
ES1721277	Private Land Extraction Bores	0874_BW014_170823	Groundwater	23/08/2017	0.01	0.005	0.015	0.005
ES1721279	Private Land Extraction Bores	0874_BW015_170824	Groundwater	24/08/2017	0.84	0.4	1.24	0.03
ES1721280	Private Land Extraction Bores	0874_BW016_170824	Groundwater	24/08/2017	0.01	0.03	0.04	0.005
ES1721281	Private Land Extraction Bores	0874_BW017_170824	Groundwater	24/08/2017	0.01	0.02	0.03	0.01
ES1721282	Private Land Extraction Bores	0874_BW018_170824	Groundwater	24/08/2017	0.07	0.02	0.09	0.005
ES1721283	Private Land Extraction Bores	0874_BW019_170824	Groundwater	24/08/2017	0.01	0.02	0.03	0.005
ET1800003	Private Land Extraction Bores	0874_BW020_171213	Groundwater	13/12/2017	0.01	0.02	0.03	0.005
ET1800005	Private Land Extraction Bores	0874_BW021_171214	Groundwater	14/12/2017	0.02	0.03	0.05	0.005
ET1800006	Private Land Extraction Bores	0874_BW022_171214	Groundwater	14/12/2017	0.01	0.03	0.04	0.005
ET1800155	Private Land Extraction Bores	0874_BW024_180118	Groundwater	18/01/2018	0.01	0.01	0.02	0.005
ET1800156	Private Land Extraction Bores	0874_BW025_180118	Groundwater	18/01/2018	0.01	0.005	0.015	0.005
ET1800158	Private Land Extraction Bores	0874_BW026_180118	Groundwater	18/01/2018	0.01	0.005	0.015	0.005
ET1800160	Private Land Extraction Bores	0874_BW027_180118	Groundwater	18/01/2018	0.01	0.005	0.015	0.005
ET1800162	Private Land Extraction Bores	0874_BW028_180118	Groundwater	18/01/2018	0.01	0.04	0.05	0.005
ET1800157	Private Land Extraction Bores	0874_BW029_190118	Groundwater	19/01/2018	0.01	0.005	0.015	0.005



	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.01	0.01	0.01
ANZECC PFAS FW 95%		0.13		220
FSANZ 2017 PFAS drinking water			0.07	0.56
FSANZ 2017 PFAS recreational water			0.7	5.6

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date				
	Private Land Extraction Bores	0874_BW001_180627	Groundwater	27/06/2018	0.0035	0.0126	0.0161	0.0011
	Private Land Extraction Bores	0874_BW002_180627	Groundwater	27/06/2018	0.0046	0.0518	0.0564	0.0013
	Private Land Extraction Bores	0874_BW003_180627	Groundwater	27/06/2018	0.0041	0.0066	0.0107	0.00025
	Private Land Extraction Bores	0874_BW004_180628	Groundwater	28/06/2018	0.0064	0.0218	0.0282	0.00025
	Private Land Extraction Bores	0874_BW005_180627	Groundwater	27/06/2018	0.0115	0.0219	0.0334	0.0090
	Private Land Extraction Bores	0874_BW006_180626	Groundwater	26/06/2018	0.106	0.0740	0.18	0.0062
	Private Land Extraction Bores	0874_BW007_180626	Groundwater	26/06/2018	0.0046	0.0209	0.0255	0.0332
	Private Land Extraction Bores	0874_BW008_180628	Groundwater	28/06/2018	0.00025	0.0015	0.00175	0.00025
	Private Land Extraction Bores	0874_BW009_180627	Groundwater	27/06/2018	0.0042	0.0177	0.0219	0.0021
	Private Land Extraction Bores	0874_BW010_180626	Groundwater	26/06/2018	0.0101	0.0150	0.0251	0.0079
	Private Land Extraction Bores	0874_BW013_180627	Groundwater	27/06/2018	0.0111	0.0320	0.0431	0.0015
	Private Land Extraction Bores	0874_BW014_180627	Groundwater	27/06/2018	0.0084	0.0137	0.0221	0.0058
	Private Land Extraction Bores	0874_BW015_180625	Groundwater	25/06/2018	0.723	0.422	1.145	0.0247
	Private Land Extraction Bores	0874_BW020_180627	Groundwater	27/06/2018	0.0242	0.0100	0.0342	0.0007
	Private Land Extraction Bores	0874_BW021_180625	Groundwater	25/06/2018	0.0359	0.0121	0.048	0.0019
	Private Land Extraction Bores	0874_BW022_180627	Groundwater	27/06/2018	0.0025	0.0054	0.0079	0.00025
	Private Land Extraction Bores	0874_BW023_180626	Groundwater	26/06/2018	0.0030	0.0109	0.0139	0.0007
	Private Land Extraction Bores	0874_BW024_180625	Groundwater	25/06/2018	0.0030	0.0006	0.0036	0.00025
	Private Land Extraction Bores	0874_BW027_180627	Groundwater	27/06/2018	0.0064	0.0245	0.0309	0.0012
	Private Land Extraction Bores	0874_BW028_180625	Groundwater	25/06/2018	0.0150	0.0255	0.0405	0.0034
	Private Land Extraction Bores	0874_BW029_180626	Groundwater	26/06/2018	0.0147	0.0035	0.0182	0.00025
ET1701055	Rowes Bay	0874_MW212_S_170815	Groundwater	15/08/2017	0.01	0.01	0.02	0.005
ET1701055	Rowes Bay	0874_MW213_S_170815	Groundwater	15/08/2017	0.01	0.005	0.015	0.005
ET1701771	Rowes Bay	0874_MW256_S_171207	Groundwater	7/12/2017	0.02	0.07	0.09	0.02
ES1803162	Rowes Bay	0874_MW264_S_180123	Groundwater	23/01/2018	0.02	0.025	0.045	0.005
ET1701038	Rowes Bay Landfill	0874_MWRB1_S_170814	Groundwater	14/08/2017	0.01	0.12	0.13	0.005
ET1701082	Rowes Bay Landfill	0874_MWRB2_S_170818	Groundwater	18/08/2017	0.04	0.04	0.08	0.005
ET1701038	Rowes Bay Landfill	0874_MWRB3_S_170814	Groundwater	14/08/2017	0.01	0.05	0.06	0.005
ET1701038	Rowes Bay Landfill	0874_MWRB5_S_170814	Groundwater	14/08/2017	0.38	0.09	0.47	0.005
ET1701082	The Common	0874_MW201_S_170818	Groundwater	18/08/2017	0.01	0.005	0.015	0.005
ET1701082	The Common	0874_MW202_S_170818	Groundwater	18/08/2017	0.02	0.005	0.025	0.005
ET1701082	The Common	0874_MW203_S_170818	Groundwater	18/08/2017	0.01	0.005	0.015	0.005
ET1701079	The Common	0874_MW204_S_170817	Groundwater	17/08/2017	0.01	0.03	0.04	0.005
ET1701079	The Common	0874_MW205_S_170817	Groundwater	17/08/2017	0.72	0.02	0.74	0.005
ET1701079	The Common	0874_MW206_S_170817	Groundwater	17/08/2017	15.9	0.04	15.94	0.08
ET1701079	The Common	0874_MW207_S_170817	Groundwater	17/08/2017	0.08	0.025	0.105	0.025
ET1701079	The Common	0874_MW208_S_170817	Groundwater	17/08/2017	0.11	0.03	0.14	0.005
ET1701070	Third Party Commercial Property	0874_MW414_S_170816	Groundwater	16/08/2017	0.53	0.91	1.44	0.06



	Perfluorohexane sulfonic acid (PFHxS) µg/L	Perfluorooctane sulfonic acid (PFOS) µg/L	Sum of PFHxS and PFOS µg/L	Perfluorooctanoic acid (PFOA) µg/L
EQL	0.02	0.01	0.01	0.01
ANZECC PFAS FW 95%		0.13		220
FSANZ 2017 PFAS drinking water			0.07	0.56
FSANZ 2017 PFAS recreational water			0.7	5.6

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date				
ET1701070	Third Party Commercial Property	0874_MW415_S_170816	Groundwater	16/08/2017	2.7	0.39	3.09	0.005
ET1701070	Third Party Commercial Property	0874_MW422_S_170816	Groundwater	16/08/2017	0.29	0.005	0.295	0.005
ET1701067	Third Party Commercial Property	0874_MW437_S_170816	Groundwater	16/08/2017	0.12	0.09	0.21	0.005
ET1701067	Third Party Commercial Property	0874_MW439_S_170816	Groundwater	16/08/2017	0.27	0.06	0.33	0.025
ET1701072	Third Party Commercial Property	0874_MW455_S_170816	Groundwater	16/08/2017	2.76	2.32	5.08	0.005
ET1701072	Third Party Commercial Property	0874_MW456_S_170816	Groundwater	16/08/2017	0.72	0.21	0.93	0.005
ET1701072	Third Party Commercial Property	0874_MW457_S_170816	Groundwater	16/08/2017	1.24	1.18	2.42	0.005
ET1701072	Third Party Commercial Property	0874_MW459_S_170816	Groundwater	16/08/2017	3.04	2.2	5.24	0.005
ET1701072	Third Party Commercial Property	0874_MW460_S_170816	Groundwater	16/08/2017	0.01	0.06	0.07	0.005
ET1701072	Third Party Commercial Property	0874_MW463_S_170816	Groundwater	16/08/2017	0.01	0.05	0.06	0.005
ET1701072	Third Party Commercial Property	0874_MW465_S_170816	Groundwater	16/08/2017	0.27	0.53	0.8	0.005
ET1701072	Third Party Commercial Property	0874_MW466_S_170816	Groundwater	16/08/2017	0.48	0.5	0.98	0.01

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

Statistics

Number of Results	123	123	123	123
Number of Detects	113	115	117	122
Minimum Concentration	0.00	0.00	0.00	0.00
Maximum Concentration	16	7	16	0.23
Average Concentration	0.4	0.2	0.6	0.01
Geometric Average	0.04	0.03	0.08	0.01
Median Concentration	0.02	0.03	0.05	0.01
Standard Deviation	2	1	2	0
90th Percentile	0.7	0.4	1.0	0.03
95th Percentile	1	1	2	0.04



	Perfluorohexane sulfonic acid (PFHxS) µg/L	Perfluorooctane sulfonic acid (PFOS) µg/L	Sum of PFHxS and PFOS µg/L	Perfluorooctanoic acid (PFOA) µg/L
EQL	0.0005	0.0003	0.0003	0.0005
ANZECC PFAS FW 95%		0.13		220
DoH and FSANZ drinking water quality value			0.07	0.56
DoH and FSANZ recreational water quality value			0.7	5.6

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date				
ET1801011	38 SQN & Domestic area	0874_MW006_S_180412	Water	Groundwater	12/04/2018	0.19	0.2	0.39	0.025
ET1801086	38 SQN & Domestic area	0874_MW036_S_180418	Water	Groundwater	18/04/2018	4.09	1.44	5.53	0.24
ET1801011	38 SQN & Domestic area	0874_MW049_S_180412	Water	Groundwater	12/04/2018	0.21	1.46	1.67	1.16
ET1801086	38 SQN & Domestic area	0874_MW049_S_180418	Water	Groundwater	18/04/2018	0.74	1.56	2.3	0.75
ET1801059	38 SQN & Domestic area	0874_MW061_S_180417	Water	Groundwater	17/04/2018	8.75	20.6	29.35	0.79
ET1801059	38 SQN & Domestic area	0874_MW061_S_180417_F	Water	Groundwater	17/04/2018	0.71	0.005	0.715	0.37
ET1801059	38 SQN & Domestic area	0874_MW063_S_180417	Water	Groundwater	17/04/2018	15.3	28.3	43.6	1.2
ET1801059	38 SQN & Domestic area	0874_MW063_S_180417_F	Water	Groundwater	17/04/2018	0.42	0.005	0.425	0.43
ET1801086	38 SQN & Domestic area	0874_MW224_S_180418	Water	Groundwater	18/04/2018	0.83	1.2	2.03	0.025
ET1801059	38 SQN & Domestic area	0874_MW232_S_180417	Water	Groundwater	17/04/2018	4.3	9.46	13.76	0.29
ET1801059	38 SQN & Domestic area	0874_MW232_S_180417_F	Water	Groundwater	17/04/2018	0.01	0.005	0.015	0.08
ET1801086	5AVN	0874_MW009_S_180418	Water	Groundwater	18/04/2018	5.43	10	15.43	0.52
ET1801095	5AVN	0874_MW038_S_180419	Water	Groundwater	19/04/2018	520	534	1054	60.5
ET1801095	5AVN	0874_MW043_S_180419	Water	Groundwater	19/04/2018	184	132	316	11
ET1801095	5AVN	0874_MW114_S_180419	Water	Groundwater	19/04/2018	25.6	45.9	71.5	1.28
ET1801086	5AVN	0874_MW125_D_180418	Water	Groundwater	18/04/2018	569	731	1300	10.6
ET1801086	5AVN	0874_MW125_D_180418_F	Water	Groundwater	18/04/2018	0.65	0.025	0.675	4.39
ET1801095	5AVN	0874_MW142_S_180419	Water	Groundwater	19/04/2018	0.296	0.181	0.477	0.0237
ET1801086	5AVN	0874_MW247_S_180419	Water	Groundwater	19/04/2018	21.8	107	128.8	1.38
ET1801086	5AVN	0874_MW247_S_180419_F	Water	Groundwater	19/04/2018	0.01	0.01	0.02	0.14
ET1801086	5AVN	0874_MW248_S_180419	Water	Groundwater	19/04/2018	727	1,510	2237	61
ET1801086	5AVN	0874_MW248_S_180419_F	Water	Groundwater	19/04/2018	3.64	0.06	3.7	22.2
ET1801086	5AVN	0874_MW249_S_180419	Water	Groundwater	19/04/2018	2.47	1.93	4.4	0.13
ET1801086	5AVN	0874_MW249_S_180419_F	Water	Groundwater	19/04/2018	0.01	0.005	0.015	0.05
ET1801011	Eastern Base boundary	0874_MW140_D_180412	Water	Groundwater	12/04/2018	0.135	0.0039	0.1389	0.0007
ET1801043	Fuel Farm 2 NQ0099	0874_MW005_S_180416	Water	Groundwater	16/04/2018	270	135	405	7.41
ET1801043	Fuel Farm 2 NQ0099	0874_MW005_S_180416_F	Water	Groundwater	16/04/2018	29.5	0.45	29.95	1.28
ET1801043	Fuel Farm 2 NQ0099	0874_MW046_S_180416	Water	Groundwater	16/04/2018	88.7	149	237.7	3.62
ET1801043	Fuel Farm 2 NQ0099	0874_MW081_S_180416	Water	Groundwater	16/04/2018	3,320	1,800	5120	146
ET1801043	Fuel Farm 2 NQ0099	0874_MW081_S_180416_F	Water	Groundwater	16/04/2018	243	0.28	243.28	69.3
ET1801043	Fuel Farm 2 NQ0099	0874_MW090_S_180416	Water	Groundwater	16/04/2018	1.61	2.42	4.03	0.06
ET1801024	Ingham Rd Sports Fields	0874_MW226_S_180413	Water	Groundwater	13/04/2018	0.071	0.0201	0.0911	0.0013
ET1801024	Ingham Rd Sports Fields	0874_MW227_S_180413	Water	Groundwater	13/04/2018	0.16	0.0239	0.1839	0.0016
ET1801024	Ingham Rd Sports Fields	0874_MW228_S_180413	Water	Groundwater	13/04/2018	0.0937	0.0217	0.1154	0.0014
ET1801086	Ingham Rd Sports Fields	0874_MW229_S_180418	Water	Groundwater	18/04/2018	0.0908	0.124	0.2148	0.0056
ET1801095	Mount St John	0874_MW234_S_180419	Water	Groundwater	19/04/2018	0.15	0.05	0.2	0.05
ET1801095	Mount St John	0874_MW235_S_180419	Water	Groundwater	19/04/2018	0.13	0.121	0.251	0.171

	Perfluorohexane sulfonic acid (PFHxS) µg/L	Perfluorooctane sulfonic acid (PFOS) µg/L	Sum of PFHxS and PFOS µg/L	Perfluorooctanoic acid (PFOA) µg/L
EQL	0.0005	0.0003	0.0003	0.0005
ANZECC PFAS FW 95%		0.13		220
DoH and FSANZ drinking water quality value			0.07	0.56
DoH and FSANZ recreational water quality value			0.7	5.6

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date				
ET1801095	Mt St John	0874_MW230_S_180419	Water	Groundwater	19/04/2018	0.8	0.54	1.34	0.08
ET1801095	Mt St John	0874_MW255_S_180419	Water	Groundwater	19/04/2018	0.06	0.14	0.2	0.01
ET1801059	NQ0052	0874_MW026_S_180417	Water	Groundwater	17/04/2018	3.06	12.5	15.56	0.33
ET1801059	NQ0052	0874_MW026_S_180417_F	Water	Groundwater	17/04/2018	0.01	0.005	0.015	0.2
ET1801086	NQ0052	0874_MW051_S_180418	Water	Groundwater	18/04/2018	0.6	0.79	1.39	0.02
ET1801059	NQ0054	0874_MW013_S_180417	Water	Groundwater	17/04/2018	71.7	268	339.7	13.6
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW033_S_180417	Water	Groundwater	17/04/2018	7.99	30.7	38.69	1.71
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW034_S_180417	Water	Groundwater	17/04/2018	14.5	2.73	17.23	0.5
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW116_S_180417	Water	Groundwater	17/04/2018	34.6	48.6	83.2	5.55
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW116_S_180417_F	Water	Groundwater	17/04/2018	0.2	0.01	0.21	1.07
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW118_S_180417	Water	Groundwater	17/04/2018	0.31	1.29	1.6	0.08
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW120_S_180417	Water	Groundwater	17/04/2018	29.4	23.3	52.7	1.91
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW120_S_180417_F	Water	Groundwater	17/04/2018	2.74	0.025	2.765	0.59
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW126_S_180417	Water	Groundwater	17/04/2018	81.8	342	423.8	16.1
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW126_S_180417_F	Water	Groundwater	17/04/2018	0.01	0.005	0.015	4.84
ET1801059	NQ0054 & fuel farm 1 (NQ0052)	0874_MW129_S_180417	Water	Groundwater	17/04/2018	6.22	45.8	52.02	2.05
ET1801043	NQ0055	0874_MW015_S_180416	Water	Groundwater	16/04/2018	2,580	960	3540	86.3
ET1801043	NQ0055	0874_MW016_S_180416	Water	Groundwater	16/04/2018	909	492	1401	39.5
ET1801043	NQ0055	0874_MW016_S_180416_F	Water	Groundwater	16/04/2018	0.05	0.05	0.1	4.07
ET1801043	NQ0055	0874_MW021_S_180416	Water	Groundwater	16/04/2018	158	355	513	7.61
ET1801043	NQ0055	0874_MW054_S_180416	Water	Groundwater	16/04/2018	32	93.7	125.7	1.44
ET1801043	NQ0055	0874_MW055_S_180416	Water	Groundwater	16/04/2018	11.8	39.9	51.7	1.07
ET1801043	NQ0055	0874_MW055_S_180416_F	Water	Groundwater	16/04/2018	0.01	0.005	0.015	0.74
ET1801043	NQ0055	0874_MW138_S_180416	Water	Groundwater	16/04/2018	62.1	93.7	155.8	2.57
ET1801043	NQ0055	0874_MW139_S_180416	Water	Groundwater	16/04/2018	557	1,660	2217	53
ET1801043	NQ0055 & former fire training area NQ0107	0874_MW109_S_180416	Water	Groundwater	16/04/2018	304	666	970	39.8
ET1801043	NQ0055 & former fire training area NQ0107	0874_MW110_S_180416	Water	Groundwater	16/04/2018	582	1,420	2002	36.9
ET1801011	NQ0105	0874_MW241_S_180412	Water	Groundwater	12/04/2018	2.23	0.0739	2.3039	0.0046
ET1801086	NQ0105	0874_MW242_S_180419	Water	Groundwater	19/04/2018	0.21	0.22	0.43	0.01
ET1801086	NQ0105	0874_MW242_S_180419_F	Water	Groundwater	19/04/2018	0.01	0.01	0.02	0.01
ET1801059	NQ0106	0874_MW243_S_180417	Water	Groundwater	17/04/2018	1,010	366	1376	49.2
ET1801059	NQ0106	0874_MW243_S_180417_F	Water	Groundwater	17/04/2018	0.05	0.05	0.1	3.89
ET1801059	NQ0106 & OLAs	0874_MW136_S_180417	Water	Groundwater	17/04/2018	0.58	1.15	1.73	0.03
ET1801043	NQ0107	0874_MW250_S_180416	Water	Groundwater	16/04/2018	11.8	14.2	26	0.44
ET1801043	NQ0107	0874_MW250_S_180416_F	Water	Groundwater	16/04/2018	0.05	0.05	0.1	0.05
ET1801043	NQ0107	0874_MW251_S_180416	Water	Groundwater	16/04/2018	10.3	7.03	17.33	0.35
ET1801043	NQ0107	0874_MW251_S_180416_F	Water	Groundwater	16/04/2018	0.05	0.05	0.1	0.21

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0003	0.0003	0.0005
ANZECC PFAS FW 95%		0.13		220
DoH and FSANZ drinking water quality value			0.07	0.56
DoH and FSANZ recreational water quality value			0.7	5.6

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date				
ET1801086	NW Base boundary (OLAs)	0874_MW002_S_180418	Water	Groundwater	18/04/2018	4.01	2.66	6.67	0.16
ET1801059	OLAs	0874_MW122_S_180417	Water	Groundwater	17/04/2018	0.1	0.025	0.125	0.025
ET1801059	OLAs	0874_MW265_S_180417	Water	Groundwater	17/04/2018	2.22	0.24	2.46	0.05
ET1801059	OLAs (north-east)	0874_MW004_S_180417	Water	Groundwater	17/04/2018	0.06	0.08	0.14	0.005
ET1801086	Pad Brahman	0874_MW121_S_180419	Water	Groundwater	19/04/2018	2.39	0.32	2.71	0.005
ET1801086	Pad Brahman	0874_MW121_S_180419_F	Water	Groundwater	19/04/2018	0.05	0.05	0.1	0.005
ET1801059	Pad Brahman	0874_MW135_S_180417	Water	Groundwater	17/04/2018	7.89	0.87	8.76	0.05
ET1801086	Pad Brahman	0874_MW244_S_180419	Water	Groundwater	19/04/2018	25.9	16.2	42.1	0.84
ET1801086	Pad Brahman	0874_MW244_S_180419_F	Water	Groundwater	19/04/2018	0.05	0.05	0.1	0.3
ET1801059	Runway 13/31	0874_MW245_S_180417	Water	Groundwater	17/04/2018	259	60.2	319.2	21
ET1801059	Runway 13/31	0874_MW245_S_180417_F	Water	Groundwater	17/04/2018	8.61	0.005	8.615	2.87
ET1801059	Runway 13/31	0874_MW246_S_180417	Water	Groundwater	17/04/2018	53.8	198	251.8	3.5
ET1801059	Runway 13/31	0874_MW246_S_180417_F	Water	Groundwater	17/04/2018	0.05	0.05	0.1	1.28
ET1801043	W of Emergency Response Areas	0874_MW112_S_180416	Water	Groundwater	16/04/2018	36.2	2.14	38.34	0.58
ET1801059	W of Runway 13/31	0874_MW056_S_180417	Water	Groundwater	17/04/2018	2.77	0.69	3.46	0.005
ET1801043	W of Runway 13/31	0874_MW057_S_180416	Water	Groundwater	16/04/2018	17.2	7.09	24.29	0.37
ET1801095	W of Runway 13/31	0874_MW102_S_180419	Water	Groundwater	19/04/2018	2.96	0.05	3.01	0.005
ET1801095	W of Runway 13/31	0874_MW104_S_180419	Water	Groundwater	19/04/2018	0.15	0.05	0.2	0.005

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

Statistics

Number of Results		92	92	92	92
Number of Detects		113	115	117	122
Minimum Concentration		0.01	0.004	0.02	0.001
Maximum Concentration		3,320	1,800	5,120	146
Average Concentration		141	135	276	9
Geometric Average		2.75	1.46	5.44	0.43
Median Concentration		2.87	1.18	3.87	0.51
Standard Deviation		467	357	773	22
90th Percentile		301	365	924	35
95th Percentile		647	834	1,671	56



	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0003	0.0003	0.0005
ANZECC PFAS FW 95%		0.13		220
DoH and FSANZ drinking water quality value			0.07	0.56
DoH and FSANZ recreational water quality value			0.7	5.6

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
ET1801006	Belgian Gardens	0874_MW214_S_180411	Water	Groundwater	11/04/2018	0.0287	0.0734	0.1021	0.0058
ET1801006	Belgian Gardens	0874_MW215_S_180411	Water	Groundwater	11/04/2018	0.0314	0.0163	0.0477	0.0014
ET1801006	Belgian Gardens	0874_MW216_S_180411	Water	Groundwater	11/04/2018	0.38	0.19	0.57	0.01
ET1801006	Belgian Gardens	0874_MW256_S_180411	Water	Groundwater	11/04/2018	0.0144	0.0806	0.095	0.0118
ET1800988	Belgian Gardens	0874_MW269_S_180410	Water	Groundwater	10/04/2018	0.0061	0.0346	0.0407	0.0027
ET1801006	Belgian Gardens	0874_MW261_S_180411	Water	Groundwater	11/04/2018	0.0248	0.0143	0.0391	0.0025
ET1801095	Bohle	0874_MW237_S_180419	Water	Groundwater	19/04/2018	0.0172	0.0629	0.0801	0.0019
ET1801095	Bohle	0874_MW238_S_180419	Water	Groundwater	19/04/2018	0.027	0.062	0.089	0.0386
ET1801086	Bohle	0874_MW239_S_180419	Water	Groundwater	19/04/2018	0.137	0.285	0.422	0.0183
ET1801086	Bohle	0874_MW239_S_180419_F	Water	Groundwater	19/04/2018	0.00025	0.00015	0.0004	0.0035
ET1801095	Bohle	0874_MW240_S_180419	Water	Groundwater	19/04/2018	0.091	0.267	0.358	0.0203
ET1801086	Bushland Beach	0874_MW231_S_180418	Water	Groundwater	18/04/2018	0.0069	0.0244	0.0313	0.00025
ET1801006	Cleveland Bay/Rowes Bay	0874_MW209_S_180411	Water	Groundwater	11/04/2018	0.22	0.22	0.44	0.02
ET1801006	Cleveland Bay/Rowes Bay	0874_MW210_S_180411	Water	Groundwater	11/04/2018	0.02	0.05	0.07	0.005
ET1801095	Commercial Property - Garbutt	0874_MW405_S_180419	Water	Groundwater	19/04/2018	1.98	0.05	2.03	0.05
ET1801011	Commercial Property - Garbutt	0874_MW414_S_180412	Water	Groundwater	12/04/2018	0.39	1.21	1.6	0.38
ET1801011	Commercial Property - Garbutt	0874_MW415_S_180412	Water	Groundwater	12/04/2018	2.93	1.41	4.34	0.16
ET1801011	Commercial Property - Garbutt	0874_MW422_S_180412	Water	Groundwater	12/04/2018	0.05	0.005	0.055	0.005
ET1801011	Commercial Property - Garbutt	0874_MW437_S_180412	Water	Groundwater	12/04/2018	0.25	0.06	0.31	0.005
ET1801011	Commercial Property - Garbutt	0874_MW439_S_180412	Water	Groundwater	12/04/2018	0.58	0.08	0.66	0.025
ET1801011	Commercial Property - Garbutt	0874_MW455_S_180412	Water	Groundwater	12/04/2018	0.14	0.51	0.65	0.005
ET1801011	Commercial Property - Garbutt	0874_MW456_S_180412	Water	Groundwater	12/04/2018	0.4	0.59	0.99	0.01
ET1801011	Commercial Property - Garbutt	0874_MW457_S_180412	Water	Groundwater	12/04/2018	2.12	6.13	8.25	0.39
ET1801011	Commercial Property - Garbutt	0874_MW459_S_180412	Water	Groundwater	12/04/2018	2.13	4.53	6.66	0.13
ET1801011	Commercial Property - Garbutt	0874_MW460_S_180412	Water	Groundwater	12/04/2018	3.91	0.145	4.055	0.165
ET1801011	Commercial Property - Garbutt	0874_MW463_S_180412	Water	Groundwater	12/04/2018	0.72	0.103	0.823	0.0224
ET1801011	Commercial Property - Garbutt	0874_MW465_S_180412	Water	Groundwater	12/04/2018	0.01	0.02	0.03	0.005
ET1801011	Commercial Property - Garbutt	0874_MW466_S_180412	Water	Groundwater	12/04/2018	0.01	0.005	0.015	0.005
ET1801086	Garbutt	0874_MW223_S_180418	Water	Groundwater	18/04/2018	4.61	9.89	14.5	0.37
ET1800988	Garbutt	0874_MW236_S_180410	Water	Groundwater	10/04/2018	0.0051	0.0035	0.0086	0.0051
ET1800988	Garbutt Community	0874_MW257_S_180410	Water	Groundwater	10/04/2018	0.0292	0.0622	0.0914	0.0034
ET1800988	Garbutt Community	0874_MW258_S_180410	Water	Groundwater	10/04/2018	0.26	0.23	0.49	0.02
ET1800988	Garbutt Community	0874_MW259_S_180410	Water	Groundwater	10/04/2018	0.13	0.12	0.25	0.005
ET1800988	Garbutt Community	0874_MW260_S_180410	Water	Groundwater	10/04/2018	0.14	0.1	0.24	0.005
ET1800988	Garbutt Community	0874_MW266_S_180410	Water	Groundwater	10/04/2018	0.003	0.0044	0.0074	0.0024
ET1800988	Garbutt Community	0874_MW267_S_180410	Water	Groundwater	10/04/2018	0.58	0.32	0.9	0.02
ET1800988	Garbutt Community	0874_MW268_S_180410	Water	Groundwater	10/04/2018	0.0011	0.00015	0.00125	0.0023
ET1800988	Garbutt Community	0874_MW263_S_180410	Water	Groundwater	10/04/2018	0.68	0.41	1.09	0.03
ET1800988	Garbutt Community	0874_MW270_S_180410	Water	Groundwater	10/04/2018	0.0019	0.0013	0.0032	0.0056
ET1801006	Garbutt Community	0874_MW217_S_180411	Water	Groundwater	11/04/2018	0.0012	0.0009	0.0021	0.00025
ET1800988	Garbutt Community	0874_MW218_S_180410	Water	Groundwater	10/04/2018	0.13	0.025	0.155	0.025
ET1800988	Garbutt Community	0874_MW219_S_180410	Water	Groundwater	10/04/2018	0.0098	0.0042	0.014	0.00025



	Perfluorohexane sulfonic acid (PFHxS) µg/L	Perfluorooctane sulfonic acid (PFOS) µg/L	Sum of PFHxS and PFOS µg/L	Perfluorooctanoic acid (PFOA) µg/L
EQL	0.0005	0.0003	0.0003	0.0005
ANZECC PFAS FW 95%		0.13		220
DoH and FSANZ drinking water quality value			0.07	0.56
DoH and FSANZ recreational water quality value			0.7	5.6

Lab Report Number	Location	Field ID	Matrix Type	Matrix Description	Date	Perfluorohexane sulfonic acid (PFHxS) µg/L	Perfluorooctane sulfonic acid (PFOS) µg/L	Sum of PFHxS and PFOS µg/L	Perfluorooctanoic acid (PFOA) µg/L
ET1800988	Garbutt Community	0874_MW220_S_180410	Water	Groundwater	10/04/2018	0.0354	0.0422	0.0776	0.0049
ET1800988	Garbutt Community	0874_MW221_S_180410	Water	Groundwater	10/04/2018	5.12	1.72	6.84	0.08
ET1801086	Garbutt Community	0874_MW222_S_180418	Water	Groundwater	18/04/2018	5.25	2.26	7.51	0.16
ET1800988	Garbutt Community	0874_MW225_S_180410	Water	Groundwater	10/04/2018	0.2	0.23	0.43	0.005
ET1801024	Mount St John	0874_MW254_S_180413	Water	Groundwater	13/04/2018	0.0055	0.0007	0.0062	0.0005
ET1801024	Mount St John	0874_MW262_S_180413	Water	Groundwater	13/04/2018	0.0062	0.00015	0.00635	0.0005
ET1801024	Pallarenda	0874_MW233_S_180413	Water	Groundwater	13/04/2018	0.01	0.01	0.02	0.005
ET1801024	Pallarenda	0874_MW252_S_180413	Water	Groundwater	13/04/2018	0.0051	0.0063	0.0114	0.00025
ET1801024	Pallarenda	0874_MW253_S_180413	Water	Groundwater	13/04/2018	0.0036	0.0019	0.0055	0.00025
ET1801006	Rowes Bay	0874_MW211_S_180411	Water	Groundwater	11/04/2018	0.04	0.11	0.15	0.005
ET1801006	Rowes Bay	0874_MW212_S_180411	Water	Groundwater	11/04/2018	0.01	0.005	0.015	0.005
ET1801006	Rowes Bay	0874_MW213_S_180411	Water	Groundwater	11/04/2018	0.0085	0.0022	0.0107	0.00025
ET1801024	Rowes Bay	0874_MW264_S_180413	Water	Groundwater	13/04/2018	0.904	0.0438	0.9478	0.017
ET1801100	Rowes Bay Landfill	0874_MWRB1_180420	Water	Groundwater	20/04/2018	0.01	0.1	0.11	0.005
ET1801024	Rowes Bay Landfill	0874_MWRB2_S_180413	Water	Groundwater	13/04/2018	0.0267	0.0309	0.0576	0.0006
ET1801024	Rowes Bay Landfill	0874_MWRB3_S_180413	Water	Groundwater	13/04/2018	0.0067	0.0244	0.0311	0.0021
ET1801024	Rowes Bay Landfill	0874_MWRB5_S_180413	Water	Groundwater	13/04/2018	0.07	0.07	0.14	0.005
ET1801024	Rowes Bay Landfill	0874_MWRB5_S_180413_F	Water	Groundwater	13/04/2018	0.04	0.005	0.045	0.005
ET1801100	Town Common	0874_MW201_180420	Water	Groundwater	20/04/2018	0.0062	0.0223	0.0285	0.00025
ET1801100	Town Common	0874_MW202_180420	Water	Groundwater	20/04/2018	0.05	0.05	0.1	0.05
ET1801100	Town Common	0874_MW203_180420	Water	Groundwater	20/04/2018	0.002	0.0021	0.0041	0.00025
ET1801024	Town Common	0874_MW204_S_180413	Water	Groundwater	13/04/2018	0.01	0.005	0.015	0.005
ET1801024	Town Common	0874_MW205_S_180413	Water	Groundwater	13/04/2018	0.025	0.025	0.05	0.025
ET1801043	Town Common	0874_MW206_S_180416	Water	Groundwater	16/04/2018	4.54	0.005	4.545	0.03
ET1801024	Town Common	0874_MW207_S_180413	Water	Groundwater	13/04/2018	0.025	0.025	0.05	0.025
ET1801006	Town Common	0874_MW208_S_180411	Water	Groundwater	11/04/2018	0.09	0.06	0.15	0.005

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

Statistics

Number of Results	68	68	68	68
Number of Detects	113	115	117	122
Minimum Concentration	0.0003	0.0002	0.0004	0.0003
Maximum Concentration	5	10	15	0.39
Average Concentration	0.6	0.5	1.1	0.04
Geometric Average	0.05	0.04	0.11	0.01
Median Concentration	0.03	0.05	0.09	0.01
Standard Deviation	1	2	3	0.08
90th Percentile	2.1	0.8	4.1	0.1
95th Percentile	4	2	7	0.16

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

	Perfluorohexane sulfonic acid (PFHxS) mg/kg	Perfluorooctane sulfonic acid (PFOS) mg/kg	Sum of PFHxS and PFOS mg/kg	Perfluorooctanoic acid (PFOA) mg/kg
EQL	0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial			20	50
NEMP – Human health – Public open space			1	10
NEMP – Human health – Residential with minimal opportunities for soil access			2	20
NEMP – Human health – Residential with garden/accessible soil			0.009	0.1

Lab Report Number	on-Base Area	Field ID	Matrix Type	Date					
ES1714411	5 AVN	0874_SD019_170608	Sediment	8/06/2017	0.017	0.223	0.24	0.0024	
ES1714280	5 AVN	0874_SD123_170607	Sediment	7/06/2017	0.183	2.75	2.933	0.0245	
ES1714411	5 AVN	0874_SD124_170610	Sediment	10/06/2017	0.0138	0.0404	0.0542	0.0013	
ES1713464	Domestic Area	0874_SD010S_170530	Sediment	30/05/2017	0.0144	0.0358	0.0502	0.0013	
ES1714865	Domestic Area	0874_SD121_170612	Sediment	12/06/2017	0.0042	0.103	0.1072	0.0008	
ES1717838	Ingham Road Sports Field	0874_SD020_170717	Sediment	17/07/2017	0.0001	0.0021	0.0022	0.0001	
ES1717838	Ingham Road Sports Field	0874_SD021_170718	Sediment	18/07/2017	0.0001	0.0001	0.0002	0.0001	
ES1714865	NQ0105	0874_SD101_170613	Sediment	13/06/2017	0.0006	0.0046	0.0052	0.0001	
ES1714865	NQ0105	0874_SD102_170613	Sediment	13/06/2017	0.0378	0.0333	0.0711	0.0003	
ES1714865	NQ0105	0874_SD103_170612	Sediment	12/06/2017	0.0082	0.0611	0.0693	0.0004	
ES1714865	NQ0105	0874_SD104_170612	Sediment	12/06/2017	0.0077	0.0379	0.0456	0.0004	
ES1714280	NQ0106 & OLAs	0874_SD302_170606	Sediment	6/06/2017	0.737	5.12	5.857	0.0826	
ES1714411	NW Base Boundary	0874_SD012_170609	Sediment	9/06/2017	0.0047	0.0734	0.0781	0.0004	
ES1714411	NW Base Boundary	0874_SD013_170609	Sediment	9/06/2017	0.0092	0.0569	0.0661	0.0007	
ES1714280	OLAs	0874_SD126_170606	Sediment	6/06/2017	0.0101	0.0699	0.08	0.0009	
ES1714411	W Base Boundary	0874_SD015_170610	Sediment	10/06/2017	0.0008	0.0095	0.0103	0.0001	

Grey shading indicates where a result reported as <LOR, then half of the LOR was adopted as the result in calculating a mean and 90th percentile concentrations.

Statistics

Number of Results	16	16	16	16
Minimum Concentration	0.0001	0.0001	0.0002	0.0001
Maximum Concentration	0.7	5.1	5.9	0.1
Average Concentration	0.1	1	0.6	0.007
Geometric Average	0.01	0.04	0.05	0.001
Median Concentration	0.01	0.05	0.07	0.001
Standard Deviation	0.2	1	2	0.02
90th Percentile	0.1	1	1.6	0.01
95th Percentile	0.3	3	4	0.04

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial			20	50
NEMP – Human health – Public open space			1	10
NEMP – Human health – Residential with minimal opportunities for soil access			2	20
NEMP – Human health – Residential with garden/accessible soil			0.009	0.1

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date				
ES1717810	Background (outside IIA)	0874 SD211 170714	Sediment	14/07/2017	0.0001	0.0001	0.0002	0.0001
ES1717810	Background (outside IIA)	0874 SD212 170713	Sediment	13/07/2017	0.0003	0.0031	0.0034	0.0001
ES1717810	Background (outside IIA)	0874 SD213 170712	Sediment	12/07/2017	0.0001	0.0007	0.0008	0.0001
ES1717838	Bohle River	0874 SD129 170717	Sediment	17/07/2017	0.0001	0.0007	0.0008	0.0001
ES1717810	Bohle River	0874 SD201 170717	Sediment	17/07/2017	0.0001	0.0001	0.0002	0.0001
ES1717810	Bohle River	0874 SD202 170715	Sediment	15/07/2017	0.0001	0.0031	0.0032	0.0001
ES1717810	Bohle River	0874 SD203 170714	Sediment	14/07/2017	0.0001	0.0006	0.0007	0.0001
ES1717810	Bohle River	0874 SD204 170714	Sediment	14/07/2017	0.0001	0.0013	0.0014	0.0001
ES1717838	Cleveland Bay	0874 SD107 170717	Sediment	17/07/2017	0.0014	0.0154	0.0168	0.0001
ES1717810	Cleveland Bay	0874 SD210 170717	Sediment	17/07/2017	0.0003	0.002	0.0023	0.0004
ET1701071	Downstream of Fuel Farm 1 (NQ0052) & NQ0054	0874 SD119 170816	Sediment	16/08/2017	0.0234	0.187	0.2104	0.0008
ES1717810	East of NQ0105	0874 SD209 170717	Sediment	17/07/2017	0.0012	0.0194	0.0206	0.0001
ET1701071	Ecological Area (within the Common)	0874 SD106 170816	Sediment	16/08/2017	0.0022	0.0052	0.0074	0.0001
ET1701082	Ecological Area (within the Common)	0874 SD110 170818	Sediment	18/08/2017	0.0133	0.0628	0.0761	0.0009
ET1701082	Ecological Area (within the Common)	0874 SD111 170818	Sediment	18/08/2017	0.0049	0.0664	0.0713	0.0003
ES1717838	Garbutt Community	0874 SD014 170717	Sediment	17/07/2017	0.0014	0.0052	0.0066	0.0003
ES1717838	Garbutt Community	0874 SD017 170717	Sediment	17/07/2017	0.0001	0.0001	0.0002	0.0001
ES1717838	Garbutt Community	0874 SD120 170717	Sediment	17/07/2017	0.0001	0.0001	0.0002	0.0001
ES1717838	Garbutt Community	0874 SD127 170717	Sediment	17/07/2017	0.0001	0.0002	0.0003	0.0001
ES1717838	Garbutt Community	0874 SD128 170717	Sediment	17/07/2017	0.0002	0.0005	0.0007	0.0001
ES1714865	Commercial Property - Garbutt	0874 SD113 170612	Sediment	12/06/2017	0.0047	0.0005	0.0052	0.0001
ES1717838	Commercial Property - Garbutt	0874 SD117 170718	Sediment	18/07/2017	0.0078	0.0409	0.0487	0.0012
ES1717810	Mundy Ck Catchment (off-Base)	0874 SD208 170714	Sediment	14/07/2017	0.0001	0.0011	0.0012	0.0001
ES1717838	Garbutt Community	0874 SD115 170717	Sediment	17/07/2017	0.0001	0.0014	0.0015	0.0001
ES1717838	Garbutt Community	0874 SD118 170717	Sediment	17/07/2017	0.0052	0.0171	0.0223	0.0008
ES1717838	Rowes Bay	0874 SD108 170717	Sediment	17/07/2017	0.0001	0.0011	0.0012	0.0001
ES1717838	Rowes Bay	0874 SD109 170718	Sediment	18/07/2017	0.0001	0.0001	0.0002	0.0001
ES1717838	Rowes Bay	0874 SD114 170717	Sediment	17/07/2017	0.001	0.0096	0.0106	0.0001
ES1717838	Rowes Bay	0874 SD116 170717	Sediment	17/07/2017	0.0001	0.0009	0.001	0.0001
ES1717838	The Common	0874 SD112 170718	Sediment	18/07/2017	0.0001	0.0011	0.0012	0.0001
ES1717810	The Common	0874 SD205 170715	Sediment	15/07/2017	0.0001	0.0001	0.0002	0.0001
ES1717810	The common	0874 SD206 170713	Sediment	13/07/2017	0.0001	0.0006	0.0007	0.0001
ES1717810	The Common	0874 SD207 170715	Sediment	15/07/2017	0.001	0.0073	0.0083	0.001

Grey shading indicates where a result reported as <LOR, then half of the LOR was adopted as the result in calculating a mean and 90th percentile concentrations.

Statistics				
Number of Results	33	33	33	33
Minimum Concentration	0.0001	0.0001	0.0002	0.0001
Maximum Concentration	0.02	0.2	0.2	0.001
Average Concentration	0.002	0.014	0.016	0.00025
Geometric Average	0.0004	0.0018	0.0024	0.0002
Median Concentration	0.0001	0.0011	0.0014	0.0001
Standard Deviation	0.005	0.035	0.040	0.000
90th Percentile	0.01	0.04	0.04	0.0008
95th Percentile	0.01	0.06	0.07	0.001



	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial			20	50
NEMP – Human health – Public open space			1	10
NEMP – Human health – Residential with garden/accessible soil			0.009	0.1
NEMP – Human health – Residential with minimal opportunities for soil access			2	20

Lab Report Number	Location	Field ID	Matrix Type	Date	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
EB1809440	38 Squadron SE corner of Base	0874_SD025_180412	Sediment	12/04/2018	0.0008	0.0052	0.006	0.0001
EB1810046	5AVN	0874_SD019_180419	Sediment	19/04/2018	0.0342	0.0906	0.1248	0.0025
EB1809799	5AVN	0874_SD123_180418	Sediment	18/04/2018	0.0235	0.127	0.151	0.0018
EB1810072	5AVN	0874_SD124_180420	Sediment	20/04/2018	0.018	0.0706	0.0886	0.0011
EB1809798	Domestic area	0874_SD010S_180417	Sediment	17/04/2018	0.0022	0.0122	0.0144	0.0006
EB1809798	Fuel Farm 2 NQ0099	0874_SD024_180417	Sediment	17/04/2018	13.4	80.2	93.6	0.625
EB1809230	Ingham Rd Sports Fields	0874_SD020_180411	Sediment	11/04/2018	0.0001	0.0006	0.0007	0.0001
EB1809230	Ingham Rd Sports Fields	0874_SD021_180411	Sediment	11/04/2018	0.0004	0.0035	0.0039	0.0001
EB1809799	Mount St John	0874_SD112_180419	Sediment	19/04/2018	0.0004	0.0037	0.0041	0.0001
EB1810072	NQ0055 & NQ0107	0874_SD039_180420	Sediment	20/04/2018	2	10.4	12.4	0.129
EB1809230	NQ0105	0874_SD101_180411	Sediment	11/04/2018	0.001	0.0106	0.0116	0.0001
EB1809230	NQ0105	0874_SD102_180411	Sediment	11/04/2018	0.0017	0.0192	0.0209	0.0001
EB1809798	NQ0105	0874_SD102_180417	Sediment	17/04/2018	0.0013	0.0113	0.0126	0.0001
EB1809440	NQ0105	0874_SD103_180412	Sediment	12/04/2018	0.0128	0.0667	0.0795	0.0004
EB1809440	NQ0105	0874_SD104_180412	Sediment	12/04/2018	0.0036	0.0255	0.0291	0.0001
EB1809440	NQ0105	0874_SD105_180412	Sediment	12/04/2018	0.0067	0.0987	0.1054	0.0009
EB1809798	NQ0106 & OLAs	0874_SD126_180417	Sediment	17/04/2018	0.0341	0.35	0.3841	0.0028
EB1809798	NQ0106 & OLAs	0874_SD301_180417	Sediment	17/04/2018	0.533	2.11	2.643	0.0721
EB1809798	NQ0106 & OLAs	0874_SD302_180417	Sediment	17/04/2018	0.243	0.24	0.483	0.0217
EB1809798	NW Base boundary	0874_SD012_180417	Sediment	17/04/2018	0.0024	0.0123	0.0147	0.0001
EB1809798	NW Base boundary	0874_SD013_180417	Sediment	17/04/2018	0.006	0.103	0.109	0.0006
EB1809798	Pad Brahman	0874_SD016_180417	Sediment	17/04/2018	0.0023	0.0234	0.0257	0.0001
EB1810046	Runoff from NQ0052 & NQ0054	0874_SD001A_180419	Sediment	19/04/2018	0.0145	0.0662	0.0807	0.0033
EB1809799	The Common discharge	0874_SD131_180419	Sediment	19/04/2018	0.0007	0.0054	0.0061	0.0001
EB1809799	W of Runway 13/31 & Emergency Resp Areas	0874_SD015_180418	Sediment	18/04/2018	0.0003	0.0014	0.0017	0.0001
EB1809798	W of Runway 13/31 & Emergency Resp Areas	0874_SD125_180417	Sediment	17/04/2018	0.124	0.818	0.942	0.0056

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

Statistics

Number of Results					26	26	26	26
Number of Detects					113	115	117	122
Minimum Concentration					0.0001	0.0006	0.0007	0.0001
Maximum Concentration					13	80	94	1
Average Concentration					0.6	3.6	4.3	0.03
Geometric Average					0.01	0.05	0.06	0.00
Median Concentration					0.005	0.05	0.05	0.001
Standard Deviation					3	16	18	0.1
90th Percentile					0.4	1.5	1.8	0.05
95th Percentile					2	8	10	0.1



	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial			20	50
NEMP – Human health – Public open space			1	10
NEMP – Human health – Residential with garden/accessible soil			0.009	0.1
NEMP – Human health – Residential with minimal opportunities for soil access			2	20

Lab Report Number	Location	Field ID	Matrix Type	Date				
EB1809799	Background (outside IA)	0874_SD211_180418	Sediment	18/04/2018	0.0001	0.0001	0.0002	0.0001
EB1809799	Background (outside IA)	0874_SD212_180418	Sediment	18/04/2018	0.0001	0.0001	0.0002	0.0001
EB1809799	Background (outside IA)	0874_SD213_180418	Sediment	18/04/2018	0.0001	0.0022	0.0023	0.0001
EB1810072	Bohle River	0874_SD129_180420	Sediment	20/04/2018	0.0001	0.0003	0.0004	0.0001
EB1810072	Bohle River	0874_SD201_180420	Sediment	20/04/2018	0.0001	0.0001	0.0002	0.0001
EB1809799	Bohle River	0874_SD202_180418	Sediment	18/04/2018	0.0001	0.0012	0.0013	0.0001
EB1809799	Bohle River	0874_SD203_180418	Sediment	18/04/2018	0.0001	0.0004	0.0005	0.0001
EB1809799	Bohle River	0874_SD204_180418	Sediment	18/04/2018	0.0001	0.0005	0.0006	0.0001
EB1809052	Cleveland Bay	0874_SD210_180410	Sediment	10/04/2018	0.0001	0.0015	0.0016	0.0001
EB1810046	Downstream of Fuel Farm 1 (NQ0052) & NQ0054	0874_SD121_180419	Sediment	19/04/2018	0.0001	0.0009	0.001	0.0001
EB1809230	Ecological Area	0874_SD110_180411	Sediment	11/04/2018	0.0094	0.096	0.1054	0.0009
EB1809230	Ecological Area	0874_SD111_180411	Sediment	11/04/2018	0.004	0.0172	0.0212	0.0001
EB1809799	Garbutt Community	0874_SD014_180419	Sediment	19/04/2018	0.0001	0.0002	0.0003	0.0001
EB1810072	Garbutt Community	0874_SD120_180420	Sediment	20/04/2018	0.0001	0.0001	0.0002	0.0001
EB1810072	Garbutt Community	0874_SD127_180420	Sediment	20/04/2018	0.0001	0.001	0.0011	0.0001
EB1810072	Garbutt Community	0874_SD128_180420	Sediment	20/04/2018	0.0001	0.0001	0.0002	0.0001
ES1805726	Garbutt Community	0874_SD130_180221	Sediment	21/02/2018	0.0007	0.0044	0.0051	0.0004
EB1809052	Garbutt Community	0874_SD130_180410	Sediment	10/04/2018	0.0001	0.0018	0.0019	0.0001
EB1810046	Commercial Property - Garbutt	0874_SD117_180419	Sediment	19/04/2018	0.0098	0.0672	0.077	0.0016
EB1809052	Commercial Property - Garbutt	0874_SD113_180410	Sediment	10/04/2018	0.0384	0.205	0.2434	0.0033
EB1810072	Rowes Bay	0874_SD107_180420	Sediment	20/04/2018	0.0016	0.0053	0.0069	0.0001
EB1809052	Rowes Bay	0874_SD108_180410	Sediment	10/04/2018	0.0003	0.0032	0.0035	0.0001
EB1809052	Rowes Bay	0874_SD109_180410	Sediment	10/04/2018	0.0004	0.0039	0.0043	0.0004
EB1809052	Rowes Bay	0874_SD114_180410	Sediment	10/04/2018	0.0003	0.0045	0.0048	0.0001
EB1809052	Rowes Bay	0874_SD115_180410	Sediment	10/04/2018	0.0072	0.0526	0.0598	0.0009
EB1809052	Rowes Bay	0874_SD116_180410	Sediment	10/04/2018	0.0007	0.0047	0.0054	0.0001
EB1809052	Rowes Bay	0874_SD118_180410	Sediment	10/04/2018	0.006	0.047	0.053	0.001
EB1809052	Rowes Bay	0874_SD208_180410	Sediment	10/04/2018	0.0005	0.0116	0.0121	0.0003
EB1809799	Town Common	0874_SD205_180418	Sediment	18/04/2018	0.0008	0.0058	0.0066	0.0001
EB1809799	Town Common	0874_SD206_180418	Sediment	18/04/2018	0.0003	0.0015	0.0018	0.0001
EB1809799	Town Common	0874_SD207_180418	Sediment	18/04/2018	0.0004	0.0042	0.0046	0.0001

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

Statistics

Number of Results					31	31	31	31
Number of Detects					113	115	117	122
Minimum Concentration					0.0001	0.0001	0.0002	0.0001
Maximum Concentration					0.038	0.205	0.243	0.003
Average Concentration					0.003	0.018	0.02	0.0004
Geometric Average					0.0004	0.002	0.003	0.0002
Median Concentration					0.0003	0.002	0.002	0.0001
Standard Deviation					0.007	0.042	0.049	0.001
90th Percentile					0.007	0.053	0.06	0.001
95th Percentile					0.010	0.082	0.091	0.001

	Perfluorohexane sulfonic acid (PFHxS) µg/L	Perfluorooctane sulfonic acid (PFOS) µg/L	Sum of PFHxS and PFOS µg/L	Perfluorooctanoic acid (PFOA) µg/L
EQL	0.02	0.01	0.01	0.01
ANZECC PFAS FW 95%		0.13		220
FSANZ 2017 PFAS drinking water			0.07	0.56
FSANZ 2017 PFAS recreational water			0.7	5.6

Lab Report Number	on-Base Area	Field ID	Matrix Type	Date				
ET1701038	5 AVN	0874_SW019_170814	Water	14/08/2017	26.8	31.8	58.6	3
ET1701038	5 AVN	0874_SW123_170814	Water	14/08/2017	11	14.3	25.3	0.64
ET1701038	Domestic Area	0874_SW010S_S_170814	Water	14/08/2017	0.14	0.15	0.29	0.04
ES1717807	E of NQ0105	0874_SW209_170717	Water	17/07/2017	0.16	0.52	0.68	0.025
ES1717838	Garbutt Community	0874_SW014_170717	Water	17/07/2017	0.05	0.07	0.12	0.005
ES1717838	Garbutt Community	0874_SW017_170717	Water	17/07/2017	0.11	0.13	0.24	0.02
ET1701055	NQ0055	0874_SW039_170815	Water	15/08/2017	5.38	24.3	29.68	0.57
ET1701082	NQ0105	0874_SW102_170818	Water	18/08/2017	0.54	0.38	0.92	0.005
ET1701071	NQ0105	0874_SW103_170816	Water	16/08/2017	0.89	0.11	1	0.005
ET1701038	NQ0106 & OLAs	0874_SW126_170814	Water	14/08/2017	2.19	4.65	6.84	0.19
ET1701079	NW Base Boundary	0874_SW013_170817	Water	17/08/2017	13.9	0.9	14.8	0.4
ET1701038	Pad Brahman	0874_SW016_170814	Water	14/08/2017	0.22	0.28	0.5	0.04
ET1701038	Runoff from NQ0052 & NQ0054	0874_SW001A_S_170814	Water	14/08/2017	19.1	48.1	67.2	1.78
ET1701038	S of Runway 13/31	0874_SW125_170814	Water	14/08/2017	3.14	2.07	5.21	0.18
ES1717838	SW of Ingham Road Sports Field	0874_SW021_170718	Water	18/07/2017	0.19	0.11	0.3	0.02

Purple shading indicates where a result is reported as <LOR, then half of the LOR was adopted as the result in calculating a mean and 90th percentile concentrations.

Statistics

Number of Results	15	15	15	15
Number of Detects	21	23	25	30
Minimum Concentration	0.05	0.07	0.12	0.01
Minimum Detect	2.02	4.02	6.02	11.02
Maximum Concentration	26.80	48.10	67.20	3.00
Maximum Detect	5.86	7.86	9.86	14.86
Average Concentration	5.6	8.5	14.1	0.5
Geometric Average	1.140	1.101	2.546	0.082
Median Concentration	0.890	0.520	1.000	0.040
Standard Deviation	8.34	14.78	22.01	0.84
90th Percentile	17.0	28.8	47.0	1.3
95th Percentile	21.4	36.7	61.2	2.1

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.01	0.01	0.01
ANZECC PFAS FW 95%		0.13		220
FSANZ 2017 PFAS drinking water			0.07	0.56
FSANZ 2017 PFAS recreational water			0.7	5.6

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
ES1717807	Background (outside IIA)	0874_SW211_170714	Water	14/07/2017	0.01	0.005	0.02	0.005
ES1717807	Background (outside IIA)	0874_SW212_170713	Water	13/07/2017	0.025	0.025	0.05	0.025
ES1717807	Background (outside IIA)	0874_SW213_170712	Water	12/07/2017	0.025	0.025	0.05	0.025
ES1717838	Bohle River	0874_SW129_170717	Water	17/07/2017	0.02	0.08	0.1	0.01
ES1717807	Bohle River	0874_SW201_170717	Water	17/07/2017	0.01	0.005	0.015	0.02
ES1717807	Bohle River	0874_SW202_170715	Water	15/07/2017	0.09	0.1	0.19	0.025
ES1717807	Bohle River	0874_SW203_170714	Water	14/07/2017	0.025	0.025	0.05	0.025
ES1717807	Bohle River	0874_SW204_170714	Water	14/07/2017	0.025	0.025	0.05	0.025
ES1717838	Cleveland Bay	0874_SW107_170717	Water	17/07/2017	0.15	0.14	0.29	0.025
ES1717807	Cleveland Bay	0874_SW210_170717	Water	17/07/2017	0.025	0.025	0.05	0.025
ES1717807	E of NQ0105	0874_SW209_170717	Water	17/07/2017	0.16	0.52	0.68	0.025
ET1701071	Ecological Area (within Town common)	0874_SW106_170816	Water	16/08/2017	16	11.7	27.7	1.18
ET1701082	Ecological Area (within Town common)	0874_SW110_170818	Water	18/08/2017	3.53	2.73	6.26	0.12
ET1701082	Ecological Area (within Town common)	0874_SW111_170818	Water	18/08/2017	3.74	2.32	6.06	0.14
ES1717838	Garbutt Community	0874_SW014_170717	Water	17/07/2017	0.05	0.07	0.12	0.005
ES1717838	Garbutt Community	0874_SW017_170717	Water	17/07/2017	0.11	0.13	0.24	0.02
ES1717838	Garbutt Community	0874_SW127_170717	Water	17/07/2017	0.06	0.05	0.11	0.005
ES1717838	Garbutt Community	0874_SW128_170717	Water	17/07/2017	0.07	0.03	0.1	0.005
ES1717838	Garbutt Community	0874_SW120_170717	Water	17/07/2017	0.12	0.14	0.26	0.04
ET1701071	Commercial Property - Garbutt	0874_SW113_170816	Water	16/08/2017	2.39	1.4	3.79	0.05
ES1717838	Commercial Property - Garbutt	0874_SW117_170718	Water	18/07/2017	10.8	14.1	24.9	1.07
ES1717807	Mundy Ck Catchment (off-Base)	0874_SW208_170717	Water	17/07/2017	0.01	0.02	0.03	0.005
ES1717838	NW of Townsville Airport	0874_SW115_170718	Water	18/07/2017	0.01	0.04	0.05	0.005
ES1717838	NW of Townsville Airport	0874_SW118_170718	Water	18/07/2017	4.85	5.21	10.06	0.7
ES1717838	Rowes Bay	0874_SW108_170717	Water	17/07/2017	0.025	0.025	0.05	0.025
ES1717838	Rowes Bay	0874_SW109_170718	Water	18/07/2017	0.025	0.025	0.05	0.025
ES1717838	Rowes Bay	0874_SW114_170718	Water	18/07/2017	0.02	0.05	0.07	0.005
ES1717838	Rowes Bay	0874_SW116_170718	Water	18/07/2017	0.01	0.03	0.04	0.005
ES1717838	The Common	0874_SW112_170718	Water	18/07/2017	0.04	0.06	0.1	0.04
ES1717807	The Common	0874_SW205_170715	Water	15/07/2017	0.16	0.24	0.4	0.02
ES1717807	The Common	0874_SW206_170715	Water	15/07/2017	0.22	0.17	0.39	0.025
ES1717807	The Common	0874_SW207_170715	Water	15/07/2017	0.18	0.18	0.36	0.025

Purple shading indicates where a result is reported as <LOR, then half of the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

Statistics

Number of Results	32	32	32	32
Minimum Concentration	0.01	0.01	0.02	0.01
Maximum Concentration	16.0	14.1	27.7	1.2
Average Concentration	1.34	1.24	2.58	0.12
Geometric Average	0.100	0.114	0.222	0.026
Median Concentration	0.055	0.065	0.105	0.025
Standard Deviation	3.46	3.26	6.64	0.29
90th Percentile	3.72	2.69	6.24	0.14
95th Percentile	7.53	8.13	16.74	0.87

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0003	0.0003	0.0005
ANZECC PFAS FW 95%		0.13		220
DoH and FSANZ drinking water quality value			0.07	0.56
DoH and FSANZ recreational water quality value			0.7	5.6

Lab Report Number	Location	Field ID	Matrix Type	Date				
ET1801093	5AVN	0874_SW019_180419	Water	19/04/2018	69	62	131	4.4
ET1800537	5AVN	0874_SW123_180301	Water	1/03/2018	0.869	1.57	2.439	0.0652
ET1800553	5AVN	0874_SW123_180302	Water	2/03/2018	2.46	3.92	6.38	0.152
ET1800553	5AVN	0874_SW123_180302_F	Water	2/03/2018	1.54	3.17	4.71	0.107
ET1800576	5AVN	0874_SW123_180303	Water	3/03/2018	2.87	7.02	9.89	0.307
ET1800576	5AVN	0874_SW123_180303_F	Water	3/03/2018	3.54	7.33	10.87	0.345
ET1800572	5AVN	0874_SW123_180304	Water	4/03/2018	15.5	19.9	35.4	1.04
ET1800572	5AVN	0874_SW123_180304_F	Water	4/03/2018	16.5	20.3	36.8	0.984
ET1800563	5AVN	0874_SW123_180305	Water	5/03/2018	16.7	20.4	37.1	1.28
ET1800563	5AVN	0874_SW123_180305_F	Water	5/03/2018	23.4	20.5	43.9	2.71
ET1801082	5AVN	0874_SW123_180418	Water	18/04/2018	16.6	25.9	42.5	1.06
ET1801082	5AVN	0874_SW123_180418_F	Water	18/04/2018	0.01	0.005	0.015	0.32
ET1801098	5AVN	0874_SW124_180420	Water	20/04/2018	12.5	6.13	18.63	0.54
ET1801057	Domestic area	0874_SW010S_180417	Water	17/04/2018	0.6	1.33	1.93	0.27
ET1801057	Domestic area	0874_SW010S_180417_F	Water	17/04/2018	0.152	0.0012	0.1532	0.168
ET1801082	Mount St John	0874_SW112_180419	Water	19/04/2018	0.136	0.166	0.302	0.0384
ET1801082	Mount St John	0874_SW112_180419_F	Water	19/04/2018	0.00025	0.00015	0.0004	0.0087
ES1805726	Mount St John	0874_SW130_180221	Water	21/02/2018	0.0808	0.165	0.2458	0.0139
ET1800983	Mount St John	0874_SW130_180410	Water	10/04/2018	0.03	0.03	0.06	0.005
ET1800537	Mundy Creek discharge	0874_SW132_180301	Water	1/03/2018	14.4	27.3	41.7	2.88
ET1800553	Mundy Creek discharge	0874_SW132_180302	Water	2/03/2018	15	27.1	42.1	2.63
ET1800553	Mundy Creek discharge	0874_SW132_180302_F	Water	2/03/2018	2.14	4.54	6.68	0.145
ET1800576	Mundy Creek discharge	0874_SW132_180303	Water	3/03/2018	11.9	28.6	40.5	2.69
ET1800576	Mundy Creek discharge	0874_SW132_180303_F	Water	3/03/2018	14.7	35.6	50.3	3.04
ET1800572	Mundy Creek discharge	0874_SW132_180304	Water	4/03/2018	18.8	27.6	46.4	3.72
ET1800572	Mundy Creek discharge	0874_SW132_180304_F	Water	4/03/2018	19.8	26.8	46.6	3.71
ET1800563	Mundy Creek discharge	0874_SW132_180305	Water	5/03/2018	14.5	25.2	39.7	2.98
ET1800563	Mundy Creek discharge	0874_SW132_180305_F	Water	5/03/2018	18.8	26.5	45.3	5
ET1801057	Mundy Creek discharge	0874_SW132_180417	Water	17/04/2018	19.4	25	44.4	2.56
ET1801057	Mundy Creek discharge	0874_SW132_180417_F	Water	17/04/2018	0.01	0.005	0.015	0.87
ET1801098	NQ0055	0874_SW039_180420	Water	20/04/2018	314	141	455	14.1

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0003	0.0003	0.0005
ANZECC PFAS FW 95%		0.13		220
DoH and FSANZ drinking water quality value			0.07	0.56
DoH and FSANZ recreational water quality value			0.7	5.6

Lab Report Number	Location	Field ID	Matrix Type	Date				
ET1801005	NQ0105	0874_SW101_180411	Water	11/04/2018	0.391	0.652	1.043	0.0212
ET1800553	NQ0105	0874_SW102_180302	Water	2/03/2018	0.204	0.325	0.529	0.0146
ET1800553	NQ0105	0874_SW102_180302_F	Water	2/03/2018	0.205	0.364	0.569	0.0138
ET1800576	NQ0105	0874_SW102_180303	Water	3/03/2018	0.129	0.308	0.437	0.005
ET1800576	NQ0105	0874_SW102_180303_F	Water	3/03/2018	0.201	0.373	0.574	0.016
ET1800572	NQ0105	0874_SW102_180304	Water	4/03/2018	0.281	0.506	0.787	0.023
ET1800572	NQ0105	0874_SW102_180304_F	Water	4/03/2018	0.198	0.468	0.666	0.0195
ET1800563	NQ0105	0874_SW102_180305	Water	5/03/2018	0.237	0.526	0.763	0.022
ET1800563	NQ0105	0874_SW102_180305_F	Water	5/03/2018	0.166	0.656	0.822	0.0283
ET1801044	NQ0105	0874_SW102_180416	Water	16/04/2018	0.68	0.7	1.38	0.02
ET1801044	NQ0105	0874_SW102_180416_F	Water	16/04/2018	0.01	0.005	0.015	0.005
ET1801010	NQ0105	0874_SW103_180412	Water	12/04/2018	0.55	0.84	1.39	0.03
ET1801010	NQ0105	0874_SW104_180412	Water	12/04/2018	1.15	0.0933	1.2433	0.0239
ET1801057	NQ0106 & OLAs	0874_SW126_180417	Water	17/04/2018	1.92	3.77	5.69	0.13
ET1801057	NQ0106 & OLAs	0874_SW126_180417_F	Water	17/04/2018	0.01	0.005	0.015	0.08
ET1801057	NW Base boundary/OLAs	0874_SW012_180417	Water	17/04/2018	2.93	3.66	6.59	0.176
ET1801057	NW Base boundary/OLAs	0874_SW013_180417	Water	17/04/2018	3.54	5.96	9.5	0.19
ET1801057	NW Base boundary/OLAs	0874_SW013_180417_F	Water	17/04/2018	0.01	0.005	0.015	0.04
ET1801057	Pad Brahman	0874_SW016_180417	Water	17/04/2018	0.0769	0.0885	0.1654	0.0062
ET1801057	Pad Brahman	0874_SW016_180417_F	Water	17/04/2018	0.00025	0.00015	0.0004	0.0023
ET1801093	Runoff from NQ0052 & NQ0054	0874_SW001A_180419	Water	19/04/2018	34.8	50.6	85.4	4.66
ET1801057	Runway 13/31	0874_SW125_180417	Water	17/04/2018	3.62	3.07	6.69	0.17
ET1801057	Runway 13/31	0874_SW125_180417_F	Water	17/04/2018	0.01	0.005	0.015	0.03
ET1800553	The Common discharge	0874_SW131_180302	Water	2/03/2018	1.72	3.8	5.52	0.122
ET1800553	The Common discharge	0874_SW131_180302_F	Water	2/03/2018	1.63	4.07	5.7	0.116
ET1800576	The Common discharge	0874_SW131_180303	Water	3/03/2018	1.04	3.5	4.54	0.111
ET1800576	The Common discharge	0874_SW131_180303_F	Water	3/03/2018	1.05	3.16	4.21	0.113
ET1800572	The Common discharge	0874_SW131_180304	Water	4/03/2018	1.9	4.98	6.88	0.142
ET1800572	The Common discharge	0874_SW131_180304_F	Water	4/03/2018	2.14	5.02	7.16	0.133
ET1800563	The Common discharge	0874_SW131_180305	Water	5/03/2018	1.2	3.89	5.09	0.125
ET1800563	The Common discharge	0874_SW131_180305_F	Water	5/03/2018	1.7	4.5	6.2	0.176

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0003	0.0003	0.0005
ANZECC PFAS FW 95%		0.13		220
DoH and FSANZ drinking water quality value			0.07	0.56
DoH and FSANZ recreational water quality value			0.7	5.6

Lab Report Number	Location	Field ID	Matrix Type	Date				
ET1801082	The Common discharge	0874_SW131_180419	Water	19/04/2018	2.28	2.71	4.99	0.142
ET1801082	The Common discharge	0874_SW131_180419_F	Water	19/04/2018	0.00025	0.001	0.00125	0.077
ET1801005	W of Ingham Sports Field adj Base boundary	0874_SW020_180411	Water	11/04/2018	0.0199	0.0253	0.0452	0.0027
ET1801082	W of Runway 13/31 & Emergency Resp Areas	0874_SW015_180418	Water	18/04/2018	0.5	0.356	0.856	0.0295

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

Statistics

Number of Results					66	66	66	66
Number of Detects					113	115	117	122
Minimum Concentration					0.0003	0.0002	0.0004	0.0023
Maximum Concentration					314	141	455	14
Average Concentration					10.8	10.7	21.5	1.0
Geometric Average					0.78	0.99	1.91	0.14
Median Concentration					1.37	3.17	4.85	0.13
Standard Deviation					39	21	59	2
90th Percentile					18.8	27.2	44.9	3.0
95th Percentile					23	34	49	4



	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	µg/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0003	0.0003	0.0005
ANZECC PFAS FW 95%		0.13		220
DoH and FSANZ drinking water quality value			0.07	0.56
DoH and FSANZ recreational water quality value			0.7	5.6

Lab Report Number	Location	Field ID	Matrix Type	Date				
ET1801082	Background (outside IA)	0874_SW211_180418	Water	18/04/2018	0.0005	0.00015	0.00065	0.00025
ET1801082	Background (outside IA)	0874_SW212_180418	Water	18/04/2018	0.0103	0.0053	0.0156	0.0009
ET1801082	Background (outside IA)	0874_SW213_180418	Water	18/04/2018	0.0012	0.0013	0.0025	0.00025
ET1801098	Bohle River	0874_SW129_180420	Water	20/04/2018	0.0028	0.0031	0.0059	0.0051
ET1801098	Bohle River	0874_SW201_180420	Water	20/04/2018	0.0022	0.0017	0.0039	0.006
ET1801082	Bohle River	0874_SW202_180418	Water	18/04/2018	0.153	0.125	0.278	0.0111
ET1801082	Bohle River	0874_SW203_180418	Water	18/04/2018	0.0261	0.0191	0.0452	0.0021
ET1801082	Bohle River	0874_SW204_180418	Water	18/04/2018	0.015	0.0082	0.0232	0.0007
ET1800983	Cleveland Bay	0874_SW210_180410	Water	10/04/2018	0.0383	0.0381	0.0764	0.0028
ET1801005	Ecological Area	0874_SW110_180411	Water	11/04/2018	2.87	3.45	6.32	0.23
ET1801005	Ecological Area	0874_SW111_180411	Water	11/04/2018	1.44	2.73	4.17	0.11
ET1801098	Garbutt	0874_SW120_180420	Water	20/04/2018	0.15	0.1	0.25	0.04
ET1801082	Garbutt	0874_SW014_180419	Water	19/04/2018	0.034	0.031	0.065	0.0069
ET1801082	Garbutt	0874_SW014_180419_F	Water	19/04/2018	0.00025	0.00015	0.0004	0.0018
ET1801005	Garbutt	0874_SW017_180411	Water	11/04/2018	0.11	0.1	0.21	0.005
ET1801098	Garbutt Community	0874_SW127_180420	Water	20/04/2018	0.0315	0.0228	0.0543	0.0052
ET1801098	Garbutt Community	0874_SW128_180420	Water	20/04/2018	0.0375	0.0199	0.0574	0.0034
ET1801098	Rowes Bay	0874_SW107_180420	Water	20/04/2018	0.489	0.124	0.613	0.0085
ET1800983	Rowes Bay	0874_SW108_180410	Water	10/04/2018	0.175	0.16	0.335	0.0097
ET1800983	Rowes Bay	0874_SW109_180410	Water	10/04/2018	0.118	0.157	0.275	0.0149
ET1800983	Rowes Bay	0874_SW114_180410	Water	10/04/2018	0.0551	0.215	0.2701	0.0123
ET1800983	Rowes Bay	0874_SW115_180410	Water	10/04/2018	0.784	1.06	1.844	0.0908
ET1800983	Rowes Bay	0874_SW116_180410	Water	10/04/2018	0.383	0.489	0.872	0.0448
ET1800983	Rowes Bay	0874_SW118_180410	Water	10/04/2018	6.14	7.04	13.18	0.5
ET1800983	Rowes Bay	0874_SW208_180410	Water	10/04/2018	0.191	0.368	0.559	0.027
ET1801093	Third Party Commercial Property	0874_SW117_180419	Water	19/04/2018	13.9	18.4	32.3	1.88
ET1801093	Third Party Commercial Property	0874_SW117_180419_F	Water	19/04/2018	0.01	0.005	0.015	0.44
ET1801098	Third Party Commercial Property	0874_SW119_180420	Water	20/04/2018	21.1	14.7	35.8	2.68
ET1800983	Third Party Commercial Property	0874_SW113_180410	Water	10/04/2018	5.33	3.08	8.41	0.25
ET1801082	Town Common	0874_SW205_180418	Water	18/04/2018	0.48	0.39	0.87	0.025
ET1801082	Town Common	0874_SW206_180418	Water	18/04/2018	0.16	0.05	0.21	0.05
ET1801082	Town Common	0874_SW207_180418	Water	18/04/2018	0.18	0.21	0.39	0.05

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

Statistics								
Number of Results					32	32	32	32
Number of Detects					113	115	117	122
Minimum Concentration					0.0003	0.0002	0.0004	0.0003
Maximum Concentration					21	18	36	3
Average Concentration					1.7	1.7	3.4	0.2
Geometric Average					0.10	0.08	0.18	0.02
Median Concentration					0.13	0.11	0.26	0.01
Standard Deviation					4	4	9	1
90th Percentile					5.1	3.4	8.2	0.4
95th Percentile					10	10	22	1

Purple shading indicates where a result reported as <LOR, half the LOR was adopted as the result in calculating the mean and 90th percentile concentrations.

							Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
							mg/kg	mg/kg	mg/kg	mg/kg
EQL							0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial									20	50
NEMP – Human health – Public open space									1	10
NEMP – Human health – Residential with minimal opportunities for soil access									2	20
NEMP – Human health – Residential with garden/accessible soil									0.009	0.1
Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	Depth					
ES1714865		NQ0105	0874_BH001_0.5_170612	Soil	12/06/2017	0.5	1.31	1.31	2.62	0.0516
ES1714865		NQ0105	0874_BH003_0.2_170612	Soil	12/06/2017	0.2	0.0028	0.0257	0.0285	0.0006
ES1714865		NQ0105	0874_SD105_170612	Soil	12/06/2017	0.05	0.0035	0.0629	0.0664	0.0002
ES1714411		NQ0106	0874_BH012_0.5_170609	Soil	9/06/2017	0.5	0.0081	0.0053	0.0134	0.0003
ES1714280		NQ0106	0874_BH202_0.3_170606	Soil	6/06/2017	0.3	0.07	1.53	1.6	0.0086
ES1714280		NQ0106	0874_BH202_0.5_170606	Soil	6/06/2017	0.5	0.965	1.74	2.705	0.125
ES1714411		NQ0106	0874_BH207_0.5_170609	Soil	9/06/2017	0.5	2.52	11.5	14.02	0.314
ES1714280		NQ0106	0874_MW243_0.5_170606	Soil	6/06/2017	0.5	2.94	13.7	16.64	0.392
ES1714411		OLAs – NQ0106	0874_SD301_170609	Soil	9/06/2017	0.05	1.45	11.5	12.95	0.335
ES1719419		Pad Brahman	0874_BH014_0.5_170802	Soil	2/08/2017	0.5	0.0165	0.0247	0.0412	0.0001
ES1714149		Disused Runway 13/31	0874_BH016_0.05_170601	Soil	1/06/2017	0.05	0.0262	0.178	0.2042	0.0017
ES1714149		Disused Runway 13/31	0874_BH016_0.5_170601	Soil	1/06/2017	0.5	0.0652	0.475	0.5402	0.0067
ES1714149		Disused Runway 13/31	0874_BH017_0.2_170601	Soil	1/06/2017	0.2	0.0992	0.166	0.2652	0.0176
ES1714149		Disused Runway 13/31	0874_MW245_0.2_170601	Soil	1/06/2017	0.2	0.106	0.8	0.906	0.025
ES1714149		Disused Runway 13/31	0874_MW246_0.3_170601	Soil	1/06/2017	0.3	0.883	3.82	4.703	0.0775
ES1715280		5 AVN	0874_BH022_0.5_170615	Soil	15/06/2017	0.5	0.0008	0.0082	0.009	0.0014
ES1714865		5AVN	0874_MW248_0.5_170613	Soil	13/06/2017	0.5	0.0046	0.0308	0.0354	0.0006
ES1714280		Fuel Farm 1 (NQ0052)	0874_BH023_0.2_170607	Soil	7/06/2017	0.2	0.0366	0.019	0.0556	0.0033
ES1714411		Fuel Farm 1 (NQ0052)	0874_BH024_0.2_170608	Soil	8/06/2017	0.2	0.0166	2.7	2.7166	0.013
ES1713464		Fuel Farm 1 (NQ0052)	0874_BH028_0.5_170531	Soil	31/05/2017	0.5	0.852	16.4	17.252	0.278
ES1714280		Fuel Farm 1 (NQ0052)	0874_BH031_0.5_170607	Soil	7/06/2017	0.5	2.14	1.37	3.51	0.723
ES1714280		Fuel Farm 1 (NQ0052)	0874_BH032_0.2_170607	Soil	7/06/2017	0.2	0.0036	0.962	0.9656	0.0088
ES1715280		Fuel Farm 1 (NQ0052)	0874_BH035_0.5_170616	Soil	16/06/2017	0.5	0.0685	0.52	0.5885	0.0043
ES1714149		Fuel Farm 2 (NQ0099)	0874_BH038_0.5_170602	Soil	2/06/2017	0.5	1.18	7.36	8.54	0.076
ES1714149		Fuel Farm 2 (NQ0099)	0874_BH039_0.5_170602	Soil	2/06/2017	0.5	0.351	0.0624	0.4134	0.0102
ES1714149		Fuel Farm 2 (NQ0099)	0874_BH041_0.2_170602	Soil	2/06/2017	0.2	0.0476	0.0685	0.1161	0.0037
ES1715280		NQ0107	0874_BH044_0.5_170615	Soil	15/06/2017	0.5	4.98	8.61	13.59	0.341
ES1714149		NQ0107	0874_BH046_0.5_170605	Soil	5/06/2017	0.5	0.167	0.0883	0.2553	0.0095
ES1714149		NQ0107	0874_BH047_0.2_170605	Soil	5/06/2017	0.2	0.172	0.0751	0.2471	0.0158
ES1715280		NQ0107	0874_BH049_0.5_170615	Soil	15/06/2017	0.5	1.52	5	6.52	0.144
ES1714149		NQ0107	0874_BH050_0.5_170605	Soil	5/06/2017	0.5	0.0383	0.0003	0.0386	0.0008
ES1714149		NQ0107	0874_BH051_0.5_170605	Soil	5/06/2017	0.5	0.15	0.345	0.495	0.0163
ES1714280		NQ0107	0874_MW250_0.5_170606	Soil	6/06/2017	0.5	0.0006	0.0035	0.0041	0.0001
ES1714149		NQ0107	0874_MW251_0.5_170605	Soil	5/06/2017	0.5	0.0449	0.0303	0.0752	0.0026
ES1715280		NQ055/Runway 01/19/NQ0107	0874_BH054_0.7_170615	Soil	15/06/2017	0.7	0.0405	0.415	0.4555	0.003
ES1716954		Kindergarten	0874_BH995_0.2_170710	Soil	10/07/2017	0.2	0.0001	0.0016	0.0017	0.0004
ES1716954		Kindergarten	0874_BH995_0.5_170710	Soil	10/07/2017	0.5	0.0001	0.0001	0.0002	0.0001
ES1716954		Kindergarten	0874_BH996_0.2_170710	Soil	10/07/2017	0.2	0.0001	0.0017	0.0018	0.0001
ES1716954		Kindergarten	0874_BH996_0.5_170710	Soil	10/07/2017	0.5	0.0003	0.0049	0.0052	0.0001
ES1715280		Kindergarten	0874_BH997_0.2_170616	Soil	16/06/2017	0.2	0.0003	0.0059	0.0062	0.0001
ES1716573		Kindergarten	0874_BH997_0.5_170616	Soil	16/06/2017	0.5	0.001	0.0116	0.0126	0.0006
ES1714411		Kindergarten	0874_BH998_0.5_170610	Soil	10/06/2017	0.5	0.0006	0.0007	0.0013	0.0001
ES1714411		Kindergarten	0874_BH999_0.5_170610	Soil	10/06/2017	0.5	0.001	0.0048	0.0058	0.0008
ES1714411		Kindergarten	0874_MW232_0.5_170610	Soil	10/06/2017	0.5	0.0021	0.0164	0.0185	0.0011
ES1713464		Kindergarten & domestic	0874_MW224_0.2_170530	Soil	30/05/2017	0.2	0.0001	0.0001	0.0002	0.0001
ES1716954		Kindergarten & domestic	0874_SD992_170710	Soil	10/07/2017	0.05	0.0001	0.0006	0.0007	0.0001
ES1716954		Kindergarten & domestic	0874_SD993_170710	Soil	10/07/2017	0.05	0.0001	0.0015	0.0016	0.0001
ES1716954		Kindergarten & domestic	0874_SD994_170710	Soil	10/07/2017	0.05	0.0002	0.0018	0.002	0.0001
ES1716954		Kindergarten & domestic	0874_SD995_170710	Soil	10/07/2017	0.05	0.0001	0.0011	0.0012	0.0001
ES1715280		Kindergarten & domestic	0874_SD996_170616	Soil	16/06/2017	0.05	0.0005	0.0073	0.0078	0.0001
ES1818611		East of Mundy Creek Drain	0874_BH061_180625	Soil	25/06/2018	0.01	0.0001	0.0014	0.0015	0.0001
ES1818611		East of Mundy Creek Drain	0874_BH062_180625	Soil	25/06/2018	0.01	0.0001	0.0008	0.0009	0.0001

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial			20	50
NEMP – Human health – Public open space			1	10
NEMP – Human health – Residential with minimal opportunities for soil access			2	20
NEMP – Human health – Residential with garden/accessible soil			0.009	0.1

Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	Depth				
ES1716027	Ingham Road Sports Field	0874_MW228_S_0.5_170622	Soil	22/06/2017	0.5	0.0024	0.107	0.1094	0.0008
ES1818611	Ingham Road Sports Field	0874_BH063_180625	Soil	25/06/2018	0.01	0.0003	0.0015	0.0018	0.0001
ES1818611	Ingham Road Sports Field	0874_BH064_180625	Soil	25/06/2018	0.01	0.0005	0.0017	0.0022	0.0001
ES1818611	Ingham Road Sports Field	0874_BH065_180625	Soil	25/06/2018	0.01	0.0001	0.0006	0.0007	0.0001
ES1818611	Ingham Road Sports Field	0874_BH066_180625	Soil	25/06/2018	0.01	0.0002	0.0134	0.0136	0.0001
EB1802084	Mt St John	0874_MW255_S_0.5_180117	Soil	17/01/2018	0.5	0.0001	0.0001	0.0002	0.0001
ES1714280	OLAs	0874_SD023a_170606	Soil	6/06/2017	0.05	0.0084	0.021	0.0294	0.001
ES1714411	OLAs	0874_SD023b_170609	Soil	9/06/2017	0.05	0.0022	0.0116	0.0138	0.0001
ES1714411	OLAs	0874_SD023c_170609	Soil	9/06/2017	0.05	0.0228	0.101	0.1238	0.0018
ES1715280	38SQN	0874_SD025_170616	Soil	16/06/2017	0.05	0.0016	0.0263	0.0279	0.0011
ES1713464	NQ0054 - Former Fire Training Area	0874_BH025_0.5_170531	Soil	31/05/2017	0.5	26.9	73.2	100.1	4.61
ES1713464	NQ0054 - Former Fire Training Area	0874_BH026_0.5_170531	Soil	31/05/2017	0.5	0.798	21	21.8	0.284
ES1714280	NQ0054 - Former Fire Training Area	0874_SD122_170606	Soil	6/06/2017	0.05	0.14	0.58	0.72	0.0421

Grey shading indicates where a result reported as <LOR, then half of the LOR was adopted as the result in calculating a mean and 90th percentile concentrations.

Statistics

Number of Results	65	65	65	65	65
Minimum Concentration	0.01	0.0001	0.0001	0.0002	0.0001
Maximum Concentration	0.7	26.9	73.2	100.1	4.6
Average Concentration	0.3	0.8	2.9	3.6	0.1
Geometric Average	0.18	0.01	0.05	0.07	0.002
Median Concentration	0.30	0.01	0.03	0.06	0.001
Standard Deviation	0.2	3.4	9.8	13.1	0.6
90th Percentile	0.5	1.4	8.1	11.2	0.3
95th Percentile	0.5	2.4	13.3	16.1	0.3

Appendix D - Exposure Point Concentration Data: Deeper Soil on-Base

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial			20	50
NEMP – Human health – Public open space			1	10
NEMP – Human health – Residential with minimal opportunities for soil access			2	20
NEMP – Human health – Residential with garden/accessible soil			0.009	0.1

Lab Report Number	on-Base Area	Field ID	Matrix Type	Date	Depth				
ES1714865	NQ0105	0874_BH001_0.5_170612	Soil	12/06/2017	0.5	1.31	1.31	2.62	0.0516
ES1714865	NQ0105	0874_BH002_1.0_170612	Soil	12/06/2017	1	0.0093	0.0019	0.0112	0.0004
ES1714865	NQ0105	0874_BH003_0.2_170612	Soil	12/06/2017	0.2	0.0028	0.0257	0.0285	0.0006
ES1714865	NQ0105	0874_BH003_1.0_170612	Soil	12/06/2017	1	0.0026	0.0008	0.0034	0.0001
ES1714865	NQ0105	0874_BH003_1.7_170612	Soil	12/06/2017	1.7	0.0067	0.0026	0.0093	0.0001
ES1714865	NQ0105	0874_BH004_1.0_170612	Soil	12/06/2017	1	0.0102	0.005	0.0152	0.0004
ES1714865	NQ0105	0874_BH005_1.0_170612	Soil	12/06/2017	1	0.268	0.232	0.5	0.0084
ES1714865	NQ0105	0874_BH006_1.0_170612	Soil	12/06/2017	1	0.027	0.002	0.029	0.0008
ES1714865	NQ0105	0874_BH007_1.0_170612	Soil	12/06/2017	1	0.001	0.001	0.002	0.0001
ES1714865	NQ0105	0874_MW241_S_1.0_170612	Soil	12/06/2017	1	0.0022	0.0004	0.0026	0.0001
ES1714865	NQ0105	0874_SD105_170612	Soil	12/06/2017	0.05	0.0035	0.0629	0.0664	0.0002
ES1714280	NQ0106	0874_BH008_1.0_170606	Soil	6/06/2017	1	0.0556	0.0071	0.0627	0.003
ES1714411	NQ0106	0874_BH010_1.0_170609	Soil	9/06/2017	1	0.068	0.0693	0.1373	0.0027
ES1714411	NQ0106	0874_BH011_1.0_170609	Soil	9/06/2017	1	0.0696	0.083	0.1526	0.0048
ES1714411	NQ0106	0874_BH012_0.5_170609	Soil	9/06/2017	0.5	0.0081	0.0053	0.0134	0.0003
ES1714411	NQ0106	0874_BH201_2.0_170609	Soil	9/06/2017	2	0.0009	0.0001	0.001	0.0001
ES1714280	NQ0106	0874_BH202_0.3_170606	Soil	6/06/2017	0.3	0.07	1.53	1.6	0.0086
ES1714280	NQ0106	0874_BH202_0.5_170606	Soil	6/06/2017	0.5	0.965	1.74	2.705	0.125
ES1714280	NQ0106	0874_MW243_S_0.5_170606	Soil	6/06/2017	0.5	2.94	13.7	16.64	0.392
ES1714411	NQ0106	0874_BH204_1.0_170609	Soil	9/06/2017	1	0.931	2.3	3.231	0.0713
ES1714411	NQ0106	0874_BH205_1.5_170609	Soil	9/06/2017	1.5	0.191	0.241	0.432	0.019
ES1714411	NQ0106	0874_BH207_0.5_170609	Soil	9/06/2017	0.5	2.52	11.5	14.02	0.314
ES1714411	OLAs – NQ0106	0874_SD301_170609	Soil	9/06/2017	0.05	1.45	11.5	12.95	0.335
ES1719419	Pad Brahman	0874_BH013_1.0_170802	Soil	2/08/2017	1	0.0133	0.0006	0.0139	0.0001
ES1719419	Pad Brahman	0874_BH014_0.5_170802	Soil	2/08/2017	0.5	0.0165	0.0247	0.0412	0.0001
ES1719419	Pad Brahman	0874_BH015_2.0_170802	Soil	2/08/2017	2	0.0001	0.0001	0.0002	0.0001
ES1714149	Disused Runway 13/31	0874_BH016_0.05_170601	Soil	1/06/2017	0.05	0.0262	0.178	0.2042	0.0017
ES1714149	Disused Runway 13/31	0874_BH016_0.5_170601	Soil	1/06/2017	0.5	0.0652	0.475	0.5402	0.0067
ES1714149	Disused Runway 13/31	0874_BH017_0.2_170601	Soil	1/06/2017	0.2	0.0992	0.166	0.2652	0.0176
ES1714149	Disused Runway 13/31	0874_BH017_1.0_170601	Soil	1/06/2017	1	0.018	0.0063	0.0243	0.0006
ES1714149	Disused Runway 13/31	0874_BH018_1.0_170602	Soil	2/06/2017	1	0.0047	0.0098	0.0145	0.0005
ES1714149	Disused Runway 13/31	0874_BH018_2.0_170602	Soil	2/06/2017	2	0.0005	0.0008	0.0013	0.0001
ES1714149	Disused Runway 13/31	0874_MW245_S_0.2_170601	Soil	1/06/2017	0.2	0.106	0.8	0.906	0.025
ES1714149	Disused Runway 13/31	0874_MW245_S_1.0_170601	Soil	1/06/2017	1	0.0141	0.007	0.0211	0.0007
ES1714149	Disused Runway 13/31	0874_MW246_S_0.3_170601	Soil	1/06/2017	0.3	0.883	3.82	4.703	0.0775
ES1714865	Disused Runway 13/31	0874_BH019_1.0_170614	Soil	14/06/2017	1	0.0013	0.0017	0.003	0.0001
ES1714865	NQ055/Runway 01/19/NQ0107	0874_BH020_1.5_170613	Soil	13/06/2017	1.5	0.0091	0.0314	0.0405	0.0004
ES1714865	NQ055/Runway 01/19/NQ0107	0874_BH021_1.0_170613	Soil	13/06/2017	1	0.0053	0.0006	0.0059	0.0001
ES1715280	5 AVN	0874_BH022_0.5_170615	Soil	15/06/2017	0.5	0.0008	0.0082	0.009	0.0014

Appendix D - Exposure Point Concentration Data: Deeper Soil on-Base

							Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
							mg/kg	mg/kg	mg/kg	mg/kg
EQL							0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial									20	50
NEMP – Human health – Public open space									1	10
NEMP – Human health – Residential with minimal opportunities for soil access									2	20
NEMP – Human health – Residential with garden/accessible soil									0.009	0.1
ES1714411	5AVN	0874_BH056_1.0_170608	Soil	8/06/2017	1	0.284	0.0901	0.3741	0.0202	
ES1714411	5AVN	0874_BH057_1.0_170608	Soil	8/06/2017	1	0.105	0.0409	0.1459	0.02	
ES1714411	5AVN	0874_BH058_1.0_170608	Soil	8/06/2017	1	0.0722	0.0744	0.1466	0.0049	
ES1714865		0874_MW248_S_0.5_170613	Soil	13/06/2017	0.5	0.0046	0.0308	0.0354	0.0006	
ES1714865	5AVN	0874_MW249_S_1.0_170614	Soil	14/06/2017	1	0.0299	0.239	0.2689	0.006	
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH023_0.2_170607	Soil	7/06/2017	0.2	0.0366	0.019	0.0556	0.0033	
ES1714411	Fuel Farm 1 (NQ0052)	0874_BH024_0.2_170608	Soil	8/06/2017	0.2	0.0166	2.7	2.7166	0.013	
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH028_0.5_170531	Soil	31/05/2017	0.5	0.852	16.4	17.252	0.278	
ES1713464	Fuel Farm 1 (NQ0052)	0874_BH028_1.5_170531	Soil	31/05/2017	1.5	0.166	0.0673	0.2333	0.021	
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH031_0.5_170607	Soil	7/06/2017	0.5	2.14	1.37	3.51	0.723	
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH031_1.7_170607	Soil	7/06/2017	1.7	0.0492	0.111	0.1602	0.008	
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH032_0.2_170607	Soil	7/06/2017	0.2	0.0036	0.962	0.9656	0.0088	
ES1714280	Fuel Farm 1 (NQ0052)	0874_BH032_1.0_170607	Soil	7/06/2017	1	0.102	0.0291	0.1311	0.0486	
ES1715280	Fuel Farm 1 (NQ0052)	0874_BH035_0.5_170616	Soil	16/06/2017	0.5	0.0685	0.52	0.5885	0.0043	
ES1715280	Fuel Farm 1 (NQ0052)	0874_BH035_1.5_170616	Soil	16/06/2017	1.5	0.224	0.167	0.391	0.0068	
ES1714411	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH029_1.0_170608	Soil	8/06/2017	1	0.84	0.35	1.19	0.145	
ES1714411	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH030_1.5_170608	Soil	8/06/2017	1.5	0.151	0.132	0.283	0.0212	
ES1714280	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH034_1.0_170607	Soil	7/06/2017	1	1.03	1.25	2.28	0.189	
ES1714280	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH036_1.0_170607	Soil	7/06/2017	1	0.0029	0.0009	0.0038	0.0001	
ES1714280	NQ0054 & Fuel Farm 1 (NQ0052)	0874_BH037_2.0_170607	Soil	7/06/2017	2	0.0019	0.0004	0.0023	0.0001	
ES1714280	NQ0054	0874_SD122_170606	Soil	6/06/2017	0.05	0.14	0.58	0.72	0.0421	
ES1713464	NQ0054 - Former Fire Training Area	0874_BH025_0.5_170531	Soil	31/05/2017	0.5	26.9	73.2	100.1	4.61	
ES1713464	NQ0054 - Former Fire Training Area	0874_BH025_1.0_170531	Soil	31/05/2017	1	2.12	1.41	3.53	0.231	
ES1713464	NQ0054 - Former Fire Training Area	0874_BH026_0.5_170531	Soil	31/05/2017	0.5	0.798	21	21.8	0.284	
ES1713464	NQ0054 - Former Fire Training Area	0874_BH026_1.0_170531	Soil	31/05/2017	1	2.29	3.18	5.47	0.362	
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH038_0.5_170602	Soil	2/06/2017	0.5	1.18	7.36	8.54	0.076	
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH039_0.5_170602	Soil	2/06/2017	0.5	0.351	0.0624	0.4134	0.0102	
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH040_1.0_170602	Soil	2/06/2017	1	0.0132	0.0028	0.016	0.0003	
ES1714149	Fuel Farm 2 (NQ0099)	0874_BH041_0.2_170602	Soil	2/06/2017	0.2	0.0476	0.0685	0.1161	0.0037	
ES1715280	NQ0107	0874_BH044_0.5_170615	Soil	15/06/2017	0.5	4.98	8.61	13.59	0.341	
ES1714149	NQ0107	0874_BH046_0.5_170605	Soil	5/06/2017	0.5	0.167	0.0883	0.2553	0.0095	
ES1714149	NQ0107	0874_BH046_1.4_170605	Soil	5/06/2017	1.4	0.258	0.0135	0.2715	0.0091	
ES1714149	NQ0107	0874_BH047_0.2_170605	Soil	5/06/2017	0.2	0.172	0.0751	0.2471	0.0158	
ES1714149	NQ0107	0874_BH047_1.0_170605	Soil	5/06/2017	1	0.0164	0.0019	0.0183	0.0005	
ES1715280	NQ0107	0874_BH049_0.5_170615	Soil	15/06/2017	0.5	1.52	5	6.52	0.144	
ES1714149	NQ0107	0874_BH050_0.5_170605	Soil	5/06/2017	0.5	0.0383	0.0003	0.0386	0.0008	
ES1714149	NQ0107	0874_BH051_0.5_170605	Soil	5/06/2017	0.5	0.15	0.345	0.495	0.0163	
ES1714280	NQ0107	0874_MW250_S_0.5_170606	Soil	6/06/2017	0.5	0.0006	0.0035	0.0041	0.0001	
ES1714149	NQ0107	0874_MW251_S_0.5_170605	Soil	5/06/2017	0.5	0.0449	0.0303	0.0752	0.0026	
ES1715280	NQ055/Runway 01/19/NQ0107	0874_BH042_1.0_170615	Soil	15/06/2017	1	0.0385	1.95	1.9885	0.0032	
ES1715280	NQ055/Runway 01/19/NQ0107	0874_BH045_1.5_170615	Soil	15/06/2017	1.5	1.4	2.7	4.1	0.0468	

Appendix D - Exposure Point Concentration Data: Deeper Soil on-Base

							Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
							mg/kg	mg/kg	mg/kg	mg/kg
EQL							0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial									20	50
NEMP – Human health – Public open space									1	10
NEMP – Human health – Residential with minimal opportunities for soil access									2	20
NEMP – Human health – Residential with garden/accessible soil									0.009	0.1
ES1714280	NQ055/Runway 01/19/NQ0107	0874_BH048 1.0 170606	Soil	6/06/2017	1	0.0566	0.0341	0.0907	0.0016	
ES1715280	NQ055/Runway 01/19/NQ0107	0874_BH052 1.0 170615	Soil	15/06/2017	1	1.52	3.01	4.53	0.106	
ES1715280	NQ055/Runway 01/19/NQ0107	0874_BH053 1.0 170615	Soil	15/06/2017	1	0.193	0.342	0.535	0.0094	
ES1715280	NQ055/Runway 01/19/NQ0107	0874_BH054 0.7 170615	Soil	15/06/2017	0.7	0.0405	0.415	0.4555	0.003	
ES1714865	NQ055/Runway 01/19/NQ0107	0874_BH055 1.0 170613	Soil	13/06/2017	1	0.0141	0.0164	0.0305	0.0011	
ES1716954	Kindergarten	0874_BH995 0.2 170710	Soil	10/07/2017	0.2	0.0001	0.0016	0.0017	0.0004	
ES1716954	Kindergarten	0874_BH995 0.5 170710	Soil	10/07/2017	0.5	0.0001	0.0001	0.0002	0.0001	
ES1716954	Kindergarten	0874_BH995 1.0 170710	Soil	10/07/2017	1	0.0001	0.0005	0.0006	0.0001	
ES1716954	Kindergarten	0874_BH995 1.5 170710	Soil	10/07/2017	1.5	0.0001	0.0002	0.0003	0.0001	
ES1716954	Kindergarten	0874_BH996 0.2 170710	Soil	10/07/2017	0.2	0.0001	0.0017	0.0018	0.0001	
ES1716954	Kindergarten	0874_BH996 0.5 170710	Soil	10/07/2017	0.5	0.0003	0.0049	0.0052	0.0001	
ES1716954	Kindergarten	0874_BH996 1.0 170710	Soil	10/07/2017	1	0.003	0.0001	0.0031	0.0001	
ES1716954	Kindergarten	0874_BH996 1.5 170710	Soil	10/07/2017	1.5	0.0006	0.0006	0.0012	0.0001	
ES1715280	Kindergarten	0874_BH997 0.2 170616	Soil	16/06/2017	0.2	0.0003	0.0059	0.0062	0.0001	
ES1716573	Kindergarten	0874_BH997 0.5 170616	Soil	16/06/2017	0.5	0.001	0.0116	0.0126	0.0006	
ES1716573	Kindergarten	0874_BH997 1.0 170616	Soil	16/06/2017	1	0.0004	0.0102	0.0106	0.0004	
ES1715280	Kindergarten	0874_BH997 1.4 170616	Soil	16/06/2017	1.4	0.0007	0.0247	0.0254	0.0004	
ES1716573	Kindergarten	0874_BH997 1.4 170616	Soil	16/06/2017	1.4	0.001	0.0136	0.0146	0.0004	
ES1714411	Kindergarten	0874_BH998 0.5 170610	Soil	10/06/2017	0.5	0.0006	0.0007	0.0013	0.0001	
ES1714411	Kindergarten	0874_BH998 1.0 170610	Soil	10/06/2017	1	0.0004	0.0004	0.0008	0.0001	
ES1714411	Kindergarten	0874_BH999 0.5 170610	Soil	10/06/2017	0.5	0.001	0.0048	0.0058	0.0008	
ES1714411	Kindergarten	0874_BH999 1.7 170610	Soil	10/06/2017	1.7	0.0009	0.0001	0.001	0.0001	
ES1714411	Kindergarten	0874_MW232 S 0.5 170610	Soil	10/06/2017	0.5	0.0021	0.0164	0.0185	0.0011	
ES1713464	Kindergarten & domestic	0874_MW224 0.2 170530	Soil	30/05/2017	0.2	0.0001	0.0001	0.0002	0.0001	
ES1713464	Kindergarten & domestic	0874_MW224 1.0 170530	Soil	30/05/2017	1	0.0024	0.0086	0.011	0.0001	
ES1715280	Kindergarten & domestic	0874_BH060 1.9 170616	Soil	16/06/2017	1.9	0.0001	0.0013	0.0014	0.0001	
ES1715280	Kindergarten & domestic	0874_SD996 170616	Soil	16/06/2017	0.05	0.0005	0.0073	0.0078	0.0001	
ES1716954	Kindergarten & domestic	0874_SD992 170710	Soil	10/07/2017	0.05	0.0001	0.0006	0.0007	0.0001	
ES1716954	Kindergarten & domestic	0874_SD993 170710	Soil	10/07/2017	0.05	0.0001	0.0015	0.0016	0.0001	
ES1716954	Kindergarten & domestic	0874_SD994 170710	Soil	10/07/2017	0.05	0.0002	0.0018	0.002	0.0001	
ES1716954	Kindergarten & domestic	0874_SD995 170710	Soil	10/07/2017	0.05	0.0001	0.0011	0.0012	0.0001	
ES1716156	Garbutt Community - soil sample collected from monitoring well MW222 installed just inside the base boundary	0874_MW222 S 1.0 170626	Soil	26/06/2017	1	0.0024	0.0006	0.003	0.0001	
ES1715280	Belgian Gardens or Garbutt	0874_MW223 S 1.0 170616	Soil	16/06/2017	1	0.0011	0.0033	0.0044	0.0003	
ES1716027	Ingham Road sports fields	0874_MW228 S 0.5 170622	Soil	22/06/2017	0.5	0.0024	0.107	0.1094	0.0008	
ES1716156	Ingham Road sports fields	0874_MW229 S 1.0 170626	Soil	26/06/2017	1	0.0001	0.0001	0.0002	0.0001	
ES1716027	Mt St John	0874_MW235 S 1.0 170623	Soil	23/06/2017	1	0.0008	0.0568	0.0576	0.0004	
EB1802084	Mt St John	0874_MW255 S 0.5 180117	Soil	17/01/2018	0.5	0.0001	0.0001	0.0002	0.0001	
ES1714280	OLAs	0874_SD023a 170606	Soil	6/06/2017	0.05	0.0084	0.021	0.0294	0.001	
ES1714411	OLAs	0874_SD023b 170609	Soil	9/06/2017	0.05	0.0022	0.0116	0.0138	0.0001	

Appendix D - Exposure Point Concentration Data: Deeper Soil on-Base

							Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
							mg/kg	mg/kg	mg/kg	mg/kg
EQL							0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial									20	50
NEMP – Human health – Public open space									1	10
NEMP – Human health – Residential with minimal opportunities for soil access									2	20
NEMP – Human health – Residential with garden/accessible soil									0.009	0.1
ES1714411	OLAs	0874_SD023c_170609	Soil	9/06/2017	0.05		0.0228	0.101	0.1238	0.0018
ES1715280	38SQN	0874_SD025_170616	Soil	16/06/2017	0.05		0.0016	0.0263	0.0279	0.0011

Grey shading indicates where a result reported as <LOR, then half of the LOR was adopted as the result in calculating a mean and 90th percentile concentrations.

Statistics

Number of Results	121	121	121	121	121
Minimum Concentration	0.05	0.00	0.00	0.00	0.00
Maximum Concentration	2.0	26.9	73.2	100.1	4.6
Average Concentration	0.8	0.5	1.7	2.2	0.08
Geometric Average	0.55	0.01	0.03	0.06	0.002
Median Concentration	1.00	0.01	0.02	0.04	0.001
Standard Deviation	0.5	2.5	7.3	9.7	0.4
90th Percentile	1.5	1.2	2.7	4.1	0.14
95th Percentile	1.7	2.1	8.6	13.0	0.3

Appendix D - Exposure Point Concentration Data: Shallow Soil off-Base

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial			20	50
NEMP – Human health – Public open space			1	10
NEMP – Human health – Residential with minimal opportunities for soil access			2	20
NEMP – Human health – Residential with garden/accessible soil			0.009	0.1

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date	Depth				
EB1714774	Cleveland Bay/Rowes Bay	0874_MW210_S_0.2_170710	Soil	10/07/2017	0.2	0.0001	0.0008	0.0009	0.0001
EB1714266	Rowes Bay	0874_MW211_S_0.5_170711	Soil	11/07/2017	0.5	0.0001	0.0001	0.0002	0.0001
	Rowes Bay	0874_SS202_180626	Soil	26/06/2018	0.01	0.0001	0.0012	0.001	0.0001
	Rowes Bay	0874_SS203_180628	Soil	28/06/2018	0.01	0.0001	0.0006	0.0007	0.0001
ES1718168	Belgian Gardens	0874_MW216_S_0.2_170713	Soil	13/07/2017	0.2	0.0001	0.0001	0.0002	0.0001
ES1804071	Belgian Gardens	0874_MW269_0.5_171219	Soil	19/12/2017	0.5	0.0001	0.0001	0.0002	0.0001
ES1718168	Garbutt Community	0874_MW217_S_0.5_170713	Soil	13/07/2017	0.5	0.0001	0.0001	0.0002	0.0001
EB1714585	Garbutt Community	0874_MW218_S_0.2_170713	Soil	13/07/2017	0.2	0.0001	0.0001	0.0002	0.0001
ES1718168	Garbutt Community	0874_MW219_S_0.2_170713	Soil	13/07/2017	0.2	0.0001	0.0003	0.0004	0.0001
ES1718168	Garbutt Community	0874_MW220_S_0.2_170714	Soil	14/07/2017	0.2	0.0001	0.0001	0.0002	0.0001
	Garbutt Community	0874_SS200_180625	Soil	25/06/2018	0.01	0.0001	0.0011	0.0012	0.0001
	Garbutt Community	0874_SS204_180625	Soil	25/06/2018	0.01	0.0016	0.0116	0.0132	0.0003
	Pallarenda	0874_SS201_180627	Soil	27/06/2018	0.01	0.0001	0.0012	0.0013	0.0001
ES1719402	Bohle	0874_MW238_S_0.5_170731	Soil	31/07/2017	0.5	0.0001	0.0001	0.0002	0.0001
ES1719402	Bohle	0874_MW240_S_0.2_170801	Soil	1/08/2017	0.2	0.0001	0.0001	0.0002	0.0001

Grey shading indicates where a result reported as <LOR, half LOR was adopted as the result in calculating a mean and 90th percentile concentrations.

Statistics

Number of Results	15	15	15	15	15
Minimum Concentration	0.01	0.0001	0.0001	0.0002	0.0001
Maximum Concentration	0.5	0.0016	0.0116	0.0132	0.0003
Average Concentration	0.2	0.0002	0.0012	0.0014	0.0001
Geometric Average	0.09	0.0001	0.0003	0.0005	0.0001
Median Concentration	0.20	0.0001	0.0001	0.0002	0.0001
Standard Deviation	0.2	0.0004	0.0029	0.0033	0.0001
90th Percentile	0.5	0.0001	0.0012	0.0013	0.0001
95th Percentile	0.5	0.0005	0.0043	0.0049	0.0002

	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Sum of PFHxS and PFOS	Perfluorooctanoic acid (PFOA)
	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0002	0.0002	0.0002	0.0002
NEMP – Human health – Industrial/commercial			20	50
NEMP – Human health – Public open space			1	10
NEMP – Human health – Residential with minimal opportunities for soil access			2	20
NEMP – Human health – Residential with garden/accessible soil			0.009	0.1

Lab Report Number	off-Base Area	Field ID	Matrix Type	Date	Depth				
ES1730525	Garbutt Community	0874_BH257_1.5_171129	Soil	29/11/2017	1.5	0.0001	0.0001	0.0002	0.0001
ES1720186	Town Common	0874_MW204_S_1.5_170810	Soil	10/08/2017	1.5	0.0001	0.0001	0.0002	0.0001
ES1720186	Town Common	0874_MW205_S_1.0_170810	Soil	10/08/2017	1	0.0001	0.0001	0.0002	0.0001
ES1720186	Town Common	0874_MW206_S_1.5_170810	Soil	10/08/2017	1.5	0.0026	0.0001	0.0027	0.0001
ES1720186	Town Common	0874_MW207_S_1.5_170810	Soil	10/08/2017	1.5	0.0001	0.0001	0.0002	0.0001
ES1720186	Town Common	0874_MW208_S_2.0_170810	Soil	10/08/2017	2	0.0001	0.0001	0.0002	0.0001
EB1714211	Cleveland Bay/Rowes Bay	0874_MW209_S_1.5_170710	Soil	10/07/2017	1.5	0.0001	0.0001	0.0002	0.0001
EB1714774	Cleveland Bay/Rowes Bay	0874_MW210_S_0.2_170710	Soil	10/07/2017	0.2	0.0001	0.0008	0.0009	0.0001
EB1714266	Rowes Bay	0874_MW211_S_0.5_170711	Soil	11/07/2017	0.5	0.0001	0.0001	0.0002	0.0001
ES1718168	Belgian Gardens	0874_MW216_S_0.2_170713	Soil	13/07/2017	0.2	0.0001	0.0001	0.0002	0.0001
ES1718168	Garbutt Community	0874_MW217_S_0.5_170713	Soil	13/07/2017	0.5	0.0001	0.0001	0.0002	0.0001
EB1714585	Garbutt Community	0874_MW218_S_0.2_170713	Soil	13/07/2017	0.2	0.0001	0.0001	0.0002	0.0001
ES1718168	Garbutt Community	0874_MW219_S_0.2_170713	Soil	13/07/2017	0.2	0.0001	0.0003	0.0004	0.0001
ES1718168	Garbutt Community	0874_MW220_S_0.2_170714	Soil	14/07/2017	0.2	0.0001	0.0001	0.0002	0.0001
ES1718902	Garbutt Community	0874_MW221_S_1.5_170728	Soil	28/07/2017	1.5	0.0001	0.0001	0.0002	0.0001
ES1730694	Garbutt Community	0874_MW263_2.0_171130	Soil	30/11/2017	2	0.0001	0.0001	0.0002	0.0001
ES1718902	Bushland Beach	0874_MW231_S_1.0_170731	Soil	31/07/2017	1	0.0001	0.0001	0.0002	0.0001
ES1718902	Bohle	0874_MW237_S_2.0_170731	Soil	31/07/2017	2	0.0001	0.0001	0.0002	0.0001
ES1719402	Bohle	0874_MW238_S_0.5_170731	Soil	31/07/2017	0.5	0.0001	0.0001	0.0002	0.0001
ES1719402	Bohle	0874_MW240_S_0.2_170801	Soil	1/08/2017	0.2	0.0001	0.0001	0.0002	0.0001
ES1714865	Rowes Bay	0874_MW242_S_2.5_170612	Soil	12/06/2017	2.5	0.0006	0.0013	0.002	0.0001
EB1802408	Pallarenda	0874_MW252_S_1.5_180119	Soil	19/01/2018	1.5	0.0001	0.0001	0.0002	0.0001
EB1802408	Pallarenda	0874_MW253_S_1.5_180118	Soil	18/01/2018	1.5	0.0001	0.0001	0.0002	0.0001
ES1804071	Belgian Gardens	0874_MW269_0.5_171219	Soil	19/12/2017	0.5	0.0001	0.0001	0.0002	0.0001

Grey shading indicates where a result reported as <LOR, then half of the LOR was adopted as the result in calculating a mean and 90th percentile concentrations.

Statistics					
Number of Results	24	24	24	24	24
Minimum Concentration	0.20	0.00	0.00	0.00	0.00
Maximum Concentration	2.5	0.0	0.0	0.003	0.0001
Average Concentration	1.1	0.0002	0.0002	0.0004	0.0001
Geometric Average	0.77	0.00	0.00	0.00	0.00
Median Concentration	1.25	0.00	0.00	0.00	0.00
Standard Deviation	0.7	0.0	0.0	0.0	0.0
90th Percentile	2.0	0.0001	0.0002	0.0008	0.0001
95th Percentile	2.0	0.001	0.001	0.002	0.0001

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	PFHxS + PFOS	Perfluorooctanoic acid (PFOA)
1	ES1717792003	2270642A	0874	BO002	170716	0874_BO0002_M1F_170716	ES Impact	individual	Flesh	1	1	Fish	detritivore	detritivore flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	28.2	0.5	0.5	9	9.5	0.5
1	ES1717792036	2270642A	0874	BO006	170715	0874_BO0006_B1F_170715	ES Impact	individual	Flesh	1	1	Fish	consumer	consumer flesh	Bream	Acanthopagrus australis	Sparidae	Town Common	Town Common	26	0.5	0.5	2	2.5	0.5
1	ES1717792041	2270642A	0874	BO007	170716	0874_BO0007_B1F_170716	ES Impact	individual	Flesh	1	1	Fish	consumer	consumer flesh	Bream	Acanthopagrus auratus	Sparidae	Town Common	Town Common	6	0.5	0.5	2	2.5	0.5
1	ES1717792044	2270642A	0874	BO007	170716	0874_BO0007_W1F_170716	ES Impact	individual	Flesh	1	1	Fish	consumer	consumer whole	Whiting	Sillago sihama	Sillaginidae	Town Common	Town Common	20.6	0.5	0.5	8	8.5	0.5
1	ES1717792050	2270642A	0874	BO007	170716	0874_BO0007_Q1F_170716	ES Impact	individual	Flesh	1	1	Fish	apex predator	apex predator flesh	Queenfish	Scomberoides sp.	Carangidae	Town Common	Town Common	19.4	0.5	0.5	6	6.5	0.5
1	ES1717792060	2270642A	0874	BO008	170717	0874_BO0008_M1F_170717	ES Impact	individual	Flesh	1	1	Fish	detritivore	detritivore flesh	Mullet	Mugil cephalus	Mugilidae	Rowes Bay	Mundy Creek	26.4	0.5	0.5	1	1.5	0.5
2	ES1730645004	2270642A	0874	BO002	43069	0874_BO0002_MF1_171130	ES Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove Jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River	72.9	0.5	0.5	0.5	1	0.5
2	ES1730645006	2270642A	0874	BO002	43069	0874_BO0002_FHF1_171130	ES Impact	composite	Flesh	2	1	Fish	Apex predator	Apex predator Flesh	Flathead	Platycephalus fiscus	Platycephalidae	Bohle River	Bohle River	27.7	0.5	0.5	3	3.5	0.5
2	ES1730645008	2270642A	0874	BO002	43069	0874_BO0002_FHF2_171130	ES Impact	composite	Flesh	3	1	Fish	Apex predator	Apex predator Flesh	Flathead	Platycephalus fiscus	Platycephalidae	Bohle River	Bohle River	34.4	0.5	0.5	1	1.5	0.5
2	ES1730645009	2270642A	0874	BO002	43069	0874_BO0002_BF1_171130	ES Impact	composite	Flesh	9	1	Fish	Consumer	Consumer Flesh	Bream	Acanthopagrus australis	Sparidae	Bohle River	Bohle River	42.5	0.5	0.5	0.5	1	0.5
2	ES1730645013	2270642A	0874	BO002	43069	0874_BO0002_MF1_171130	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	34.2	0.5	0.5	2	2.5	0.5
2	ES1730645015	2270642A	0874	BO002	43069	0874_BO0002_MF2_171130	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	31.8	0.5	0.5	2	2.5	0.5
2	ES1730645017	2270642A	0874	BO002	43069	0874_BO0002_MF3_171130	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	156	0.5	0.5	0.5	1	0.5
2	ES1730645019	2270642A	0874	BO002	43069	0874_BO0002_MF4_171130	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	30.7	0.5	0.5	3	3.5	0.5
2	ES1730645021	2270642A	0874	BO002	43069	0874_BO0002_MF3_171130	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	115	0.5	0.5	0.5	1	0.5
2	ES1730645023	2270642A	0874	BO007	43070	0874_BO0007_BF1_171201	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	Acanthopagrus australis	Sparidae	Town Common	Town Common	52.4	0.5	0.5	0.5	1	0.5
2	ES1730645042	2270642A	0874	BO002	43070	0874_BO0002_BF2_171201	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	Acanthopagrus australis	Sparidae	Bohle River	Bohle River	57.6	0.5	0.5	0.5	1	0.5
2	ES1730645044	2270642A	0874	BO002	43070	0874_BO0002_ML6_171201	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	42.4	0.5	0.5	2	2.5	0.5
2	ES1730645047	2270642A	0874	BO002	43070	0874_BO0002_BF3_R1_171201	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	Acanthopagrus australis	Sparidae	Bohle River	Bohle River	74.9	0.5	0.5	0.5	1	0.5
2	ES1730645048	2270642A	0874	BO002	43070	0874_BO0002_BF3_R2_171201	ES Impact	individual	Flesh	1	2	Fish	Consumer	Consumer Flesh	Bream	Acanthopagrus australis	Sparidae	Bohle River	Bohle River	85.3	0.5	0.5	0.5	1	0.5
2	ES1730645049	2270642A	0874	BO002	43070	0874_BO0002_FHF3_171201	ES Impact	composite	Flesh	2	1	Fish	Apex predator	Apex predator Flesh	Flathead	Platycephalus fiscus	Platycephalidae	Bohle River	Bohle River	36.4	0.5	0.5	0.5	1	0.5
2	ES1730645100	2270642A	0874	BO002	43072	0874_BO0002_MF1_171203	ES Impact	composite	Flesh	2	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	68.3	0.5	0.5	2	2.5	0.5
2	ES1730645102	2270642A	0874	BO002	43072	0874_BO0002_MF8_171203	ES Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	61.8	0.5	0.5	3	3.5	0.5
2	ES1730645103	2270642A	0874	BO002	43072	0874_BO0002_FHF4_171203	ES Impact	composite	Flesh	4	1	Fish	Apex predator	Apex predator Flesh	Flathead	Platycephalus fiscus	Platycephalidae	Bohle River	Bohle River	37.3	0.5	0.5	0.5	1	0.5
2	ES1730645105	2270642A	0874	BO002	43072	0874_BO0002_GF1_171203	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Grunter	Pomadasyus argenteus	Haemulidae	Bohle River	Bohle River	28.5	0.5	0.5	0.5	1	0.5
3	ES1732353005	2270642A	0874	BO002	43081	0874_BO0002_CFF1_171212	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Catfish	Neoarius graffei	Ariidae	Bohle River	Bohle River	31.9	0.5	0.5	0.5	1	0.5
3	ES1732353007	2270642A	0874	BO002	43081	0874_BO0002_MF10_171212	ES Impact	composite	Flesh	4	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	56.1	0.5	0.5	2	2.5	0.5
3	ES1732353058	2270642A	0874	BO007	43083	0874_BO0007_AF1_171214	ES Impact	composite	Flesh	2	1	Fish	Consumer	Consumer Flesh	Anchovy	Engraulis australis	Engraulidae	Town Common	Town Common	2.8	0.5	0.5	8	8.5	0.5
3	ES1732353061	2270642A	0874	BO007	43083	0874_BO0007_CFF1_R1_171214	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Catfish	Neoarius graffei	Ariidae	Town Common	Town Common	134	0.5	0.5	0.5	1	0.5
3	ES1732353062	2270642A	0874	BO007	43083	0874_BO0007_CFF1_R2_171214	ES Impact	individual	Flesh	1	2	Fish	Consumer	Consumer Flesh	Catfish	Neoarius graffei	Ariidae	Town Common	Town Common	152	0.5	0.5	0.5	1	0.5
3	ES1732353064	2270642A	0874	BO007	43083	0874_BO0007_CFF2_171214	ES Impact	composite	Flesh	2	1	Fish	Consumer	Consumer Flesh	Catfish	Neoarius graffei	Ariidae	Town Common	Town Common	40.5	0.5	0.5	11	11.5	0.5
3	ES1732353066	2270642A	0874	BO007	43083	0874_BO0007_CFF3_171214	ES Impact	composite	Flesh	2	1	Fish	Consumer	Consumer Flesh	Catfish	Neoarius graffei	Ariidae	Town Common	Town Common	38.5	0.5	0.5	2	2.5	0.5
3	ES1732353067	2270642A	0874	BO007	43083	0874_BO0007_BF2_171214	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	Acanthopagrus australis	Sparidae	Town Common	Town Common	26.2	0.5	0.5	2	2.5	0.5
3	ES1732353069	2270642A	0874	BO007	43083	0874_BO0007_BF3_171214	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Bream	Acanthopagrus australis	Sparidae	Town Common	Town Common	23.1	0.5	0.5	7	7.5	0.5
3	ES1732353071	2270642A	0874	BO007	43083	0874_BO0007_CODF1_R1_171214	ES Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Cod	Epinephelus malabaricus	Serranidae	Town Common	Town Common	30.7	0.5	0.5	1	1.5	0.5
3	ES1732353072	2270642A	0874	BO007	43083	0874_BO0007_CODF1_R2_171214	ES Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Cod	Epinephelus malabaricus	Serranidae	Town Common	Town Common	33.3	0.5	0.5	0.5	1	0.5
3	ES1732353074	2270642A	0874	BO007	43083	0874_BO0007_CODF2_171214	ES Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Cod	Epinephelus malabaricus	Serranidae	Town Common	Town Common	41.9	0.5	0.5	1	1.5	0.5
3	ES1732353076	2270642A	0874	BO007	43083	0874_BO0007_GF1_171214	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Grunter	Pomadasyus argenteus	Haemulidae	Town Common	Town Common	15.8	0.5	0.5	4	4.5	0.5
3	ES1732353078	2270642A	0874	BO007	43083	0874_BO0007_GF2_171214	ES Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Grunter	Pomadasyus argenteus	Haemulidae	Town Common	Town Common	27.2	0.5	0.5	2	2.5	0.5
3	ES1732353080	2270642A	0874	BO007	43083	0874_BO0007_MF1_171214	ES Impact	composite	Flesh	3	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Town Common	Town Common	5	0.5	0.5	59	59.5	0.5
3	ES1732353082	2270642A	0874	BO007	43083	0874_BO0007_MF2_171214	ES Impact	composite	Flesh	4	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Town Common	Town Common	2	0.5	0.5	39	39.5	0.5
3	ES1732353084	2270642A	0874	BO010	43084	0874_BO010_MF1_171215	ES Impact	composite	Flesh	3	1	Fish	Detritivore	Detritivore Flesh	Mullet	Mugil cephalus	Mugilidae	Rowes Bay	Rowes Bay	0.6	0.5	0.5	0.5	1	0.5
3	ES1732353085	2270642A	0874	BO010	43084	0874_BO010_CODF1_171215	ES Impact	composite	Flesh	2	1	Fish	Apex predator	Apex predator Flesh	Cod	Epinephelus malabaricus	Serranidae	Rowes Bay	Rowes Bay	27.1	0.5	0.5	0.5	1	0.5
3	ES1732353087	2270642A	0874	BO010	43084	0874_BO010_MJF1_171215	ES Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove Jack	Lutjanus argentimaculatus	Lutjanidae	Rowes Bay	Rowes Bay	37	0.5	0.5	0.5	1	0.5
4	ES1808994039	2270642A	0874	BO016MA	180324	BO016MA_FMF1_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden snapper (fingermark)	Lutjanus johnii	Lutjanidae	Rowes Bay	Rowes Bay	66	32.5	0.5	0.5	1	0.5
4	ES1808994040	2270642A	0874	BO016MA	180324	BO016MA_FMF2_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden snapper (fingermark)	Lutjanus johnii	Lutjanidae	Rowes Bay	Rowes Bay	66	29.5	0.5	0.5	1	0.5
4	ES1808994041	2270642A	0874	BO016MA	180324	BO016MA_FMF3_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden snapper (fingermark)	Lutjanus johnii	Lutjanidae	Rowes Bay	Rowes Bay	66	30.2	0.5	0.5	1	0.5
4	ES1808994042	2270642A	0874	BO016MA	180324	BO016MA_SMF3_180324	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Spanish mackerel	Scomberomorus commerson	Scombridae	Rowes Bay	Rowes Bay	35	29.9	0.5	2	2.5	0.5
4	ES1808994048	2270642A	0874	BO016MA	180324	BO016MA_GF2_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunter)	Pomadasyus argenteus	Haemulidae	Rowes Bay	Rowes Bay	32.5	30.4	0.5	2	2.5	0.5
4	ES1808994049	2270642A	0874	BO016MA	180324	BO016MA_PFF1_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Spotted scat	Scatophagus cf. argus	Scatophagidae	Rowes Bay	Rowes Bay	28	53.8	0.5	0.5	1	0.5
4	ES1808994050	2270642A	0874	BO016MA	180324	BO016MA_PFF2_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Spotted scat	Scatophagus cf. argus	Scatophagidae	Rowes Bay	Rowes Bay	28	67.1	0.5	0.5	1	0.5
4	ES1808994051	2270642A	0874	BO016MA	180324	BO016MA_PFF3_180324	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Spotted scat	Scatophagus cf. argus	Sc								



Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	PFHxS + PFOS	Perfluorooctanoic acid (PFOA)
4	ES1808995032	2270642A	0874	BO015MA	180322	BO015MA_BF2_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Pikey Bream	Acanthopagrus pacificus	Sparidae	Bohle River	Bohle River Mouth	24	30.3	0.5	1	1.5	0.5
4	ES1808995033	2270642A	0874	BO015MA	180322	BO015MA_BF3_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Yellowfin Bream	Acanthopagrus australis	Sparidae	Bohle River	Bohle River Mouth	23.5	27.6	0.5	0.5	1	0.5
4	ES1808995034	2270642A	0874	BO015MA	180322	BO015MA_BF4_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Yellowfin Bream	Acanthopagrus australis	Sparidae	Bohle River	Bohle River Mouth	24.5	34.1	0.5	0.5	1	0.5
4	ES1808995039	2270642A	0874	BO015MA	180322	BO015MA_FHF1_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flathead	Platycephalus endrachtensis	Platycephalidae	Bohle River	Bohle River Mouth	47	41.8	0.5	0.5	1	0.5
4	ES1808995040	2270642A	0874	BO015MA	180322	BO015MA_FHF2_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Northern sand flathead	Platycephalus endrachtensis	Platycephalidae	Bohle River	Bohle River Mouth	47	37.2	0.5	2	2.5	0.5
4	ES1808995041	2270642A	0874	BO015MA	180322	BO015MA_FHF2_180322B	MA Impact	individual	Flesh	2	1	Fish	Apex predator	Apex predator Flesh	Northern sand flathead	Platycephalus endrachtensis	Platycephalidae	Bohle River	Bohle River Mouth	47	43.4	0.5	0.5	1	0.5
4	ES1808995043	2270642A	0874	BO015MA	180322	BO015MA_BAF2_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	62	44.8	0.5	1	1.5	0.5
4	ES1808995045	2270642A	0874	BO015MA	180322	BO015MA_GF4_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunter)	Pomadasys argenteus	Haemulidae	Bohle River	Bohle River Mouth	52	27	0.5	0.5	1	0.5
4	ES1808995064	2270642A	0874	BO015MA	180322	BO015MA_GF3_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunter)	Pomadasys argenteus	Haemulidae	Bohle River	Bohle River Mouth	57	68	0.5	0.5	1	0.5
4	ES1808995065	2270642A	0874	BO015MA	180322	BO015MA_GF4_180322B	MA Impact	individual	Flesh	1	2	Fish	Consumer	Consumer Flesh	Silver javelin (grunter)	Pomadasys argenteus	Haemulidae	Bohle River	Bohle River Mouth	52	43.8	0.5	0.5	1	0.5
4	ES1809001001	2270642A	0874	BO015MA	180321	BO015MA_QFF1_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	Scomberoides tala	Sciaenidae	Bohle River	Bohle River Mouth	39	44.2	0.5	2	2.5	0.5
4	ES1809001002	2270642A	0874	BO015MA	180321	BO015MA_QFF2_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	Scomberoides tala	Sciaenidae	Bohle River	Bohle River Mouth	40.5	33.4	0.5	0.5	1	0.5
4	ES1809001003	2270642A	0874	BO015MA	180321	BO015MA_QFF3_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	Scomberoides tala	Sciaenidae	Bohle River	Bohle River Mouth	35	36.5	0.5	0.5	1	0.5
4	ES1809001004	2270642A	0874	BO015MA	180321	BO015MA_QFF4_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	Scomberoides tala	Sciaenidae	Bohle River	Bohle River Mouth	35	53.6	0.5	0.5	1	0.5
4	ES1809001010	2270642A	0874	BO015MA	180321	BO015MA_QFF5_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barred queenfish	Scomberoides tala	Sciaenidae	Bohle River	Bohle River Mouth	37.5	48	0.5	0.5	1	0.5
4	ES1809001011	2270642A	0874	BO015MA	180321	BO015MA_QFF5_180321B	MA Impact	individual	Flesh	1	2	Fish	Apex predator	Apex predator Flesh	Barred queenfish	Scomberoides tala	Sciaenidae	Bohle River	Bohle River Mouth	37.5	50.6	0.5	0.5	1	0.5
4	ES1809001048	2270642A	0874	BO015MA	180321	BO015MA_TF1_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden Trevally	Gnathanodon speciosus	Carangidae	Bohle River	Bohle River Mouth	40	59	0.5	0.5	1	0.5
4	ES1809001049	2270642A	0874	BO015MA	180321	BO015MA_TF2_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden Trevally	Gnathanodon speciosus	Carangidae	Bohle River	Bohle River Mouth	43	64.1	0.5	0.5	1	0.5
4	ES1809001050	2270642A	0874	BO015MA	180321	BO015MA_TF3_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden Trevally	Gnathanodon speciosus	Carangidae	Bohle River	Bohle River Mouth	39.5	55.2	0.5	0.5	1	0.5
4	ES1809001051	2270642A	0874	BO015MA	180321	BO015MA_TF4_180321	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Golden Trevally	Gnathanodon speciosus	Carangidae	Bohle River	Bohle River Mouth	36	51.8	0.5	0.5	1	0.5
4	ES1809001060	2270642A	0874	BO015MA	180322	BO015MA_MJF1_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River Mouth	40	72	0.5	0.5	1	0.5
4	ES1809001061	2270642A	0874	BO015MA	180322	BO015MA_MJF2_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River Mouth	32	28.1	0.5	0.5	1	0.5
4	ES1809001062	2270642A	0874	BO015MA	180322	BO015MA_MJF3_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River Mouth	31.5	56.1	0.5	0.5	1	0.5
4	ES1809001063	2270642A	0874	BO015MA	180322	BO015MA_MJF4_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Mangrove jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River Mouth	28	49.5	0.5	0.5	1	0.5
4	ES1809001069	2270642A	0874	BO015MA	180322	BO015MA_GF2_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunter)	Pomadasys argenteus	Haemulidae	Bohle River	Bohle River Mouth	52	33.8	0.5	0.5	1	0.5
4	ES1809004003	2270642A	0874	BO015MA	180322	BO015MA_GF3_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Silver javelin (grunter)	Pomadasys argenteus	Haemulidae	Bohle River	Bohle River Mouth	57	36.4	0.5	0.5	1	0.5
4	ES1809004013	2270642A	0874	BO015MA	180322	BO015MA_BAF1_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	62	46.8	0.5	0.5	1	0.5
4	ES1809004015	2270642A	0874	BO015MA	180322	BO015MA_BAF3_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	77	71.2	0.5	0.5	1	0.5
4	ES1809004016	2270642A	0874	BO015MA	180322	BO015MA_BAF4_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	76	50.3	0.5	0.5	1	0.5
4	ES1809004017	2270642A	0874	BO015MA	180322	BO015MA_BAF5_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	66	42.6	0.5	0.5	1	0.5
4	ES1809004018	2270642A	0874	BO015MA	180322	BO015MA_BAF6_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	49.5	42.8	0.5	0.5	1	0.5
4	ES1809004019	2270642A	0874	BO015MA	180322	BO015MA_BAF7_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	42	41.5	0.5	2	2.5	0.5
4	ES1809004020	2270642A	0874	BO015MA	180322	BO015MA_BAF8_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	38.5	31.1	0.5	1	1.5	0.5
4	ES1809004023	2270642A	0874	BO015MA	180322	BO015MA_BAF9_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	34	64.6	0.5	0.5	1	0.5
4	ES1809004024	2270642A	0874	BO015MA	180322	BO015MA_BAF10_180322	MA Impact	individual	Flesh	1	1	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	33	41.8	0.5	1	1.5	0.5
4	ES1809004031	2270642A	0874	BO015MA	180322	BO015MA_GF1_180322	MA Impact	individual	Flesh	1	1	Fish	Consumer	Consumer Flesh	Barred javelin (grunter)	Pomadasys kakaan	Haemulidae	Bohle River	Bohle River Mouth	57	49.1	0.5	0.5	1	0.5
4	ES1809004036	2270642A	0874	BO015MA	180322	BO015MA_BAF3_180322C	MA Impact	individual	Flesh	1	2	Fish	Apex predator	Apex predator Flesh	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	77	74.6	0.5	3	3.5	0.5
4	ES1809004068	2270642A	0874	BO015MA	180321	BO015MA_MF1_180321	MA Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mullet	Liza vaigiensis	Mugilidae	Bohle River	Bohle River Mouth	54	68.3	0.5	0.5	1	0.5
4	ES1809004069	2270642A	0874	BO015MA	180321	BO015MA_MF2_180321	MA Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mullet	Liza vaigiensis	Mugilidae	Bohle River	Bohle River Mouth	50	66	0.5	0.5	1	0.5
4	ES1809004070	2270642A	0874	BO015MA	180321	BO015MA_MF3_180321	MA Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mullet	Liza vaigiensis	Mugilidae	Bohle River	Bohle River Mouth	46	50.6	0.5	0.5	1	0.5
4	ES1809004071	2270642A	0874	BO015MA	180321	BO015MA_MF4_180321	MA Impact	individual	Flesh	1	1	Fish	Detritivore	Detritivore Flesh	Diamond scale mullet	Liza vaigiensis	Mugilidae	Bohle River	Bohle River Mouth	46	46.6	0.5	2	2.5	0.5

Notes:
Shading denotes 0.5 of LOR adopted as result where reported as less than the LOR.

Maximum	59.5	0.5
Minimum	1	0.5
90th percentile	3.5	0.5
95th percentile	7.75	0.5
95%UCL		
Count	116	116
STDEV	6.62752	0.00000
Confidence interval (95%)	1.21889	#NUM!
Mean	3	1
95%UCL (max)	4	#NUM!

Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	PFHxS + PFOS	Perfluorooctanoic acid (PFOA)
1	ES1717792004	2270642A	0874	BO002	170716	0874_BO002_M1L_170716	ES Impact	individual	Liver	1	1	1 Fish	detritivore	detritivore liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	1.1	2	45	47	0.5	
1	ES1717792035	2270642A	0874	BO006	170715	0874_BO006_B1L_170715	ES Impact	individual	Liver	1	1	1 Fish	consumer	consumer liver	Bream	Acanthopagrus australis	Sparidae	Town Common	Town Common	1	1	78	79	0.5	
1	ES1717792061	2270642A	0874	BO008	170717	0874_BO008_M1L_170717	ES Impact	individual	Liver	1	1	1 Fish	detritivore	detritivore liver	Mullet	Mugil cephalus	Mugilidae	Rowes Bay	Mundy Creek	0.6	0.5	62	62.5	0.5	
2	ES1730645003	2270642A	0874	BO002	43069	0874_BO002_MJL1_171130	ES Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Mangrove Jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River	19.5	2	17	19	1	
2	ES1730645005	2270642A	0874	BO002	43069	0874_BO002_FHL1_171130	ES Impact	composite	Liver	2	1	1 Fish	Apex predator	Apex predator Liver	Flathead	Platycephalus fiscus	Platycephalidae	Bohle River	Bohle River	14.8	1	25	26	0.5	
2	ES1730645007	2270642A	0874	BO002	43069	0874_BO002_FHL2_171130	ES Impact	composite	Liver	3	1	1 Fish	Apex predator	Apex predator Liver	Flathead	Platycephalus fiscus	Platycephalidae	Bohle River	Bohle River	17.1	1	35	36	1	
2	ES1730645010	2270642A	0874	BO002	43069	0874_BO002_BL1_171130	ES Impact	composite	Liver	9	1	1 Fish	Consumer	Consumer Liver	Bream	Acanthopagrus australis	Sparidae	Bohle River	Bohle River	15.8	0.5	9	9.5	0.5	
2	ES1730645014	2270642A	0874	BO002	43069	0874_BO002_ML1_171130	ES Impact	individual	Liver	1	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	97.5	0.5	4	4.5	0.5	
2	ES1730645016	2270642A	0874	BO002	43069	0874_BO002_ML2_171130	ES Impact	individual	Liver	1	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	12.9	0.5	15	15.5	0.5	
2	ES1730645018	2270642A	0874	BO002	43069	0874_BO002_ML3_171130	ES Impact	individual	Liver	1	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	15.4	0.5	8	8.5	0.5	
2	ES1730645020	2270642A	0874	BO002	43069	0874_BO002_ML4_171130	ES Impact	individual	Liver	1	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	15.6	0.5	15	15.5	0.5	
2	ES1730645022	2270642A	0874	BO002	43069	0874_BO002_ML5_171130	ES Impact	individual	Liver	1	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	14.6	0.5	12	12.5	0.5	
2	ES1730645024	2270642A	0874	BO007	43070	0874_BO007_BL1_171201	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Bream	Acanthopagrus australis	Sparidae	Town Common	Town Common	14.8	3	30	33	1	
2	ES1730645045	2270642A	0874	BO002	43070	0874_BO002_MF6_171201	ES Impact	individual	Liver	1	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	31.9	0.5	3	3.5	0.5	
2	ES1730645046	2270642A	0874	BO002	43070	0874_BO002_BL3_171201	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Bream	Acanthopagrus australis	Sparidae	Bohle River	Bohle River	19.9	1	1	2	1	
2	ES1730645050	2270642A	0874	BO002	43070	0874_BO002_FHL3_171201	ES Impact	composite	Liver	2	1	1 Fish	Apex predator	Apex predator Liver	Flathead	Platycephalus fiscus	Platycephalidae	Bohle River	Bohle River	14.3	0.5	24	24.5	0.5	
2	ES1730645099	2270642A	0874	BO002	43072	0874_BO002_ML7_171203	ES Impact	composite	Liver	2	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	15	1	24	25	1	
2	ES1730645101	2270642A	0874	BO002	43072	0874_BO002_ML8_171203	ES Impact	individual	Liver	1	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	14.8	0.5	12	12.5	0.5	
2	ES1730645104	2270642A	0874	BO002	43072	0874_BO002_FHL4_171203	ES Impact	composite	Liver	4	1	1 Fish	Apex predator	Apex predator Liver	Flathead	Platycephalus fiscus	Platycephalidae	Bohle River	Bohle River	13.3	0.5	9	9.5	0.5	
2	ES1730645120	2270642A	0874	BO002	43072	0874_BO002_GL1_171203	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Grunter	Pomadasy s argenteus	Haemulidae	Bohle River	Bohle River	0.5	0.5	6	6.5	0.5	
2	ES1730645121	2270642A	0874	BO002	43070	0874_BO002_BL2_171201	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Bream	Acanthopagrus australis	Sparidae	Bohle River	Bohle River	2.4	1	1	2	1	
3	ES1732353006	2270642A	0874	BO002	43081	0874_BO002_CFL1_171212	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Catfish	Neoarius graffei	Ariidae	Bohle River	Bohle River	0.6	0.5	0.5	1	0.5	
3	ES1732353008	2270642A	0874	BO002	43081	0874_BO002_ML10_171212	ES Impact	composite	Liver	4	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River	0.5	0.5	60	60.5	1	
3	ES1732353059	2270642A	0874	BO007	43083	0874_BO007_CFL1_R1_171214	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Catfish	Neoarius graffei	Ariidae	Town Common	Town Common	15.1	0.5	53	53.5	0.5	
3	ES1732353060	2270642A	0874	BO007	43083	0874_BO007_CFL1_R2_171214	ES Impact	individual	Liver	1	2	1 Fish	Consumer	Consumer Liver	Catfish	Neoarius graffei	Ariidae	Town Common	Town Common	12.3	0.5	49	49.5	0.5	
3	ES1732353063	2270642A	0874	BO007	43083	0874_BO007_CFL2_171214	ES Impact	composite	Liver	2	1	1 Fish	Consumer	Consumer Liver	Catfish	Neoarius graffei	Ariidae	Town Common	Town Common	0.6	21	386	407	2	
3	ES1732353065	2270642A	0874	BO007	43083	0874_BO007_CFL3_171214	ES Impact	composite	Liver	2	1	1 Fish	Consumer	Consumer Liver	Catfish	Neoarius graffei	Ariidae	Town Common	Town Common	1.2	74	217	291	5	
3	ES1732353068	2270642A	0874	BO007	43083	0874_BO007_BL2_171214	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Bream	Acanthopagrus australis	Sparidae	Town Common	Town Common	1	0.5	86	86.5	0.5	
3	ES1732353070	2270642A	0874	BO007	43083	0874_BO007_BL3_171214	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Bream	Acanthopagrus australis	Sparidae	Town Common	Town Common	0.4	2	120	122	0.5	
3	ES1732353073	2270642A	0874	BO007	43083	0874_BO007_CODL1_171214	ES Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Cod	Epinephelus malabaricus	Serranidae	Town Common	Town Common	0.8	1	47	48	0.5	
3	ES1732353075	2270642A	0874	BO007	43083	0874_BO007_CODL2_171214	ES Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Cod	Epinephelus malabaricus	Serranidae	Town Common	Town Common	0.7	3	66	69	0.5	
3	ES1732353077	2270642A	0874	BO007	43083	0874_BO007_GL1_171214	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Grunter	Pomadasy s argenteus	Haemulidae	Town Common	Town Common	0.2	0.5	117	117.5	0.5	
3	ES1732353079	2270642A	0874	BO007	43083	0874_BO007_GL2_171214	ES Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Grunter	Pomadasy s argenteus	Haemulidae	Town Common	Town Common	0.4	0.5	68	68.5	0.5	
3	ES1732353081	2270642A	0874	BO007	43083	0874_BO007_ML1_171214	ES Impact	composite	Liver	3	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Town Common	Town Common	0.8	1	983	984	0.5	
3	ES1732353083	2270642A	0874	BO007	43083	0874_BO007_ML2_171214	ES Impact	composite	Liver	4	1	1 Fish	Detritivore	Detritivore Liver	Mullet	Mugil cephalus	Mugilidae	Town Common	Town Common	0.7	0.5	420	420.5	0.5	
3	ES1732353086	2270642A	0874	BO010	43084	0874_BO010_CODL1_171215	ES Impact	composite	Liver	2	1	1 Fish	Apex predator	Apex predator Liver	Cod	Epinephelus malabaricus	Serranidae	Rowes Bay	Rowes Bay	0.8	0.5	0.5	1	0.5	
3	ES1732353088	2270642A	0874	BO010	43084	0874_BO010_MJL1_171215	ES Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Mangrove Jack	Lutjanus argentimaculatus	Lutjanidae	Rowes Bay	Rowes Bay	0.9	0.5	12	12.5	0.5	
4	ES1808994036	2270642A	0874	BO016MA	180324	BO016MA_FML2_180324	MA Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Golden snapper (fingermark)	Lutjanus johni	Lutjanidae	Rowes Bay	Rowes Bay	66	5.9	1	12	13	1
4	ES1808994037	2270642A	0874	BO016MA	180324	BO016MA_FML1_180324	MA Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Golden snapper (fingermark)	Lutjanus johnii	Lutjanidae	Rowes Bay	Rowes Bay	66	6.2	1	7	8	1
4	ES1808994038	2270642A	0874	BO016MA	180324	BO016MA_FML3_180324	MA Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Golden snapper (fingermark)	Lutjanus johnii	Lutjanidae	Rowes Bay	Rowes Bay	66	4.7	1	13	14	1
4	ES1808994053	2270642A	0874	BO016MA	180324	BO016MA_PFL1_180324	MA Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Spotted scat	Scatophagus cf. argus	Scatophagidae	Rowes Bay	Rowes Bay	28	3.3	0.5	2	2.5	0.5
4	ES1808994054	2270642A	0874	BO016MA	180324	BO016MA_PFL2_180324	MA Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Spotted scat	Scatophagus cf. argus	Scatophagidae	Rowes Bay	Rowes Bay	30	2.4	0.5	3	3.5	0.5
4	ES1808994055	2270642A	0874	BO016MA	180324	BO016MA_PFL4_180324	MA Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Spotted scat	Scatophagus cf. argus	Scatophagidae	Rowes Bay	Rowes Bay	28	2.6	0.5	3	3.5	0.5
4	ES1808994056	2270642A	0874	BO016MA	180324	BO016MA_PFL2_180324	MA Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Spotted scat	Scatophagus cf. argus	Scatophagidae	Rowes Bay	Rowes Bay	28	2.7	0.5	5	5.5	0.5
4	ES1808994057	2270642A	0874	BO016MA	180324	BO016MA_QFL3_180324	MA Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Barred queenfish	Scomberoides tala	Sciaenidae	Rowes Bay	Rowes Bay	36	2.1	5	58	63	0.5
4	ES1808994058	2270642A	0874	BO016MA	180324	BO016MA_QFL4_180324	MA Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Barred queenfish	Scomberoides tala	Sciaenidae	Rowes Bay	Rowes Bay	37	2.3	1	26	27	0.5
4	ES1808994060	2270642A	0874	BO016MA	180324	BO016MA_QFL1_180324	MA Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Barred queenfish	Scomberoides tala	Sciaenidae	Rowes Bay	Rowes Bay	65	6.9	4	63	67	0.5
4	ES1808994061	2270642A	0874	BO016MA	180324	BO016MA_QFL2_180324	MA Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Barred queenfish	Scomberoides tala	Sciaenidae	Rowes Bay	Rowes Bay	44.5	2.5	0.5	10	10.5	0.5
4	ES1808994065	2270642A	0874	BO016MA	180324	BO016MA_GL1_180324	MA Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Barred javelin (grunter)	Pomadasy s kakaan	Haemulidae	Rowes Bay	Rowes Bay	59	8	0.5	2	2.5	0.5
4	ES1808995001	2270642A	0874	BO016MA	180324	BO016MA_GL2_180324	MA Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Silver javelin (grunter)	Pomadasy s argenteus	Haemulidae	Rowes Bay	Rowes Bay	32.5	5.9	1	21	22	1
4	ES1808995002	2270642A	0874	BO016MA	180324	BO016MA_GL3_180324	MA Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Silver javelin (grunter)	Pomadasy s argenteus	Haemulidae	Rowes Bay	Rowes Bay	34.5	2.9	1	20	21	1
4	ES1808995003	2270642A	0874	BO016MA	180324	BO016MA_GL4_180324	MA Impact	individual	Liver	1	1	1 Fish	Consumer	Consumer Liver	Silver javelin (grunter)	Pomadasy s argenteus	Haemulidae	Rowes Bay	Rowes Bay	33	5	1	7	8	1
4	ES1808995015	2270642A	0874	BO016MA	180324	BO016MA_TSL1_180324	MA Impact	individual	Liver	1	1	1 Fish	Apex predator	Apex predator Liver	Blue Threadfin salmon	Eleutheronema tetradactylum	Polynemidae	Rowes Bay	Rowes Bay	47.5	17.8	1	5	6	1
4	ES1808995016	2270642A	087																						



Survey	ALS Sample number:	WSP Project Reference	DEFENCE Project ID	Site	Date	Sample ID	Site Type	Sample type	Component	No. of individuals in sample	Replicate	Biota Type	Trophic Level	Trophic Level / Component	Biota Common Name	Biota Species Name	Biota Family	Drainage	Location	Total Fish Length (cm)	Weight of sample prepared	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	PFHxS + PFOS	Perfluorooctanoic acid (PFOA)
4	ES1809001053	2270642A	0874	BO015MA	180321	BO015MA_TL2_180321	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden Trevally	Gnathanodon speciosus	Carangidae	Bohle River	Bohle River Mouth	43	8.7	2	45	47	0.5
4	ES1809001054	2270642A	0874	BO015MA	180321	BO015MA_TL3_180321	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden Trevally	Gnathanodon speciosus	Carangidae	Bohle River	Bohle River Mouth	39.5	11	2	45	47	0.5
4	ES1809001055	2270642A	0874	BO015MA	180321	BO015MA_TL4_180321	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Golden Trevally	Gnathanodon speciosus	Carangidae	Bohle River	Bohle River Mouth	36	11	1	33	34	0.5
4	ES1809001056	2270642A	0874	BO015MA	180321	BO015MA_ML1_180321	MA Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Sea mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River Mouth	53	14.8	0.5	43	43.5	0.5
4	ES1809001057	2270642A	0874	BO015MA	180321	BO015MA_ML2_180321	MA Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Sea mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River Mouth	40	11	0.5	30	30.5	0.5
4	ES1809001058	2270642A	0874	BO015MA	180321	BO015MA_ML3_180321	MA Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Sea mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River Mouth	53	9	0.5	14	14.5	0.5
4	ES1809001059	2270642A	0874	BO015MA	180321	BO015MA_ML4_180321	MA Impact	individual	Liver	1	1	Fish	Detritivore	Detritivore Liver	Sea mullet	Mugil cephalus	Mugilidae	Bohle River	Bohle River Mouth	45	8.2	0.5	32	32.5	0.5
4	ES1809001064	2270642A	0874	BO015MA	180322	BO015MA_ML1_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River Mouth	40	8.6	0.5	61	61.5	0.5
4	ES1809001065	2270642A	0874	BO015MA	180322	BO015MA_ML2_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River Mouth	32	5.2	0.5	22	22.5	0.5
4	ES1809001066	2270642A	0874	BO015MA	180322	BO015MA_ML3_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River Mouth	31.5	1.8	0.5	3	3.5	0.5
4	ES1809001067	2270642A	0874	BO015MA	180322	BO015MA_ML4_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Mangrove jack	Lutjanus argentimaculatus	Lutjanidae	Bohle River	Bohle River Mouth	28	1.7	0.5	44	44.5	0.5
4	ES1809001070	2270642A	0874	BO015MA	180322	BO015MA_GL1_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Silver javelin (grunter)	Pomadasys argenteus	Haemulidae	Bohle River	Bohle River Mouth	52	6	0.5	19	19.5	0.5
4	ES1809004001	2270642A	0874	BO015MA	180322	BO015MA_BAL2_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	62	9	5	45	50	1
4	ES1809004002	2270642A	0874	BO015MA	180322	BO015MA_BAL1_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	62	8.8	4	39	43	1
4	ES1809004021	2270642A	0874	BO015MA	180322	BO015MA_BAL3_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	77	5.3	3	82	85	1
4	ES1809004022	2270642A	0874	BO015MA	180322	BO015MA_BAL3_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	77	4.5	2	68	70	0.5
4	ES1809004025	2270642A	0874	BO015MA	180322	BO015MA_BAL6_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	49.5	10.8	2	57	59	0.5
4	ES1809004026	2270642A	0874	BO015MA	180322	BO015MA_BAL7_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	42	7.5	4	78	82	0.5
4	ES1809004027	2270642A	0874	BO015MA	180322	BO015MA_BAL5_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	66	22.4	3	75	78	0.5
4	ES1809004028	2270642A	0874	BO015MA	180322	BO015MA_BAL8_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	38.5	4	6	172	178	0.5
4	ES1809004029	2270642A	0874	BO015MA	180322	BO015MA_BAL9_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	34	2.8	5	143	148	0.5
4	ES1809004030	2270642A	0874	BO015MA	180322	BO015MA_BAL10_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	33	4.1	4	154	158	0.5
4	ES1809004032	2270642A	0874	BO015MA	180322	BO015MA_GL1_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Barred javelin (grunter)	Pomadasys kakaan	Haemulidae	Bohle River	Bohle River Mouth	57	6.2	0.5	18	18.5	0.5
4	ES1809004033	2270642A	0874	BO015MA	180322	BO015MA_GL3_180322	MA Impact	individual	Liver	1	1	Fish	Consumer	Consumer Liver	Silver javelin (grunter)	Pomadasys argenteus	Haemulidae	Bohle River	Bohle River Mouth	57	2.8	0.5	14	14.5	0.5
4	ES1809004035	2270642A	0874	BO015MA	180322	BO015MA_BAL4_180322	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Barramundi	Lates calcarifer	Centropomidae	Bohle River	Bohle River Mouth	76	4.6	7	228	235	0.5
4	ES1809004072	2270642A	0874	BO016MA	180324	BO016MA_SML1_180324	MA Impact	individual	Liver	1	1	Fish	Apex predator	Apex predator Liver	Spanish mackerel	Scomberomorus commerson	Scombridae	Rowes Bay	Rowes Bay	35	1.2	2	61	63	0.5
4	ES1809004077	2270642A	0874	BO015MA	180322	BO015MA_GL3_180322B	MA Impact	individual	Liver	1	2	Fish	Consumer	Consumer Liver	Silver javelin (grunter)	Pomadasys argenteus	Haemulidae	Bohle River	Bohle River Mouth	57	6.4	0.5	24	24.5	0.5

Notes:
Shading denotes 0.5 of LOR adopted as result where reported as less than the LOR.

Maximum	984	5
Minimum	1	0.5
90th percentile	148.6	1
95th percentile	189.55	1
95%UCL		
Count	99	99
STDEV	118.8074	0.50666
Confidence interval (95%)	23.69571	0.10105
Mean	63	0.7
95%UCL (max)	86	0.8

APPENDIX E

TOXICITY SUMMARY



TOXICITY SUMMARY – PFOS

CHEMICAL AND PHYSICOCHEMICAL PROPERTIES OF PFOS, PFOA AND PFHXS

PROPERTY	PFOS	PFOA	PFHxS
CAS number	1763-23-1	335-67-1	355-46-4
Formula of typical substance	C ₈ HF ₁₇ O ₃ S	C ₈ HF ₁₅ O ₂	C ₆ HF ₁₃ O ₃ S
Appearance at normal temperature and pressure	White powder (potassium salt)	White to off-white powder	White crystalline powder
Molecular mass (g/mol)	500.13	414.07	400.12
Melting point (°C)	54 (potassium salt)	37–60	No known data
Boiling point (°C)	258–260 (potassium salt)	192.4	114.7
Density at 20°C (g/mL)	~ 0.6 (potassium salt)	1.792	1.84
Water solubility at 25°C (mg/L)	520–570	3,400–9,500	2,300
Octanol-water partition coefficient (log K _{ow})	6.43	5.3	5.17
Acid disassociation constant (pK _a)	~ 3.3 (estimated)	Debated (0.5 estimated, 2.8–3.8 reported)	0.14
Organic-carbon partition coefficient (log K _{oc})	2.57–4.2	2.06–3.7	1.78
Henry's Law constant (atm·m ³ /mol)	3.05 x 10 ⁻⁹	Not measurable	Not available
Air/water partition coefficient	<2 x 10 ⁻⁶	Not available	Not available

Source: (DoH, 2017; CRC Care, 2017, Concawe, 2016)

Notes: g/mol – grams per mole; °C – degrees Celsius; g/mL – grams per millilitre; mg/L – milligrams per litre; atm·m³/mol – atmosphere – cubic metres per mole.

TOXICOLOGICAL PROFILE – PERFLUORO-N-OCTANE SULFONIC ACID (PFOS)

Perfluoro-n-octane sulfonic acid (PFOS) is from a larger group of human-made chemicals called per- and poly-fluorinated alkyl substances (PFAS) (Environment and Climate Change Canada, 2017). PFAS and their derivatives repel oil, grease and water and have been used in industrial processes and consumer products since the 1950s (ATSDR, 2015).

PFOS comprises an eight carbon chain saturated with fluorine with highly stable carbon-fluorine bonds (Environment and Climate Change Canada, 2017). PFOS is resistant to hydrolysis, photolysis, microbial degradation and metabolism by vertebrates, and is considered persistent and bioaccumulative (Environment Canada, 2006). PFOS can exist in various forms including as an anion, an acid, potassium salt, ammonium salt, diethanolamine salt and lithium salt (Environment

and Climate Change Canada, 2017). PFOS, as well as PFOA and PFHxS, are the most commonly found PFAS in the environment due to its widespread manufacture, use and physico-chemical properties. PFOS has been found in wildlife located long distances from known sources or manufacturing facilities suggesting they are capable of long-range transport (Environment Canada, 2006).

USES

PFOS and PFOS related compounds have been widely used as water, oil, soil and grease repellents, falling into three main categories: surface treatment of furnishings and apparel, paper protection and performance chemicals. Historically, PFOS was used as a surface treatment within industrial manufacturing, including leather tanneries, textile mills and carpet manufacturing plants (Environment and Climate Change Canada, 2017). The potassium salt of PFOS was used in the manufacture of aqueous film forming foams (AFFF) used as a fire fighting foam. Firefighting foams containing PFAS were used extensively worldwide and within Australia by both civilian and military authorities due to their effectiveness in extinguishing liquid fuel fires. Other uses of PFOS included photographic film, electronics chemicals, acid mist suppressants for metal plating, floor polishes and insecticide in bait stations. Phasing out or eliminating products containing PFOS began around 2000 (Environment and Climate Change Canada, 2017 and Environment Canada, 2006).

BEHAVIOUR AND FATE

PFOS is an environmentally stable compound and may be the ultimate degradation product of several fluorochemicals produced using perfluorooctane sulphonyl fluoride. Given it contains both hydrophobic and hydrophilic functional groups, it behaves differently to other hydrophobic pollutants. The acid form of PFOS will dissociate to ionic forms in neutral water and based on its vapour pressure and predicted Henry's Law constant, PFOS is not expected to volatilise (OECD, 2002 and Environment and Climate Change Canada, 2017).

The acid form of PFOS has been detected in remote locations far from direct point sources, such as environmental media and biota of the Arctic region. Various source pathways have been proposed including long-range atmospheric transport of precursor compounds and subsequent atmospheric oxidation occurring. Another source pathway is transport via ocean water. PFOS has been detected around the world in invertebrates, amphibians, fish, reptiles, birds, bird eggs and mammals, with the highest concentrations occurring in apex predators (ATSDR, 2015).

EXPOSURE

PFAS compounds have been widely detected within human serum samples, with a National Health and Nutrition Survey during 1999-200 and 2003-2004 reporting a 95-100% detection rate for PFOS, PFOA, PFNA and PFHxS (ATSDR, 2015). Subsequent studies have reported a decline in PFOS blood levels.

PFAS compounds have been detected in indoor air, outdoor air, dust, food, surface water and various consumer products and the primary route of exposure appears to be from ingestion of contaminated drinking water. PFOS has been measured in umbilical cord blood samples resulting in exposure to babies in utero and it has also been measured in human breast milk resulting in exposure to infants (ATSDR, 2015).

TOXICOKINETICS

Although not fully understood, the mode of action of PFAS is partly attributed to its structure. It is absorbed via the oral route, with >95% availability shown within 24 hours following oral administration (Borg and Håkansson, 2012 as cited in FSANZ, 2017). It is highly bound to serum albumin and other plasma proteins in both humans and animals which likely contributes to its long biological half-life. In rat oral-dosing studies, PFOS was mainly found in blood, liver, lung and kidney.

Following reviews by ATSDR 2015, EFSA 2008, Borg and Håkansson 2012, and US EPA 2016 (as cited in FSANZ, 2017), there is currently no evidence that PFOS undergoes metabolism from studies conducted in rodent or nonhuman primates.

Animal studies have not revealed any significant gender difference in half-life (US EPA, 2016 and Roberts et al. 2016, as cited in FSANZ, 2017). In humans, the elimination half-life is 5.4 years and this lack of elimination from humans appears to be due to resorption from the renal tubules back to the blood (US EPA, 2016).

HEALTH BASED GUIDANCE VALUES

In April 2017, the Commonwealth Department of Health (DoH) released health based guidance values for PFAS substances for use in site investigations in Australia (DoH 2017). The health based guidance values are a precautionary measure to protect human health while further research is conducted into the potential health impacts of PFAS (DoH, 2017).

Water-borne PFAS exposure has been shown to be toxic to freshwater and marine aquatic organisms, resulting in adverse effects on reproduction, immunology and development in exposed organisms (CRC Care, 2017). Less information is available on the potential effect of PFAS exposure on terrestrial organisms. Table E.1 below summarises the health based guidance values for use currently in Australia.

Table E.1 Health based guidance values for use in Australia

EXPOSURE SCENARIO	PFOS/PFHxS	DESCRIPTION	REFERENCE
Health based guidance values	0.02 µg/kg _{bw} /day	Tolerable daily intake (TDI)	Food Standards Australia New Zealand (FSANZ, 2017)
	0.07 µg/L	Drinking water	Australian Government Department of Health (2017)
	0.7 µg/L	Recreational water	

Note: bw = body weight

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TOXICOLOGICAL PROFILE – PERFLUOROOCTANOIC ACID (PFOA)

Perfluorooctanoic acid (PFOA) is a fully fluorinated, synthetic organic acid which is generated in the degradation of other perfluorinated compounds. It is stable to metabolic and environmental degradation due to the strong carbon-fluorine bonds. Along with other PFAS compounds, PFOA is used to make products more resistant to water, grease and stains (US EPA, 2016). It is moderately soluble in water, persistent and bioaccumulative. PFOA is currently recommended for listing as a Persistent Organic Pollutant (POP) according to the Stockholm Convention website (<http://chm.pops.int/TheConvention/ThePOPs/ChemicalsProposedforListing/tabid/2510/Default.aspx>).

USES

PFOA has been widely used in industrial processes, with initial production occurring in the 1940s. As concern grew about the potential environmental and health impacts associated with PFOA, manufacture and use in many countries was reduced from early 2000s. The US EPA launched a global 2010/2015 PFOA Stewardship program to phase out PFOA and related chemicals by 2015 involving eight major manufacturing companies. While the programs goals were successfully met, other countries such as China, India, and Russia recently increased production of PFOA and related PFAS (ITRC, 2017).

PFOA has been used in numerous industrial applications and consumer products as surface coating and protectant formulations. It's used on non-stick cookware, waterproof and breathable membranes for clothing, and in the aerospace, automotive, building and construction, chemical processing, electronics, semiconductors and textile industries (ITRC, 2017 and CRC CARE 2017).

BEHAVIOUR AND FATE

Due to its chemical stability, PFOA is persistent in the environment, resistant to biodegradation, atmospheric photooxidation, direct photolysis, and hydrolysis (US EPA, 2014). PFOA can also be formed from precursor compounds by microbial degradation or larger organism metabolism. Therefore, exposure to PFAS may occur from precursor transformation despite PFAS compounds being phased out (CRC CARE, 2017). PFOA has a reported half-life of 92 years in water and is therefore persistent in groundwater and surface waters. It sorbs to natural organic matter and may partition from the groundwater column into organic matter rich sediments and soil particles. Despite its low volatility, PFOA can be transported long distances in air because of the high atmospheric half-life (CRC CARE, 2017).

In their anionic forms, PFOA and PFOS are water soluble and can migrate readily from soil to groundwater, where they can be transported long distances (US EPA, 2014). This long-range transport of PFOA may explain the measurement of the chemical in environmental media and biota in Arctic regions, far from known point sources.

EXPOSURE

While it has been phased out in many countries, exposure to PFOA is still possible due to its legacy uses, degradation of precursors, existing use on imported goods, and its extremely high persistence in the environment and human body (US EPA, 2016). The main exposure pathway for the general human population is through food intake, while those working in manufacturing facilities may be occupationally exposed via indoor air inhalation. Precursor substances in food packaging can be metabolised in the body to PFOA. For communities that are located near a contaminated water supply, ingestion of contaminated drinking water will be the major exposure route (ATSDR, 2015).

PFOA has been detected in human breast milk and umbilical cord blood, and infants and toddlers had the highest estimated dosage due to greater hand-to-mouth contact and greater contact with treated carpet, clothes and soil/dust ingestion (ATSDR, 2015). Maternal-foetal transfer and maternal-infant transfer has been shown to occur (US EPA, 2015).

TOXICOKINETICS

PFOA is absorbed via the oral route, with >93% availability shown within 24 hours following oral administration (Borg and Håkansson, 2012 as cited in FSANZ, 2017). In circulation, its highly bound to plasma proteins, primarily albumin (Roberts et al. 2016 as cited in FSANZ, 2017).

After oral exposure, PFOA is readily absorbed and accumulates primarily in the blood serum, kidney and liver with a half-life of approximately two to nine years in humans. In most biological fluids PFOA will be present as the perfluorooctanoate anion and this greatly influences its absorption and membrane transport (US EPA, 2014).

Studies in rodents and nonhuman primates has not found quantitatively significant metabolism of PFOA, suggesting it does not undergo chemical reactions in the body (ATSDR, 2015). In humans PFOA is excreted in urine and this has been supported by further studies in rodents and nonhuman primates as the major excretion route. Another elimination pathway in females is via umbilical cord blood and breast milk (ATSDR, 2015 and US EPA, 2016). A half-life range of 2.3 to 3.8 years has been estimated in humans (Roberts et al. 2016 as cited in FSANZ, 2017).

HEALTH BASED GUIDANCE VALUES

Table E.2 below summarises the PFOA health based guidance values for use currently in Australia.

Table E.2 Health based guidance values for use in Australia

EXPOSURE SCENARIO	PFOA	DESCRIPTION	REFERENCE
Health based guidance values	0.16 µg/kg _{bw} /d	Tolerable daily intake (TDI)	Food Standards Australia New Zealand (FSANZ, 2017)
	0.56 µg/L	Drinking water	Australian Government Department of Health (2017)
	5.6 µg/L	Recreational water	

Note: bw = body weight

REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR), 2015. *Draft Toxicological Profile for Perfluoroalkyls*. August 2015.

CRC CARE, 2017. *Assessment, management and remediation guidance for perfluorooctanesulfonate (PFOS) and perfluorooctanoic acid (PFOA)*, CRC CARE Technical Report no. 38, CRC for Contamination Assessment and Remediation of the Environment, Newcastle, Australia.

FSANZ, 2017. *Hazard assessment report – Perfluorooctane Sulfonate (PFOS), Perfluorooctanoic Acid (PFOA), Perfluorohexane Sulfonate (PFHxS)*, Food Standards Australia and New Zealand.

Interstate Technology Regulatory Council (ITRC, 2017) *History and Use of Per- and Polyfluoroalkyl Substances (PFAS)*

United States Environmental Protection Agency (US EPA), 2014. *Emerging contaminants – perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA)*, *Emerging contaminants fact sheet – PFOS and PFOA*. March 2014.

US EPA, 2016. *Health effects Support Document for Perfluorooctane Sulfonate (PFOS)*. EPA Document Number: 822-R-16-002 May 2016.

TOXICOLOGICAL PROFILE – PERFLUOROHEXANE SULFONATE (PFHxS)

Perfluorohexane sulfonate (PFHxS), is a six carbon chain with a sulfonate functional group. It is a completely fluorinated organic acid which can repel both oil and water making it ideal as a component in aqueous firefighting foam and surface coating for paper, cardboard and cookware (FSANZ, 2017). The European Chemicals Agency (ECHA) has added PFHxS and its salts to the Candidate List of substances of very high concern due to its very persistent and very bioaccumulative properties (Chemical Watch, 2018).

While the largest manufacturer of PFAS ceased production in 2002, subsequently, the diethanolammonium salt of PFHxS has been used as a substitute and in particular has been reported as a component of etchants for electroplating. It has often been used as a substitute of PFOS, however animal and human data suggests the chemical may be more bioaccumulative in humans than PFOS (Chemical Watch, 2018).

USES

PFHxS has been used as surfactants, to make fluoropolymers and as water and stain protective coatings for carpets, paper and textiles. Due to its ability to reduce friction, PFHxS was also used in a variety of other industries, including aerospace, automotive, building and construction, and electronics (ATSDR, 2017).

BEHAVIOUR AND FATE

PFHxS is not expected to be susceptible to direct photolysis by sunlight and its detection in remote regions, such as the Arctic indicates it is transported long distances. It exists almost entirely in the anion form, is expected to be mobile since it does not adsorb strongly to organic matter or if released to water is not expected to adsorb to suspended solid or sediment. It has low volatility and generally resistant to biodegradation and hydrolysis. In the atmosphere, it can exist in both vapour and particulate phases (Pubchem – Chemistry Database, 2018).

EXPOSURE

As with other PFAS compounds, exposure to PFHxS is mainly through ingestion of contaminated food via cookware or food-packaging materials or contaminated water, plants and animals (FSANZ, 2017). There has been widespread detection in human serum samples and it has been detected within human breast milk, providing an exposure route for infants. Higher levels of PFHxS have been reported in blood serum of children than adults and while the observed differences have not been determined, it has been suggested that they have greater exposure due to hand to mouth transfer from treated carpets for example (ATSDR, 2015).

TOXICOKINETICS

Far less studies have been conducted with PFHxS, however the structure is similar to PFOS. The limited toxicokinetic studies conducted suggest it is readily absorbed by the oral route and studies on rats have found close to 100% is bioavailable within 24 hours of oral administration. As with PFOS and PFOA it is highly bound to plasma proteins and although tissue distribution has not been widely studied, the highest concentrations of PFHxS are generally found in liver and kidney (FSANZ, 2017).

PFHxS is excreted predominantly through urine, with smaller amounts in faeces (Li *et al.* 2017 and FSANZ, 2017). Excretion in humans is generally slower than animals, with elimination half-lives generally much shorter. The processes of reabsorption by organic anion transporters (OATs) in kidneys and uptake from enterohepatic circulation are believed to be more active in humans and thus slow down the excretion. In humans, a geometric mean half-life was determined in a study of former fluorochemical production workers by Olsen *et al.* (2009 as cited in Li *et al.* 2017 and FSANZ, 2017) of 7.3 years and 5.3 years in a population exposed to contaminated drinking water (Li *et al.*, 2017).

HEALTH BASED GUIDANCE VALUES

A review of studies on PFHxS undertaken by FSANZ (2017) found data was very limited. Only one study on rats was considered adequate and this concluded there was no evidence of reproductive or developmental toxicity. Therefore, as an interim conservative measure, FSANZ agreed with the enHealth approach of using the TDI for PFOS. This means that PFHxS and PFOS should be summed for the purposes of exposure assessment and risk characterisation (FSANZ, 2017). This is summarised in Table E.1.

REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR), 2015. *Draft Toxicological Profile for Perfluoroalkyls*. August 2015.

ATSDR, 2017. *An Overview of Perfluoroalkyl and Polyfluoroalkyl Substances and Interim Guidance for Clinicians Responding to Patient Exposure Concerns*. Interim Guidance, revised on 6/07/2017.

Chemical Watch, 2018. Global Risk and Regulation News, <https://chemicalwatch.com/> Accessed April 27 2018.

FSANZ, 2017. *Hazard assessment report – Perfluorooctane Sulfonate (PFOS), Perfluorooctanoic Acid (PFOA), Perfluorohexane Sulfonate (PFHxS)*, Food Standards Australia and New Zealand.

Li, Y., Fletcher, T., Mucs, D., Scott, K., Lindh, C., Tallving, P., and Jakobsson, K. 2017. *Half-lives of PFOS, PFHxS and PFOA after end of exposure to contaminated drinking water*. Occupational and Environmental Medicine, 75(1): 46-51.

Pubchem – Open Chemistry Database, 2018. https://pubchem.ncbi.nlm.nih.gov/compound/Perfluorohexanesulfonic_acid Accessed May 3 2018.

Updated EHS Summary of Perfluorohexane sulfonic acid for the MA TURA Science Advisory Board Meeting – March 29, 2017.

APPENDIX F

PLANT UPTAKE ESTIMATIONS AND HEALTH RISK CALCULATIONS



Appendix F - Dry Season

Estimation of Hazard Index (HI) - Direct Contact: Soil

Receptor Defence Personnel
Exposure Setting: Direct contact (oral, dermal and dust) with soil during base activities - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration:	years	30
Exposure Frequency:	days/year	240
Soil Ingestion Rate	mg/day	25
Oral Bioavailability	unitless	1
Exposure Time (indoors)	hours/day	7
Exposure Time (outdoors)	hours/day	1
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	3.70E+10
Particulate Emission Factor (indoor)	m ³ /kg	2.60E+07
Indoor Dust Transport Factor	unitless	0.5
Fraction of Soil from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	6300
Soil Adherence Factor	mg/cm ² /day	0.2
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	3.6 Mean EPC

COPC	Tolerable Daily Intake			Estimated Daily Intake			HQ			Total HI
	mg/kg/day	mg/kg/day	mg/m3	mg/kg/day	mg/kg/day	mg/m3				
	Oral	Dermal	Dust	Oral	Dermal	Dust	Oral	Dermal	Dust	
PFOS + PFHxS	1.86E-05	1.86E-05	6.51E-05	7.59E-07	1.91E-08	1.48E-09	4.1E-02	1.03E-03	2.27E-05	4.2E-02

Receptor Defence Personnel
Exposure Setting: Direct contact (oral, dermal and dust) with soil during base activities - upper limit exposure scenario

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration:	years	30
Exposure Frequency:	days/year	240
Soil Ingestion Rate	mg/day	30
Oral Bioavailability	unitless	1
Exposure Time (indoors)	hours/day	1
Exposure Time (outdoors)	hours/day	7
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	3.70E+10
Particulate Emission Factor (indoor)	m ³ /kg	2.60E+07
Indoor Dust Transport Factor	unitless	0.5
Fraction of Soil from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	7900
Soil Adherence Factor	mg/cm ² /day	1.7
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	11.2 90th percentile EPC

COPC	Tolerable Daily Intake			Estimated Daily Intake			HQ			Total HI
	mg/kg/day	mg/kg/day	mg/m3	mg/kg/day	mg/kg/day	mg/m3				
	Oral	Dermal	Dust	Oral	Dermal	Dust	Oral	Dermal	Dust	
PFOS + PFHxS	1.86E-05	1.86E-05	6.51E-05	3.16E-06	7.06E-07	2.20E-09	1.7E-01	3.80E-02	3.38E-05	2.1E-01

Appendix F - Dry Season
Estimation of Hazard Index (HI) - Inhalation of Dust Particulates

Receptor Kindergarten - Child
Exposure Setting: Inhalation of dusts generated from exposed soil - typical exposure setting

Parameter	Units	Child
Exposure Duration:	years	3
Exposure Frequency:	days/year	240
Exposure Time (indoors)	hours/day	3
Exposure Time (outdoors)	hours/day	3
Particulate Retention	unitless	0.375
Particle Emission (outdoor)	m³/kg	3.70E+10
Particle Emission (indoor)	m³/kg	2.70E+07
Indoor Dust Transport Factor	unitless	0.5
Averaging Time (Threshold)	years	3
PFOS + PFHxS - Exposure Point Concentration	mg/kg	3.6 Mean EPC

COPC	Tolerable Daily Intake	Estimated Daily Intake	HQ
	mg/m³	mg/m³	
	Dust	Dust	
PFOS + PFHxS	6.51E-05	8.63E-10	1.3E-05

Receptor Kindergarten - Adult
Exposure Setting: Inhalation of dusts generated from exposed soil - typical exposure setting

Parameter	Units	Adult
Exposure Duration:	years	30
Exposure Frequency:	days/year	240
Exposure Time (indoors)	hours/day	3
Exposure Time (outdoors)	hours/day	3
Particulate Retention	unitless	0.375
Particle Emission (outdoor)	m³/kg	3.70E+10
Particle Emission (indoor)	m³/kg	2.70E+07
Indoor Dust Transport Factor	unitless	0.5
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	3.6 Mean EPC

COPC	Tolerable Daily Intake	Estimated Daily Intake	HQ
	mg/m³	mg/m³	
	Dust	Dust	
PFOS + PFHxS	6.51E-05	8.63E-10	1.3E-05

Receptor Kindergarten - Child
Exposure Setting: Inhalation of dusts generated from exposed soil - upper limit exposure setting

Parameter	Units	Child
Exposure Duration:	years	3
Exposure Frequency:	days/year	240
Exposure Time (indoors)	hours/day	3
Exposure Time (outdoors)	hours/day	3
Particulate Retention	unitless	0.375
Particle Emission (outdoor)	m³/kg	3.70E+10
Particle Emission (indoor)	m³/kg	2.70E+07
Indoor Dust Transport Factor	unitless	0.5
Averaging Time (Threshold)	years	3
PFOS + PFHxS - Exposure Point Concentration	mg/kg	11.2 Mean EPC

COPC	Tolerable Daily Intake	Estimated Daily Intake	HQ
	mg/m³	mg/m³	
	Dust	Dust	
PFOS + PFHxS	6.51E-05	1.48E-09	2.3E-05

ReceptorKindergarten - Adult

Exposure Setting:Inhalation of dusts generated from exposed soil - upper limit exposure setting

Parameter	Units	Adult
Exposure Duration:	years	30
Exposure Frequency:	days/year	240
Exposure Time (indoors)	hours/day	3
Exposure Time (outdoors)	hours/day	3
Particulate Retention	unitless	0.375
Particle Emission (outdoor)	m ³ /kg	3.70E+10
Particle Emission (indoor)	m ³ /kg	2.70E+07
Indoor Dust Transport Factor	unitless	0.5
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	11.2Mean EPC

COPC	Tolerable Daily Intake	Estimated Daily Intake	HQ
	mg/m ³	mg/m ³	
	Dust	Dust	
PFOS + PFHxS	6.51E-05	1.48E-09	2.3E-05

Estimation of Hazard Index (HI) - Direct Contact: Soil

Parameter	Units	Adult	
Body weight	kg	78	
Exposure Duration:	years	30	
Exposure Frequency:	days/year	20	
Soil Ingestion Rate	mg/day	330	
Oral Bioavailability	unitless	1	
Exposure Time (outdoors)	hours/day	8	
Event Frequency	events/day	1	
Particulate Retention	unitless	0.375	
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08	
Fraction of Soil from Contaminated Source	unitless	1	
Conversion Factor	kg/mg	0.000001	
Area of Exposed Skin	cm ²	6300	
Soil Adherence Factor	mg/cm ² /day	0.5	
Dermal Absorption Factor	unitless	0.0005	
Averaging Time (Threshold)	years	30	
PFOs + PFHxS - Exposure Point Concentration	mg/kg	2.2	Mean EPC
PFOA - Exposure Point Concentration	mg/kg	0.08	Mean EPC

2.8E-02

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration:	years	30
Exposure Frequency:	days/year	40
Soil Ingestion Rate	mg/day	330
Oral Bioavailability	unitless	1
Exposure Time (outdoors)	hours/day	10
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08
Fraction of Soil from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	7900
Soil Adherence Factor	mg/cm ² /day	1.7
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	4.1
PFQA - Exposure Point Concentration	mg/kg	0.1

1.2E-01

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Direct Contact: Sediment

Receptor Maintenance/Utility Worker (on-Base)
Exposure Setting: Direct contact (oral and dermal) with sediment (dry season) during maintenance works - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration:	years	30
Exposure Frequency:	days/year	20
Sediment Ingestion Rate	mg/day	330
Oral Bioavailability	unitless	1
Exposure Time (outdoors)	hours/day	8
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08
Fraction of Sediment from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	6300
Adherence Factor	mg/cm ² /day	0.5
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.6 Mean EPC
PFOA - Exposure Point Concentration	mg/kg	0.007 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
	Oral	Dermal	Oral	Dermal			
PFOS + PFHxS	1.86E-05	1.86E-05	1.39E-07	6.64E-10	7.48E-03	3.57E-05	7.5E-03
PFOA	1.59E-04	1.59E-04	1.62E-09	7.74E-12	1.02E-05	4.86E-08	1.0E-05
							7.5E-03

Receptor Maintenance/Utility Worker (on-Base)
Exposure Setting: Direct contact (oral and dermal) with sediment (dry season) during maintenance works - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration:	years	30
Exposure Frequency:	days/year	40
Sediment Ingestion Rate	mg/day	330
Oral Bioavailability	unitless	1
Exposure Time (outdoors)	hours/day	10
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08
Fraction of Sediment from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	7900
Adherence Factor	mg/cm ² /day	1.7
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	1.6 90th percentile EPC
PFOA - Exposure Point Concentration	mg/kg	0.01 90th percentile EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
	Oral	Dermal	Oral	Dermal			
PFOS + PFHxS	1.86E-05	1.86E-05	8.27E-07	1.68E-08	4.44E-02	9.04E-04	4.5E-02
PFOA	1.59E-04	1.59E-04	5.17E-09	1.05E-10	3.24E-05	6.60E-07	3.3E-05
							4.5E-02

Appendix F - Wet Season**Estimation of Hazard Index (HI) - Direct Contact: Sediment**

Receptor Maintenance/Utility Worker (on-Base)
Exposure Setting: Direct contact (oral and dermal) with sediment (wet season) during maintenance works - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration:	years	30
Exposure Frequency:	days/year	20
Sediment Ingestion Rate	mg/day	330
Oral Bioavailability	unitless	1
Exposure Time (outdoors)	hours/day	8
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08
Fraction of Sediment from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	6300
Adherence Factor	mg/cm ² /day	0.5
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	4.3 Mean EPC
PFOA - Exposure Point Concentration	mg/kg	0.03 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day			
	Oral	Dermal	Oral	Dermal	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	9.97E-07	4.76E-09	5.36E-02	2.56E-04	5.4E-02
PFOA	1.59E-04	1.59E-04	6.95E-09	3.32E-11	4.37E-05	2.08E-07	4.4E-05

5.4E-02

Receptor Maintenance/Utility Worker (on-Base)
Exposure Setting: Direct contact (oral and dermal) with sediment (wet season) during maintenance works - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration:	years	30
Exposure Frequency:	days/year	40
Sediment Ingestion Rate	mg/day	330
Oral Bioavailability	unitless	1
Exposure Time (outdoors)	hours/day	10
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08
Fraction of Sediment from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	7900
Adherence Factor	mg/cm ² /day	1.7
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	10 90th percentile EPC
PFOA - Exposure Point Concentration	mg/kg	0.05 90th percentile EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day			
	Oral	Dermal	Oral	Dermal	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	5.17E-06	1.05E-07	2.78E-01	5.65E-03	2.8E-01
PFOA	1.59E-04	1.59E-04	2.58E-08	5.26E-10	1.62E-04	3.30E-06	1.7E-04

2.8E-01

Estimation of Hazard Index (HI) - Direct Contact: Soil

Parameter	Units	Adult	
Body weight	kg	78	
Exposure Duration:	years	30	
Exposure Frequency:	days/year	20	
Soil Ingestion Rate	mg/day	330	
Oral Bioavailability	unitless	1	
Exposure Time (outdoors)	hours/day	8	
Event Frequency	events/day	1	
Particulate Retention	unitless	0.375	
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08	
Fraction of Soil from Contaminated Source	unitless	1	
Conversion Factor	kg/mg	0.000001	
Area of Exposed Skin	cm ²	6300	
Soil Adherence Factor	mg/cm ² /day	0.5	
Dermal Absorption Factor	unitless	0.0005	
Averaging Time (Threshold)	years	30	
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.0002	Mean EPC
PFQA - Exposure Point Concentration	mg/kg	0.0002	Mean EPC

2.8E-06

Parameter	Units	Adult	
Body weight	kg	70	
Exposure Duration:	years	30	
Exposure Frequency:	days/year	40	
Soil Ingestion Rate	mg/day	330	
Oral Bioavailability	unitless	1	
Exposure Time (outdoors)	hours/day	10	
Event Frequency	events/day	1	
Particulate Retention	unitless	0.375	
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08	
Fraction of Soil from Contaminated Source	unitless	1	
Conversion Factor	kg/mg	0.000001	
Area of Exposed Skin	cm ²	7900	
Soil Adherence Factor	mg/cm ² /day	1.7	
Dermal Absorption Factor	unitless	0.0005	
Averaging Time (Threshold)	years	30	
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.0004	90th percentile EPC
PFOA - Exposure Point Concentration	mg/kg	0.0002	90th percentile EPC

1.2E-05

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Direct Contact: Sediment

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Direct contact (oral and dermal) with sediment during maintenance works - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration:	years	30
Exposure Frequency:	days/year	20
Sediment Ingestion Rate	mg/day	330
Oral Bioavailability	unitless	1
Exposure Time (outdoors)	hours/day	8
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08
Fraction of Sediment from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	6300
Adherence Factor	mg/cm ² /day	0.5
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.02 Mean EPC
PFOA - Exposure Point Concentration	mg/kg	0.0003 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
	Oral	Dermal	Oral	Dermal			
PFOS + PFHxS	1.86E-05	1.86E-05	4.64E-09	2.21E-11	2.49E-04	1.19E-06	2.5E-04
PFOA	1.59E-04	1.59E-04	7.42E-11	3.54E-13	4.66E-07	2.22E-09	4.7E-07
							2.5E-04

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Direct contact (oral and dermal) with sediment during maintenance works - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration:	years	30
Exposure Frequency:	days/year	40
Sediment Ingestion Rate	mg/day	330
Oral Bioavailability	unitless	1
Exposure Time (outdoors)	hours/day	10
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08
Fraction of Sediment from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	7900
Adherence Factor	mg/cm ² /day	1.7
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.04 90th percentile EPC
PFOA - Exposure Point Concentration	mg/kg	0.001 90th percentile EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
	Oral	Dermal	Oral	Dermal			
PFOS + PFHxS	1.86E-05	1.86E-05	2.07E-08	4.21E-10	1.11E-03	2.26E-05	1.1E-03
PFOA	1.59E-04	1.59E-04	4.13E-10	8.41E-12	2.60E-06	5.28E-08	2.6E-06
							1.1E-03

Appendix F - Wet Season

Estimation of Hazard Index (HI) - Direct Contact: Sediment

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Direct contact (oral and dermal) with sediment (wet season) during maintenance works - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration:	years	30
Exposure Frequency:	days/year	20
Sediment Ingestion Rate	mg/day	330
Oral Bioavailability	unitless	1
Exposure Time (outdoors)	hours/day	8
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08
Fraction of Sediment from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	6300
Adherence Factor	mg/cm ² /day	0.5
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.02 Mean EPC
PFOA - Exposure Point Concentration	mg/kg	0.0004 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day			
	Oral	Dermal	Oral	Dermal	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	4.64E-09	2.21E-11	2.49E-04	1.19E-06	2.5E-04
PFOA	1.59E-04	1.59E-04	9.27E-11	4.43E-13	5.82E-07	2.78E-09	5.9E-07

2.5E-04

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Direct contact (oral and dermal) with sediment (wet season) during maintenance works - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration:	years	30
Exposure Frequency:	days/year	40
Sediment Ingestion Rate	mg/day	330
Oral Bioavailability	unitless	1
Exposure Time (outdoors)	hours/day	10
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	4.40E+08
Fraction of Sediment from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	7900
Adherence Factor	mg/cm ² /day	1.7
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.06 90th percentile EPC
PFOA - Exposure Point Concentration	mg/kg	0.003 90th percentile EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day			
	Oral	Dermal	Oral	Dermal	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	3.10E-08	6.31E-10	1.67E-03	3.39E-05	1.7E-03
PFOA	1.59E-04	1.59E-04	1.55E-09	3.15E-11	9.73E-06	1.98E-07	9.9E-06

1.7E-03

Estimation of Hazard Index (HI) - Direct Contact: Soil

Parameter	Units	Child	
Body weight	kg	15	
Exposure Duration:	years	6	
Exposure Frequency:	days/year	365	
Soil Ingestion Rate	mg/day	100	
Oral Bioavailability	unitless	1	
Exposure Time (indoors)	hours/day	20	
Exposure Time (outdoors)	hours/day	4	
Event Frequency	events/day	1	
Particulate Retention	unitless	0.375	
Particulate Emission Factor (outdoor)	m ³ /kg	2.90E+10	
Particulate Emission Factor (indoor)	m ³ /kg	2.60E+07	
Indoor Dust Transport Factor	unitless	0.5	
Fraction of Soil from Contaminated Source	unitless	1	
Conversion Factor	kg/mg	0.000001	
Area of Exposed Skin	cm ²	6100	
Soil Adherence Factor	mg/cm ² /day	0.5	
Dermal Absorption Factor	unitless	0.0005	
Averaging Time (Threshold)	years	6	
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.0014	Mean EPC
PFOA - Exposure Point Concentration	mg/kg	0.02	Mean EPC

Total HI	1.5E-03
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Parameter	Units	Child
Body weight	kg	15
Exposure Duration:	years	6
Exposure Frequency:	days/year	365
Soil Ingestion Rate	mg/day	100
Oral Bioavailability	unitless	1
Exposure Time (indoors)	hours/day	20
Exposure Time (outdoors)	hours/day	4
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	2.90E+10
Particulate Emission Factor (indoor)	m ³ /kg	2.60E+07
Indoor Dust Transport Factor	unitless	0.5
Fraction of Soil from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	7000
Soil Adherence Factor	mg/cm ² /day	0.5
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	6
PFOA + PFHxS - Exposure Point Concentration	mg/kg	0.0013 upper limit EPC
PFOA - Exposure Point Concentration	mg/kg	0.0001 upper limit EPC

Total HI	5.8E-04
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Estimation of Hazard Index (HI) - Direct Contact: Soil

Parameter	Units	Adult	
Body weight	kg	78	
Exposure Duration:	years	29	
Exposure Frequency:	days/year	365	
Soil Ingestion Rate	mg/day	50	
Oral Bioavailability	unitless	1	
Exposure Time (indoors)	hours/day	20	
Exposure Time (outdoors)	hours/day	4	
Event Frequency	events/day	1	
Particulate Retention	unitless	0.375	
Particulate Emission Factor (outdoor)	m ³ /kg	2.90E+10	
Particulate Emission Factor (indoor)	m ³ /kg	2.60E+07	
Indoor Dust Transport Factor	unitless	0.5	
Fraction of Soil from Contaminated Source	unitless	1	
Conversion Factor	kg/mg	0.000001	
Area of Exposed Skin	cm ²	20000	
Soil Adherence Factor	mg/cm ² /day	0.5	
Dermal Absorption Factor	unitless	0.0005	
Averaging Time (Threshold)	years	29	
PFOA + PFHxS - Exposure Point Concentration	mg/kg	0.0014	Mean EPC
PFOA - Exposure Point Concentration	mg/kg	0.02	Mean EPC

Total HI	1.8E-04
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Parameter	Units	Adult
Body weight	kg	70
Exposure Duration:	years	29
Exposure Frequency:	days/year	365
Soil Ingestion Rate	mg/day	50
Oral Bioavailability	unitless	1
Exposure Time (indoors)	hours/day	20
Exposure Time (outdoors)	hours/day	4
Event Frequency	events/day	1
Particulate Retention	unitless	0.375
Particulate Emission Factor (outdoor)	m ³ /kg	2.90E+10
Particulate Emission Factor (indoor)	m ² /kg	2.60E+07
Indoor Dust Transport Factor	unitless	0.5
Fraction of Soil from Contaminated Source	unitless	1
Conversion Factor	kg/mg	0.000001
Area of Exposed Skin	cm ²	24000
Soil Adherence Factor	mg/cm ² /day	0.5
Dermal Absorption Factor	unitless	0.0005
Averaging Time (Threshold)	years	29
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.0013
PFOA	mg/kg	0.0001

upper limit EPC

Total HI	1.0E-04
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Calculation of Uptake in Home-Grown Produce
Consumption of Fruit and Vegetables by Adults and Children

Produce Group	Child Consumption Rate (g/day)	Adult Consumption Rate (g/day)	Child Consumption (g/day)	Adult Consumption (g/day)
	Typical		Upper Estimate	
Vegetables ⁽¹⁾	188	314	346	570
Fruit ⁽¹⁾	314	381	592	861
Total consumption				

Notes:

(1) Ref: ABS (2014), as presented in FSANZ (2017).

Consumption rates (from above table, with change of units)	Typical		Upper Limit	
	Vegetables	Fruit	Vegetables	Fruit
Consumption Rate Child (kg/day)	0.188	0.314	0.346	0.592
Consumption Rate Adult (kg/day)	0.314	0.381	0.57	0.861

PFAS Compound	Soil-to-Plant Concentration Factors (mg/kg fresh weight to mg/kg soil dry weight) ⁽¹⁾			
	Green Vegetables (CF _{green})	Root Vegetables (CF _{root})	Tuber Vegetables (CF _{tuber})	Tree Fruit (CF _{fruit})
PFOS	2.2E+00	5.00E-02	4.00E-02	0.07
PFOA	1.5E+00	5.00E-02	1.00E-01	0.03

Notes:

(1) Ref: NSW EPA/OEH Science (2017)

PFAS Compound	Estimated Mean Concentration in Produce from Soil (mg/kg)				
	Green Vegetables	Root vegetables	Tuber Vegetables		Fruit
PFOS	3.08E-03	7.00E-05	5.60E-05		9.80E-05
PFOA	1.50E-04	5.00E-06	1.00E-05		3.00E-06

PFAS Compound	Estimated 90th Percentile Concentration in Produce from Soil (mg/kg)			
	Green Vegetables	Root vegetables	Tuber Vegetables	Fruit
PFOS	2.86E-03	6.50E-05	5.20E-05	9.10E-05
PFOA	1.50E-04	5.00E-06	1.00E-05	3.00E-06

Average of Theoretical Estimates for Soil and Groundwater (mg/kg) - Adopted for Vegetable and Fruit Ingestion Calculations				
PFAS Compound	Mean	90th Percentile	Mean	90th Percentile
	Vegetable	Vegetable	Fruit	Fruit
PFOS + PFHxS	8.2E-04	7.7E-04	6.2E-05	1.1E-04
PFOA	4.2E-05	5.9E-05	3.0E-06	4.7E-05

Exposure Point Concentrations - Soil (shallow soil ≤0.5 mBGL)

Off-Base			
	Units	PFOS + PFHxS	PFOA
Mean	mg/kg	0.0014	0.0001
90th Percentile	mg/kg	0.0013	0.0001

Exposure Point Concentrations - Groundwater

Off-Base			
	Units	PFOS + PFHxS	PFOA
Mean	mg/L	0.0006	0.00001
90th Percentile	mg/L	0.001	0.00023

PFAS Compound	Water-to-Plant Concentration Factors (mg chemical/kg-plant per mg-chemical/L-water) ⁽¹⁾		
	Cabbage - Vegetable (CF _{veg})	Zucchini - Fruit (CF _{fruit})	Tomato - Fruit (CF _{fruit})
PFOS	1.0E-01	2.00E-01	3.00E-02
PFOA	3.0E-01	3.00E-01	3.00E-01

Notes:

(1) Ref: ToxConsult 2016, water to plant concentrations factors taken from Table 3.10.2.

PFAS Compound	Estimated Mean Concentration in Produce from Groundwater (mg/kg)			
	Cabbage - Vegetable	Zucchini - Fruit	Tomato - Fruit	Average Fruit
PFOS	6.00E-05	1.20E-04	1.80E-05	6.90E-05
PFOA	3.00E-06	3.00E-06	3.00E-06	3.00E-06

PFAS Compound	Estimated 90th Percentile Concentration in Produce from Groundwater (mg/kg)			
	Cabbage - Vegetable	Zucchini - Fruit	Tomato - Fruit	Average Fruit
PFOS	1.00E-04	2.00E-04	3.00E-05	1.15E-04
PFOA	6.90E-05	6.90E-05	6.90E-05	6.90E-05

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Resident (Child and Adult)

Receptor: Resident - Child
Exposure Setting: Consumption of home-grown vegetables - typical exposure setting

Parameter	Units	Child	
Body weight	kg	15	
Exposure Duration:	years	6	
Exposure Frequency:	days/year	365	
Ingestion Rate	kg/day	0.188	
Oral Bioavailability	unitless	1	
Fraction of produce consumed as home-grown	unitless	0.1	
Averaging Time (Threshold)	years	6	
PFOS + PFHxS - Estimated Plant Tissue Concentration	mg/kg	8.17E-04	Mean
PFOA - Estimated Plant Tissue Concentration	mg/kg	4.20E-05	Mean

COPC	Tolerable Daily Intake mg/kg/day	Estimated Daily intake mg/kg/day	HQ
PFOS + PFHxS	1.86E-05	1.02E-06	5.5E-02
PFOA	1.59E-04	5.26E-08	3.3E-04
Total HI			5.5E-02

Receptor: Resident - Adult
Exposure Setting: Consumption of home-grown vegetables - typical exposure setting

Parameter	Units	Adult	
Body weight	kg	78	
Exposure Duration:	years	29	
Exposure Frequency:	days/year	365	
Ingestion Rate	kg/day	0.314	
Oral Bioavailability	unitless	1	
Fraction of produce consumed as home-grown	unitless	0.1	
Averaging Time (Threshold)	years	29	
PFOS + PFHxS - Estimated Plant Tissue Concentration	mg/kg	8.17E-04	Mean
PFOA - Estimated Plant Tissue Concentration	mg/kg	4.20E-05	Mean

COPC	Tolerable Daily Intake mg/kg/day	Estimated Daily Intake mg/kg/day	HQ
PFOS + PFHxS	1.86E-05	3.29E-07	1.8E-02
PFOA	1.59E-04	1.69E-08	1.1E-04
Total HI			1.8E-02

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Resident (Child and Adult)

Receptor: Resident - Child
Exposure Setting: Consumption of home-grown vegetables - upper limit exposure setting

Parameter	Units	Child	
Body weight	kg	15	
Exposure Duration:	years	6	
Exposure Frequency:	days/year	365	
Ingestion Rate	kg/day	0.346	
Oral Bioavailability	unitless	1	
Fraction of produce consumed as home-grown	unitless	0.5	
Averaging Time (Threshold)	years	6	
PFOS + PFHxS - Estimated Plant Tissue Concentration	mg/kg	7.69E-04	90th Percentile
PFOA - Estimated Plant Tissue Concentration	mg/kg	5.85E-05	90th Percentile

COPC	Tolerable Daily Intake mg/kg/day	Estimated Daily Intake mg/kg/day	HQ
PFOS + PFHxS	1.86E-05	8.87E-06	4.8E-01
PFOA	1.59E-04	6.75E-07	4.2E-03
Total HI			4.8E-01

Receptor: Resident - Adult
Exposure Setting: Consumption of home-grown vegetables - upper limit exposure setting

Parameter	Units	Adult	
Body weight	kg	70	
Exposure Duration:	years	29	
Exposure Frequency:	days/year	365	
Ingestion Rate	kg/day	0.57	
Oral Bioavailability	unitless	1	
Fraction of produce consumed as home-grown	unitless	0.5	
Averaging Time (Threshold)	years	29	
PFOS + PFHxS - Estimated Plant Tissue Concentration	mg/kg	7.69E-04	90th Percentile
PFOA - Estimated Plant Tissue Concentration	mg/kg	5.85E-05	90th Percentile

COPC	Tolerable Daily Intake mg/kg/day	Estimated Daily Intake mg/kg/day	HQ
PFOS + PFHxS	1.86E-05	3.13E-06	1.7E-01
PFOA	1.59E-04	2.38E-07	1.5E-03
Total HI			1.7E-01

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Resident (Child and Adult)

Receptor: Resident - Child
Exposure Setting: Consumption of home-grown fruit - typical exposure setting

Parameter	Units	Child	
Body weight	kg	15	
Exposure Duration:	years	6	
Exposure Frequency:	days/year	365	
Ingestion Rate	kg/day	0.314	
Oral Bioavailability	unitless	1	
Fraction of produce consumed as home-grown	unitless	0.1	
Averaging Time (Threshold)	years	6	
PFOS + PFHxS - Estimated Plant Tissue Concentration	mg/kg	6.17E-05	Mean
PFOA - Estimated Plant Tissue Concentration	mg/kg	3.00E-06	Mean

COPC	Tolerable Daily Intake mg/kg/day	Estimated Daily intake mg/kg/day	HQ
PFOS + PFHxS	1.86E-05	1.29E-07	6.9E-03
PFOA	1.59E-04	6.28E-09	3.9E-05
Total HI			7.0E-03

Receptor: Resident - Adult
Exposure Setting: Consumption of home-grown fruit - typical exposure setting

Parameter	Units	Adult	
Body weight	kg	78	
Exposure Duration:	years	29	
Exposure Frequency:	days/year	365	
Ingestion Rate	kg/day	0.381	
Oral Bioavailability	unitless	1	
Fraction of produce consumed as home-grown	unitless	0.1	
Averaging Time (Threshold)	years	29	
PFOS + PFHxS - Estimated Plant Tissue Concentration	mg/kg	6.17E-05	Mean
PFOA - Estimated Plant Tissue Concentration	mg/kg	3.00E-06	Mean

COPC	Tolerable Daily Intake mg/kg/day	Estimated Daily Intake mg/kg/day	HQ
PFOS + PFHxS	1.86E-05	3.01E-08	1.6E-03
PFOA	1.59E-04	1.47E-09	9.2E-06
Total HI			1.6E-03

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Resident (Child and Adult)

Receptor: Resident - Child
Exposure Setting: Consumption of home-grown fruit - upper limit exposure setting

Parameter	Units	Child	
Body weight	kg	15	
Exposure Duration:	years	6	
Exposure Frequency:	days/year	365	
Ingestion Rate	kg/day	0.592	
Oral Bioavailability	unitless	1	
Fraction of produce consumed as home-grown	unitless	0.5	
Averaging Time (Threshold)	years	6	
PFOS + PFHxS - Estimated Plant Tissue Concentration	mg/kg	1.07E-04	90th Percentile
PFOA - Estimated Plant Tissue Concentration	mg/kg	4.70E-05	90th Percentile

COPC	Tolerable Daily Intake mg/kg/day	Estimated Daily Intake mg/kg/day	HQ
PFOS + PFHxS	1.86E-05	2.11E-06	1.1E-01
PFOA	1.59E-04	9.27E-07	5.8E-03
Total HI			1.2E-01

Receptor: Resident - Adult
Exposure Setting: Consumption of home-grown fruit - upper limit exposure

Parameter	Units	Adult	
Body weight	kg	70	
Exposure Duration:	years	29	
Exposure Frequency:	days/year	365	
Ingestion Rate	kg/day	0.861	
Oral Bioavailability	unitless	1	
Fraction of produce consumed as home-grown	unitless	0.5	
Averaging Time (Threshold)	years	29	
PFOS + PFHxS - Estimated Plant Tissue Concentration	mg/kg	1.07E-04	90th Percentile
PFOA - Estimated Plant Tissue Concentration	mg/kg	4.70E-05	90th Percentile

COPC	Tolerable Daily Intake mg/kg/day	Estimated Daily Intake mg/kg/day	HQ
PFOS + PFHxS	1.86E-05	6.58E-07	3.5E-02
PFOA	1.59E-04	2.89E-07	1.8E-03
Total HI			3.7E-02

Appendix F - Dry Season
Estimation of Hazard Index (HI) - Consumers of Aquatic Biota (Child and Adult)

Receptor: Child
Exposure Setting: Consumption of locally caught finfish (flesh) - typical exposure setting

Parameter	Units	Child	
Body weight	kg	15	
Exposure Duration:	years	6	
Exposure Frequency:	days/year	365	
Ingestion Rate for Fish	kg/day	0.028	
Oral Bioavailability	unitless	1	
Fraction of finfish consumed from contaminated source	unitless	0.5	
Averaging Time (Threshold)	years	6	
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.003	Mean

COPC	Tolerable Daily Intake mg/kg/day	Estimated Daily Intake mg/kg/day	HQ
PFOS + PFHxS	1.86E-05	2.80E-06	1.5E-01
Total HI			1.5E-01

Receptor: Adult
Exposure Setting: Consumption of locally caught finfish (flesh) - typical exposure setting

Parameter	Units	Adult	
Body weight	kg	78	
Exposure Duration:	years	29	
Exposure Frequency:	days/year	365	
Ingestion Rate for Fish	kg/day	0.056	
Oral Bioavailability	unitless	1	
Fraction of finfish consumed from contaminated source	unitless	0.5	
Averaging Time (Threshold)	years	29	
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.003	Mean

COPC	Tolerable Daily Intake	Estimated Daily Intake	HQ
	mg/kg/day	mg/kg/day	
PFOS + PFHxS	1.86E-05	1.08E-06	5.8E-02
Total HI			5.8E-02

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Consumers of Aquatic Biota (Child and Adult)

Receptor: Child
Exposure Setting: Consumption of locally caught finfish (flesh) - upper limit exposure setting

Parameter	Units	Child
Body weight	kg	15
Exposure Duration:	years	6
Exposure Frequency:	days/year	365
Ingestion Rate for Fish	kg/day	0.072
Oral Bioavailability	unitless	1
Fraction of finfish consumed from contaminated source	unitless	1
Averaging Time (Threshold)	years	6
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.004 90th Percentile

COPC	Tolerable Daily Intake	Estimated Daily Intake	HQ
	mg/kg/day	mg/kg/day	
PFOS + PFHxS	1.86E-05	1.68E-05	9.0E-01
Total HI			9.0E-01

Receptor Adult
Exposure Setting: Consumption of locally caught finfish (flesh) - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration:	years	29
Exposure Frequency:	days/year	365
Ingestion Rate for Fish	kg/day	0.143
Oral Bioavailability	unitless	1
Fraction of finfish consumed from contaminated source	unitless	1
Averaging Time (Threshold)	years	29
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.004 90th Percentile

COPC	Tolerable Daily Intake	Estimated Daily Intake	HQ
	mg/kg/day	mg/kg/day	
PFOS + PFHxS	1.86E-05	7.15E-06	3.8E-01
Total HI			3.8E-01

Appendix F - Dry Season
Estimation of Hazard Index (HI) - Consumers of Aquatic Biota (Adult)

Receptor	Adult		
Exposure Setting:	Consumption of locally caught finfish (liver) - typical exposure setting		
Parameter	Units	Adult	
Body weight	kg	78	
Exposure Duration:	years	29	
Exposure Frequency:	days/year	365	
Ingestion Rate for Fish Liver	kg/day	0.032	
Oral Bioavailability	unitless	1	
Fraction of finfish (liver) consumed from contaminated source	unitless	0.5	
Averaging Time (Threshold)	years	29	
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.06	Mean

COPC	Tolerable Daily Intake	Estimated Daily Intake	HQ
	mg/kg/day	mg/kg/day	
PFOS + PFHxS	1.86E-05	1.29E-05	6.9E-01
Total HI			6.9E-01

Receptor Adult
Exposure Setting: Consumption of locally caught finfish (liver) - upper limit exposure setting

Parameter	Units	Adult	
Body weight	kg	70	
Exposure Duration:	years	29	
Exposure Frequency:	days/year	365	
Ingestion Rate for Fish Liver	kg/day	0.084	
Oral Bioavailability	unitless	1	
Fraction of finfish (liver) consumed from contaminated source	unitless	1	
Averaging Time (Threshold)	years	29	
PFOS + PFHxS - Exposure Point Concentration	mg/kg	0.15	90th Percentile

COPC	Tolerable Daily Intake	Estimated Daily Intake	HQ
	mg/kg/day	mg/kg/day	
PFOS + PFHxS	1.86E-05	1.78E-04	9.6E+00
Total HI			9.6E+00

Appendix F - Dry Season
Estimation of Hazard Index (HI) - Incidental Exposure: Surface Water

Receptor Defence Worker
Exposure Setting: Incidental ingestion and dermal contact with surface water (dry season) during defence work - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration	years	30
Exposure Frequency	days/year	240
Exposure Time	hours/day	1
Ingestion Rate	L/hour	0.0025
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	6300
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.014 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	2.97E-07	7.49E-10	1.6E-02	4.0E-05	1.6E-02

Receptor Defence Worker
Exposure Setting: Incidental ingestion and dermal contact with surface water (dry season) during defence work - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration	years	30
Exposure Frequency	days/year	240
Exposure Time	hours/day	8
Ingestion Rate	L/hr	0.0125
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	7900
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.047 90th percentile

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	5.52E-06	2.79E-08	3.0E-01	1.50E-03	3.0E-01

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Incidental Exposure: Groundwater

Receptor Maintenance/Utility Worker (on-Base)
Exposure Setting: Incidental ingestion and dermal contact with groundwater (dry season) during maintenance work - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration	years	30
Exposure Frequency	days/year	20
Exposure Time	hours/day	8
Ingestion Rate	L/hour	0.0025
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	6300
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.36 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	6.34E-07	1.28E-08	3.4E-02	6.9E-04	3.5E-02

Receptor Maintenance/Utility Worker (on-Base)
Exposure Setting: Incidental ingestion and dermal contact with groundwater (dry season) during maintenance work - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration	years	30
Exposure Frequency	days/year	40
Exposure Time	hours/day	10
Ingestion Rate	L/hr	0.0125
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	7900
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.77 90th percentile

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	1.51E-05	9.52E-08	8.1E-01	5.12E-03	8.2E-01

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Incidental Exposure: Surface Water

Receptor Maintenance/Utility Worker (on-Base)
Exposure Setting: Incidental ingestion and dermal contact with surface water (dry season) during maintenance work - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration	years	30
Exposure Frequency	days/year	20
Exposure Time	hours/day	8
Ingestion Rate	L/hour	0.0025
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	6300
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.014 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	2.48E-08	4.99E-10	1.3E-03	2.7E-05	1.4E-03

Receptor Maintenance/Utility Worker (on-Base)
Exposure Setting: Incidental ingestion and dermal contact with surface water (dry season) during maintenance work - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration	years	30
Exposure Frequency	days/year	40
Exposure Time	hours/day	10
Ingestion Rate	L/hr	0.0125
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	7900
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.047 90th percentile

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	9.20E-07	5.81E-09	4.9E-02	3.13E-04	5.0E-02

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Incidental Exposure: Groundwater

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Incidental ingestion and dermal contact with groundwater (dry season) during maintenance work - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration	years	30
Exposure Frequency	days/year	20
Exposure Time	hours/day	8
Ingestion Rate	L/hour	0.0025
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	6300
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.0006 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	1.05E-09	2.12E-11	5.7E-05	1.1E-06	5.8E-05

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Incidental ingestion and dermal contact with groundwater (dry season) during maintenance work - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration	years	30
Exposure Frequency	days/year	40
Exposure Time	hours/day	10
Ingestion Rate	L/hr	0.0125
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	7900
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.001 90th percentile

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	1.96E-08	1.24E-10	1.1E-03	6.65E-06	1.1E-03

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Incidental Exposure: Surface Water

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Incidental ingestion and dermal contact with surface water (dry season) during maintenance work - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration	years	30
Exposure Frequency	days/year	20
Exposure Time	hours/day	8
Ingestion Rate	L/hour	0.0025
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	6300
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.0026 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	4.57E-09	9.21E-11	2.5E-04	4.9E-06	2.5E-04

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Incidental ingestion and dermal contact with surface water (dry season) during maintenance work - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration	years	30
Exposure Frequency	days/year	40
Exposure Time	hours/day	10
Ingestion Rate	L/hr	0.0125
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	7900
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.006 90th percentile

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	1.21E-07	7.67E-10	6.5E-03	4.12E-05	6.6E-03

Appendix F - Dry Season

Estimation of Hazard Index (HI) - Resident (Adult)

Receptor Resident - Adult

Exposure Setting: Direct contact with groundwater (oral and dermal) during domestic activities
(i.e. garden watering) - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration	years	35
Exposure Frequency	days/year	365
Exposure Time	hours/day	2.25
Ingestion Rate	L/hr	0.00125
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	6300
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	35
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.0006 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	9.62E-09	1.09E-10	5.2E-04	5.86E-06	5.2E-04

Receptor Resident - Adult

Exposure Setting: Direct contact with groundwater (oral and dermal) during domestic activities
(i.e. garden watering) - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration	years	35
Exposure Frequency	days/year	365
Exposure Time	hours/day	2.25
Ingestion Rate	L/hr	0.00625
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	7900
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	35
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.001 90th percentile

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	8.93E-08	2.54E-10	4.8E-03	1.37E-05	4.8E-03

Estimation of Hazard Index (HI) - Incidental Exposure: Surface Water

Parameter	Units	Adult	
Body weight	kg	78	
Exposure Duration	years	30	
Exposure Frequency	days/year	240	
Exposure Time	hours/day	1	
Ingestion Rate	L/hour	0.0025	
Oral Bioavailability	unitless	1	
Fraction of Water from Contaminated Source	unitless	1	
Area of Exposed Skin	cm ²	6300	
Dermal Permeability	cm/hr	0.000001	
Conversion Factor	L/cm ³	0.001	
Averaging Time (Threshold)	years	30	
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.022	Mean EPC
PFOA	mg/L	0.001	Mean EPC

Total HI	2.5E-02
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Parameter	Units	Adult	
Body weight	kg	70	
Exposure Duration	years	30	
Exposure Frequency	days/year	240	
Exposure Time	hours/day	8	
Ingestion Rate	L/hr	0.0125	
Oral Bioavailability	unitless	1	
Fraction of Water from Contaminated Source	unitless	1	
Area of Exposed Skin	cm ²	7900	
Dermal Permeability	cm/hr	0.000001	
Conversion Factor	L/cm ³	0.001	
Averaging Time (Threshold)	years	30	
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.045	90th percentile
PFOA - Exposure Point Concentration	mg/L	0.003	90th percentile

Total HI	2.9E-01
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Estimation of Hazard Index (HI) - Incidental Exposure: Groundwater

Parameter	Units	Adult	
Body weight	kg	78	
Exposure Duration	years	30	
Exposure Frequency	days/year	20	
Exposure Time	hours/day	8	
Ingestion Rate	L/hour	0.0025	
Oral Bioavailability	unitless	1	
Fraction of Water from Contaminated Source	unitless	1	
Area of Exposed Skin	cm ²	6300	
Dermal Permeability	cm/hr	0.000001	
Conversion Factor	L/cm ³	0.001	
Averaging Time (Threshold)	years	30	
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.28	Mean EPC
PFOA - Exposure Point Concentration	mg/L	0.009	mean EPC

Receptor	Maintenance/Utility Worker (on-Base)
Exposure Setting:	Incidental ingestion and dermal contact with groundwater (wet season) during maintenance work - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration	years	30
Exposure Frequency	days/year	40
Exposure Time	hours/day	10
Ingestion Rate	L/hr	0.0125
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	7900
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.92 90th percentile
PFOA - Exposure Point Concentration	mg/L	0.0354 90th percentile

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		HI
	Oral	Dermal	Oral	Dermal	Oral	Dermal	
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day			
PFOS + PFHxS	1.86E-05	1.86E-05	1.81E-05	1.14E-07	9.7E-01	6.15E-03	9.8E-01
PFOA	1.59E-04	1.59E-04	6.93E-07	4.38E-09	4.35E-03	2.75E-05	4.4E-03
Total HI							9.8E-01

Appendix F - Wet Season

Estimation of Hazard Index (HI) - Incidental Exposure: Groundwater

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Incidental ingestion and dermal contact with groundwater (wet season) during maintenance work - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration	years	30
Exposure Frequency	days/year	20
Exposure Time	hours/day	8
Ingestion Rate	L/hour	0.0025
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	6300
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.001 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	1.93E-09	3.89E-11	1.0E-04	2.1E-06	1.1E-04

Receptor Maintenance/Utility Worker (off-Base)
Exposure Setting: Incidental ingestion and dermal contact with groundwater (wet season) during maintenance work - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration	years	30
Exposure Frequency	days/year	40
Exposure Time	hours/day	10
Ingestion Rate	L/hr	0.0125
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	7900
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.004 90th percentile

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	8.02E-08	5.07E-10	4.3E-03	2.73E-05	4.3E-03

Appendix F - Wet Season**Estimation of Hazard Index (HI) - Incidental Exposure: Surface Water****Receptor** Maintenance/Utility Worker (off-Base)**Exposure Setting:** Incidental ingestion and dermal contact with surface water (wet season) during maintenance work - typical exposure setting

Parameter	Units	Adult
Body weight	kg	78
Exposure Duration	years	30
Exposure Frequency	days/year	20
Exposure Time	hours/day	8
Ingestion Rate	L/hour	0.0025
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	6300
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.0034 Mean EPC

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	5.97E-09	1.20E-10	3.2E-04	6.5E-06	3.3E-04

Receptor Maintenance/Utility Worker (off-Base)**Exposure Setting:** Incidental ingestion and dermal contact with surface water (wet season) during maintenance work - upper limit exposure setting

Parameter	Units	Adult
Body weight	kg	70
Exposure Duration	years	30
Exposure Frequency	days/year	40
Exposure Time	hours/day	10
Ingestion Rate	L/hr	0.0125
Oral Bioavailability	unitless	1
Fraction of Water from Contaminated Source	unitless	1
Area of Exposed Skin	cm ²	7900
Dermal Permeability	cm/hr	0.000001
Conversion Factor	L/cm ³	0.001
Averaging Time (Threshold)	years	30
PFOS + PFHxS - Exposure Point Concentration	mg/L	0.008 90th percentile

COPC	Tolerable Daily Intake		Estimated Daily Intake		HQ		Total HI
	Oral	Dermal	Oral	Dermal			
	mg/kg/day	mg/kg/day	mg/kg/day	mg/kg/day	Oral	Dermal	
PFOS + PFHxS	1.86E-05	1.86E-05	1.60E-07	1.01E-09	8.6E-03	5.45E-05	8.7E-03

APPENDIX G

GENERIC HEALTH ADVICE





Per- and Poly-Fluoroalkyl Substances (PFAS)

HEALTH EFFECTS AND EXPOSURE PATHWAYS

What are PFAS?

Per- and Poly-fluoroalkyl Substances (PFAS) are a group of man-made chemicals that have been widely used since the 1950s in household and industrial products that resist heat, oil, stains, grease and water. This included non-stick cookware, food packaging, stain protection applications to fabric, furniture and carpet, and fire-fighting foams. Since 1970, firefighting foams containing PFAS were once used extensively in Australia and elsewhere due to their effectiveness in fighting liquid fuel fires. There are many types of PFAS, with the best known examples being perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

PFAS have emerged as compounds of interest as they can travel long distances through soil and water and can get into groundwater. These substances don't break down in the environment and can accumulate in animals, including humans. More recently, PFAS have been found to have contaminated sites where there has been historical use of fire-fighting foams. In Australia, state and territory regulatory authorities have taken action to reduce the environmental and potential public health risks at sites where there is confirmed contamination with these chemicals.

How can PFAS affect people's health?

PFAS have not been proven to cause any specific illnesses in humans. However, since these chemicals remain in humans and the environment for many years, it is recommended that as a precaution human exposure to PFAS be minimised.

Research into potential health effects of PFAS is ongoing around the world. To date there is not enough information available to definitively say what, if any, health effects may be caused by exposure to PFAS.

In studies where large doses of PFAS are given to laboratory animals, possible links with effects on the immune system, liver, reproduction, development and benign (non-cancer) tumours have been identified. However, studies in people have not provided definitive results. PFAS behaves differently in the bodies of animals compared to humans, so effects shown in one animal may not mean the same thing happens in humans.

There is no current evidence that supports a substantial impact on an individual's health from PFAS exposure. A number of studies show a link between PFAS exposure and several health effects, however there is limited or no evidence of human disease accompanying these health effects. Further information on these health effects is below. Organisations that study toxic chemicals have concluded that it is not currently possible to identify any definite diseases caused by PFAS due to problems with study designs and contradictions in study results.

As part of the Australian Government's response to PFAS contamination at Defence sites, the Australian National University has been commissioned to undertake an epidemiological study (a health study that looks at patterns of disease in a population) of three sites in Australia – Williamtown in New South Wales, Oakey in Queensland and Katherine in the Northern Territory. This study is expected to add to understanding the effects of PFAS on health in this population.

What is the evidence telling us so far?

An Expert Health Panel (the Panel) for PFAS was established in late 2017 to advise the Australian Government on the evidence for potential health impacts associated with PFAS exposure and recommend priority areas for future research. The Panel provided its advice to Government in March 2018. The Panel's report is available at health.gov.au/pfas.

A number of health conditions have been highlighted for further research based on the evidence so far. These conditions have been mentioned by the Panel and other international health agencies as being possibly linked to PFAS exposure.

An explanation of the evidence available on some of the highlighted health conditions is described below.



Does PFAS exposure affect cholesterol levels?

A number of studies show a possible link between PFAS exposure and increased blood cholesterol. However, the reported increases in blood cholesterol are small. Because of the design of the studies, it can't be determined if PFAS causes the increased blood cholesterol changes or if other factors are involved, such as diet.

Does PFAS exposure cause cancer?

There is no conclusive evidence that exposure to PFAS causes cancer in humans. Some studies have shown a possible link between kidney and testicular cancers and PFAS. In these studies there was no overall increased risk of cancer. In these studies other potential cancer-causing factors such as smoking were not considered. There are also some studies that have not shown a link between cancers and PFAS exposure.

Studies in rats have shown an increase in some types of thyroid cancer. The results are inconsistent, as rates of cancer only increased with one level of exposure. Higher and lower levels of exposure did not increase cancer in the rats.

Does PFAS exposure affect kidney function?

A number of studies show a link between PFAS and reduced kidney function and increased uric acid levels in the blood. The reported increases in uric acid are generally small. From the current studies available, it has not been shown that PFAS exposure causes reduced kidney function and increased uric acid levels, or is linked to kidney disease. PFAS are eliminated from the body by the kidney. People with kidney disease are expected to have reduced elimination of PFAS and therefore higher levels in the blood. It is possible that existing reduced kidney function may have resulted in the higher levels of PFAS and uric acid reported in the studies. This is known as 'reverse causation'.

Does PFAS exposure affect the immune system?

Some studies in animals show that immune problems may be associated with PFAS exposure. Some organisations are saying that PFAS is presumed to be an immune hazard to humans based on these animal studies.

A small number of studies have shown there is a possible link between PFAS and impaired vaccine response. However, internationally, most studies that have observed decreased vaccine response have not found significant increases in incidence of human disease. The overall human evidence for impaired vaccine response is currently considered to be weak. There is no evidence that PFAS exposure leads to more infections.

One study has shown that there is a possible link between PFAS and ulcerative colitis, but no other autoimmune disease. The evidence so far does not show any link between PFAS and autoimmune problems.

Does PFAS exposure cause problems during pregnancy?

There is currently no consistent evidence that exposure to PFAS causes poor outcomes in pregnant women or their babies. Current evidence does not support PFAS being a major cause of pregnancy-induced hypertension, pre-eclampsia or other pregnancy complications. There are some studies that show a lower birth weight in babies born to mothers with higher levels of PFAS in their blood. However, the reported decreases are mostly small and within the normal range for birth weight. Because of the design of these studies, it is not possible to know if PFAS causes this change or if other factors are involved. There are also some studies that have not shown a link between a lower birth weight and PFAS exposure during pregnancy.

Does PFAS exposure affect thyroid function?

There are no consistent links between PFAS and thyroid hormones in humans. Some studies have found links between PFAS exposure and thyroid hormone levels, however the pattern of changes of the different hormones was not consistent and the changes in hormone levels reported in the studies were small and mostly within the normal range.

Does PFAS exposure affect reproductive outcomes?

A number of human studies suggest that there is a link between PFAS exposure and some reproductive outcomes and levels of sex hormones, including later age for starting menstruation (periods), early menopause, delayed puberty and reduced sperm quality.

However the differences found in these studies are generally small and within normal ranges. The findings are also likely to be affected by other variables not measured in the studies or reverse causation.

What treatment is available?

There is no practical treatment available to remove PFAS from the body. As a precaution, ongoing exposure should be minimised in all people.

Do I need to be tested for PFAS?

Individual blood testing for PFAS is not currently helpful to manage any current medical problems or to predict future health problems. All Australians are expected to have some amount of PFAS in their blood due to the wide range of things they have been used for. A broad range of levels would be expected in all communities due to background exposure. There is no level of PFAS that is considered 'normal' or 'abnormal'.

How can people be exposed to PFAS?

People can be exposed to PFAS in their workplace if they are involved in the manufacture or use of PFAS. Outside of the workplace, exposure to PFAS can occur from food, water (ground and surface water) and various consumer products. Dermal (skin) contact with PFAS is not considered a significant exposure pathway.

A number of sites in Australia, including the RAAF Base Williamtown, Army Aviation Centre Oakey and RAAF Base Tindal, are being investigated because firefighting foams containing PFAS were used there in the past. People have potentially been exposed at these sites by drinking contaminated water.

There is currently no consistent evidence that exposure to PFAS causes poor outcomes in pregnant women or their babies. However, unborn babies can be exposed to PFAS through the PFAS in their mother's body. PFAS can also be transferred to babies through breast milk.

Should I continue to breastfeed?

Yes. While some PFAS have been detected in breast milk, the proven health benefits associated with breastfeeding outweigh any potential health risk to an infant from the transfer of PFAS through breast milk. Breastfeeding mothers living in or around sites contaminated with PFAS do not need to stop breastfeeding.

How long does it take for PFAS to leave my system?

The time it takes for PFAS to be excreted from the body is the same for adults and children. In humans, studies suggest that the half-life of PFAS could range from two to nine years.

How can I reduce my exposure to PFAS?

Reducing PFAS exposure will mean avoiding contaminated sources. The available data from the 24th Australian Total Diet Survey suggests that dietary exposure to PFAS from the general food supply is likely to be low as the majority of samples in studies reported in Australia and elsewhere did not detect these chemicals in testing.

Advice will change depending on where you live and food sources from contaminated areas may have higher levels of PFAS. If you live on or near a contaminated site, please follow the most current advice provided by your state or territory government or the Department of Defence. This information will be available on their websites.

Further information

People can feel anxious or concerned for many reasons when PFAS contamination is found in their area. Help is available from your GP or mental health professional. Your GP can also follow up any physical health concerns that you may have.

Support Now

The Australian Government has engaged On The Line Australia to provide a telephone and online counselling service, called *Support Now*, for people affected by PFAS contamination. This service can be accessed for free anywhere in Australia and will provide callers with specialised telephone and online counselling services to support them during this period of uncertainty.

This telephone counselling service can be accessed by calling 1300 096 257 or by visiting supportnow.org.au.

The Department of Health

For further information regarding the Australian Government Department of Health's response to PFAS contamination, including health advice published by the Australian Health Protection Principal Committee (AHPPC) and its subcommittee enHealth, please visit the Department of Health website (health.gov.au/pfas).

Alternatively you can contact the Department of Health by phone on 1800 941 180 or by email: health.PFAS@health.gov.au.

The Department of Defence

For further information regarding the Department of Defence's response to PFAS contamination and site specific information please visit the Department of Defence website (defence.gov.au/Environment/PFAS).

Per- and poly- fluoroalkyl substances (PFAS) Factsheet

What are per- and poly- fluoroalkyl substances?

Per- and poly- fluoroalkyl substances, also known as 'PFAS', are a large group of manufactured chemicals. PFAS are also known as perfluorinated chemicals (PFCs). This group of chemicals includes perfluorooctanesulfonic acid (PFOS) and the related chemicals perfluorooctanoic acid (PFOA) and perfluorohexanesulfonic acid (PFHxS).

PFAS have been used since the 1950s in a range of common household products and in some specialty applications. These include in the manufacture of non-stick cookware; fabric, furniture and carpet stain protection applications; food packaging; some industrial processes; and in some types of fire-fighting foam.

Why are these chemicals being phased out?

The manufacture and use of some PFAS are being discontinued or limited through international agreements and voluntary actions by manufacturers primarily because of their persistence in the environment, rather than because of any established health effects. PFAS break down very slowly in the environment under naturally occurring conditions. Because of this, they tend to accumulate in the food chain and in human tissue. The international scientific community has identified this characteristic as undesirable because of the potential for unforeseen effects resulting from accumulating levels, and the difficulty in removing these chemicals from the environment once they are released.

How are people exposed to PFAS?

PFAS are found at very low levels in the blood of the general population all over the world. The general public are exposed to small amounts of PFAS in everyday life through exposure to dust, indoor and outdoor air, food, water and contact with consumer products that contain these chemicals. For most people, food is thought to be the major source of exposure. Treated carpets and floors treated with waxes and sealants that contain PFAS can be an important source of exposure for babies and infants.

PFAS may be readily absorbed through the gut and are not metabolised or broken down in the body. These chemicals are only very slowly eliminated from the body. Studies have shown that Australians have small amounts of PFAS in their blood. PFAS can also be found in urine and breast milk.

People who work in industries that use PFAS, or use products containing these chemicals, may be exposed to higher levels than the general public.

Where larger quantities of PFAS have been released into the environment, communities located near those sites may be exposed to higher levels than the general public. It is important to understand how people living near contaminated areas may come into contact with PFAS so that exposure may be minimised. This could include by examining in detail the pathways through which people could be exposed to these chemicals may be one method used to determine potential exposure in these communities.

Are there any health effects linked to PFAS in humans?

The potential effects of exposure to PFAS to human health continue to be studied. These studies involve laboratory animal studies, as well as occupationally exposed workers (i.e. manufacturing workers), residents in communities with higher exposure and studies of the general population in the USA and other countries.

Adverse health effects have been demonstrated in animal studies, but at much higher exposure levels than are found in people. However, the results of these animal studies and how they apply to humans is not always clear.

Much of the research on humans has been done with people who were exposed to relatively high levels of PFAS through their work. Workers involved in the manufacture or use of PFAS usually have higher blood PFAS levels than the general public. Studies on PFAS workers have looked for effects on cholesterol levels, male hormones, heart disease, liver changes and other effects, including cancer. These studies have not consistently shown that PFAS exposure is linked to health problems.

Whether PFAS cause health problems in humans is currently unknown, but on current evidence the potential for adverse health effects cannot be excluded. Also, because the elimination of PFAS from the human body is slow, there is a risk that continued exposure to PFAS could result in adverse health effects due to accumulation of the chemicals in the body over time. As a precaution, people living in or near an area that has been identified as having been contaminated with PFAS should take steps to limit their exposure to these chemicals.

What is the evidence telling us so far?

A number of health conditions have been highlighted for further research based on the evidence so far. These conditions have been mentioned by international health agencies as being possibly linked to PFAS exposure. The following questions provide a brief explanation of the evidence available on some of these health conditions.

Does PFAS exposure affect cholesterol levels?

A number of studies show a possible link between PFAS exposure and increased blood cholesterol. Because of the design of the studies, it can't be determined if PFAS causes the increased blood cholesterol changes or if other factors are involved, such as diet.

Does PFAS exposure cause cancer?

There is no conclusive evidence that exposure to PFAS causes cancer in humans. Some studies have shown a possible link between prostate, kidney, and testicular cancers in workers involved in the manufacture of PFAS. In these studies other potential cancer-causing factors such as smoking were not considered. There are also some studies that have not shown a link between cancers and PFAS exposure.

Studies in rats have shown an increase in some types of thyroid cancer. The results are inconsistent, as rates of cancer only increased with one level of exposure. Higher and lower levels of exposure did not increase cancer in the rats.

Does PFAS exposure affect the immune system?

Some studies in animals show that immune problems may be associated with PFAS exposure. Other studies show that there isn't an effect. Some organisations are saying that PFAS is presumed to be an immune hazard to humans based on these animal studies. In studies that do show an effect on the immune system in certain people, there is no evidence that these people get more infections.

One study has shown that there is a possible link between PFAS and ulcerative colitis, but no other autoimmune disease. The evidence so far does not show any link between PFAS and autoimmune problems.

Does PFAS exposure cause problems during pregnancy?

There is currently no consistent evidence that exposure to PFAS causes poor outcomes in pregnant women or their babies. There are some studies that show a lower birth weight in babies born to mothers with higher levels of PFAS in their blood. Because of the design of these studies, it is not possible to know if PFAS causes this change or if other factors are involved. There are also some studies that have not shown a link between a lower birth weight and PFAS exposure during pregnancy.

How can I reduce my exposure to PFAS?

PFOS and PFOA are being withdrawn from service at commercial and industrial premises, and similar products are being phased out and replaced with more sustainable alternatives. However, PFAS chemicals may be present in the environment due to historic use or release from pre-treated articles imported into Australia.

The available data from the 24th Australian Total Diet Survey suggests that dietary exposure to PFAS from the general food supply is likely to be low as the majority of samples in studies reported in Australia and elsewhere did not detect these chemicals in testing.

If you live in or near a contaminated area, advice will be provided to your community on possible exposure. The advice will include information on how you may be exposed, and what actions you can take to reduce your exposure. This advice will be specific to the particular site, and information provided to communities in other areas may not apply to you. The extent of contamination, the movement of the chemicals in the environment, and likely routes of exposure will be different at different sites.

In areas where contamination of water (for example in underground springs, water bores, dams, ponds or creeks) has been identified, human exposure can be minimised by:

- not drinking the water or using it to prepare food
- not consuming food products (for example, eggs, milk, meat, fish, fruit or vegetables) grown or produced using, or in, contaminated water
- avoiding or minimising the use of the water for showering/bathing, sprinklers or to fill swimming pools or paddling pools due to the possibility of unintentionally drinking the water.

If people are concerned about use of contaminated water, an alternative water source, if available, may be considered for poultry and use on homegrown crops.

Should I continue to breastfeed?

Yes. While some PFAS have been detected in breast milk, the proven health benefits associated with breastfeeding outweigh any potential health risk to an infant from the transfer of PFAS through breast milk. Breastfeeding mothers living in or around sites contaminated with PFAS do not need to stop breastfeeding.

How long does it take for PFAS to leave my system?

The time it takes for PFAS to be excreted from the body is the same for adults and children. In humans, studies suggest that the half-life of PFAS could range from two to nine years.

Should I get my blood tested?

Blood tests are not recommended to determine whether any medical condition is attributable to exposure to PFAS and have no current value in informing clinical management, including diagnosis, treatment or prognosis, in terms of increased risk of particular conditions over time.

Blood testing will provide information on whether you have been exposed to a higher level of these chemicals than the rest of the Australian population.

It takes a very long time for levels of these chemicals to reduce in humans, with the levels of some people taking three to eight years to reduce by half if there is no ongoing exposure. This means that levels in the blood now may reflect exposure from years ago, not necessarily recent exposure. For these reasons, it is considered that there is no value in frequent blood monitoring.

Anyone concerned about their own health or that of family members should talk to their GP or call 13HEALTH (13 43 25 84).

Mercury in fish

Purpose

This advice provides guidance on the consumption of both freshwater and marine fish that may be contaminated with mercury.

Summary

- Fish is an important part of a healthy diet.
- Some varieties of fish may contain high levels of mercury.
- Mercury can be harmful if too much is ingested.
- Pregnant women, women planning a pregnancy and young children (up to six years) should limit their consumption of fish that contain high levels of mercury.
- The rest of the population can safely eat 2 to 3 serves of most varieties fish per week, which should be sourced from different locations or sources, except shark (flake), broadbill (swordfish) and marlin which should not be eaten more than once per week.
- Fish that may contain high levels of mercury include shark (flake), broadbill (swordfish), marlin, orange roughy (deep sea perch) and catfish.
- Additional precautions are required for freshwater fish in some areas due to higher levels of naturally occurring mercury.
- Fish in Hinze Dam on the Gold Coast have elevated levels of naturally occurring mercury and should not be consumed.

Where is mercury found?

Fish and other seafood may become contaminated with mercury in their environment. The mercury may naturally come from rocks and soil or from man-made sources. Some fresh water bodies naturally contain higher levels of mercury, which is mainly in the bottom sediments rather than the water.

Mercury in fish

People take in small amounts of mercury in their diet from eating fish. The levels of mercury in most fish are very low, but some species of fish contain higher levels of mercury due to their feeding habits or surrounding environment. Mercury can accumulate in fish through the food chain from bottom sediments, so large predatory fish (those that eat other fish) and long-lived fish tend to have higher concentrations of mercury.

Marine fish that may contain high levels of mercury include shark (flake), ray, broadbill, swordfish, marlin, gemfish, orange roughy (sea perch) and catfish.

Freshwater fish in Queensland that may contain higher levels of mercury include Australian bass, Murray cod, eel and golden perch.

Health advice

Fish is an excellent source of protein, is low in saturated fat and high in unsaturated fat and omega 3 oils, and is also a rich source of iodine so everyone, including pregnant women, should regularly include fish in their diet.

People can safely eat 2 to 3 serves a week of most types of fresh water and marine fish, which should be sourced from multiple locations or sources. This includes canned fish. However, because of the presence of higher levels of mercury in some fish there are a few types you should limit in your diet.

Additional precautions are necessary for pregnant women, women planning pregnancy and young children (up to six years of age) because the developing nervous system is particularly sensitive to mercury and an unborn baby can be exposed to mercury through its mother's diet.

It is recommended that consumption of the following fish should be limited as follows:

- The general population should not eat a serve of shark (flake), broadbill (swordfish) and marlin, more than once per week and no other fish that week.
- Pregnant women, women planning pregnancy and young children (up to six years of age) should eat:
 - o A serve of Australian bass, Murray cod, eel and golden perch no more than once a week, and no other fish should be eaten during that week.
 - o A serve of orange roughy, catfish, no more than once a week, and no other fish should be eaten during that week.
 - o A serve of shark (flake), broadbill (swordfish) and marlin no more than once a fortnight and should not eat any other fish during that fortnight.

The recommended weekly servings are 75 grams for children up to six years and 150 grams for the rest of the population, including pregnant women and women planning pregnancy.

Consumers concerned about the source of their seafood should ask their supplier for more information.

Hinze Dam and other South-East Queensland dams

Can I safely eat fish from these dams?

Australian bass (fish) and water in a number of dams in South-East Queensland (SEQ) were tested for mercury in 2018.

Bass in Hinze Dam on the Gold Coast were found to have elevated levels of mercury. Based on the results, fish from Hinze Dam should not be consumed. However, they may continue to be taken on a catch and release basis. If you have occasionally eaten fish from the Hinze Dam, there is very low risk of any health effects or harm.

Lower levels of mercury were also detected in fish in the Wivenhoe, Somerset, Borumba, and North Pine dams. However, the recommended consumption limits discussed above are sufficient to protect against excessive consumption of mercury.

Is it safe to drink the water?

Mercury is not very water soluble and settles in the sediments of streams, rivers, lakes and dams. Very low levels of mercury were detected in the dams tested, including Hinze Dam. These were well within safe limits for drinking. Only treated water from these sources should be consumed because untreated water contains microorganisms that may cause illness.

Is the water safe for water activities?

The levels of mercury detected in the water of SEQ dams were all within acceptable levels for recreational use including swimming. To find out what activities are permitted at SEQ dams, visit www.seqwater.com.au/recreation.

Further information

Mercury in fish

Food Standards Australia New Zealand:

<http://www.foodstandards.gov.au/consumer/chemicals/mercury/Pages/default.aspx>

Seqwater

For information about SEQ drinking water dams and recreation activities: www.seqwater.com.au.

Mercury and your health

See your local doctor if you or a family member have health concerns.

Version: 19 September 2018

Mercury in Fish



ANSWERS TO COMMON QUESTIONS MERCURY IN FISH

1. Should I be eating fish at all leading up to or during pregnancy?

Yes. Fish is a highly nutritious food. Fish is an excellent source of high quality protein, is rich in important vitamins and minerals such as vitamin D and iodine, as well as the omega-3 fatty acids. These nutrients provide important health benefits both to you and the developing baby.

By being informed about mercury and knowing the kinds of fish to limit in your diet, you can prevent any harm to your unborn child and still enjoy the health benefits of eating fish. See the table 'Advice on Fish Consumption' for guidance on the types of fish to limit in your diet if you are pregnant or planning pregnancy.

2. Should I be concerned about mercury if I am breast-feeding my baby?

No. The benefits of breastfeeding your baby far outweighs any risk posed by the small amount of mercury that may be present in breast milk.

The critical time for the baby is while it is still developing in the womb. This is why FSANZ recommends that women start to limit their exposure to mercury from fish prior to pregnancy. By doing this it means you will reduce the amount of mercury in your body before getting pregnant. If you have limited your exposure to mercury up to and during pregnancy, the amount of mercury transferred through breast milk will be very low. As a precaution however you might like to consider limiting your mercury exposure while breastfeeding. Simply follow the same advice as for pregnant women.

3. Should I be giving young children fish to eat?

Yes. Fish is a highly nutritious food. Fish is an excellent source of high quality protein, is rich in important vitamins and minerals such as vitamin D and iodine, as well as the omega-3 fatty acids. These nutrients provide important

health benefits for young children because of their growth and development needs.

But remember, the Australian Dietary Guidelines recommend that a variety of foods be consumed. See the table 'Advice on Fish Consumption' for guidance on the types of fish to limit in your children's diet, noting the smaller serving size for young children (75 grams per serve).

4. Isn't swordfish supposed to be a good source of omega-3 fatty acids?

Yes. Swordfish contains high levels of omega-3 fatty acids but a number of other fish - such as mackerel, silver warehou, atlantic salmon, canned salmon and tuna in oil, herrings and sardines are also good sources of omega-3 fatty acids. These fish have much lower mercury levels compared to swordfish, therefore they may be eaten more frequently (e.g. 2-3 times per week).

5. Is canned tuna safe to eat regularly?

Yes. In general, it is safe for all population groups, including pregnant women, to consume 2-3 serves of any type of tuna per week (canned or fresh). Canned tuna generally has lower levels of mercury than other tuna because the tuna used for canning are smaller species that are generally caught when less than 1 year old. FSANZ has calculated that it is safe for all population groups to consume a snack can of tuna (95 grams) everyday, assuming no other fish is eaten. But remember, the Australian Dietary Guidelines recommend that a variety of foods be consumed.

6. Does processing or cooking reduce the mercury content of fish?

No. The mercury content of fish is not reduced by processing techniques such as canning or freezing or by cooking.

7. What if I only like eating shark/flake?

The advice to moderate fish intake relates mainly to the large fish, like shark/flake and billfish (including swordfish, broadbill

and marlin). If your favourite fish is flake remember FSANZ's advice to limit intake and instead consider eating a variety of other types of fish. Note that flake should not be confused with hake, which is a small white fish that does not have higher mercury levels.

8. What if I like to eat more than 2-3 serves of fish per week?

Like all foods, fish should be eaten as part of a varied and balanced diet. Over-consumption of any single food group, particularly to the exclusion of other foods, is not recommended because it can lead to dietary imbalances and may increase your intake of potentially harmful substances in food, such as mercury. If you do eat more than 2-3 serves of fish per week, it is important that you eat a variety of fish, and that you avoid those fish with the high mercury levels such as shark/flake and billfish. This is especially important if you are pregnant or intending to become pregnant.

9. What about fish oil products?

Fish oil products and supplements are not a major source of dietary mercury and there is no recommendation to restrict intake of these products on the basis of mercury content.

10. Is other seafood such as crustacea or molluscs a concern?

No. Crustacea (including prawns, lobsters, and crabs) and molluscs (including oysters and calamari) generally contain lower levels of mercury than finfish. Also crustacea and molluscs tend not be consumed as frequently. Overall this means they are not a significant source of mercury for the average consumer. However, if you consume large amounts of these foods on a regular basis, they may contribute significantly to your mercury exposure.

Food Standards Australia New Zealand
PO Box 7186, Canberra ACT 2610
Tel (02) 6271 2241
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www.foodstandards.gov.au

ADVICE ON FISH CONSUMPTION

There are many nutritional benefits from eating fish. Fish is low in saturated fat and is an excellent source of protein, essential omega-3 fatty acids, iodine, and some vitamins. Australian Dietary Guidelines recommend eating a variety of protein-rich foods including meats, poultry, fish, eggs, nuts and legumes.

In deciding how much and what types of fish to eat, be aware that all fish contain a small amount of mercury, with some types of fish having higher levels than others. Eating too much of those fish with high mercury levels, or eating them every day, could have harmful effects.

The table provides guidance on the number of serves of different types of fish that are safe to eat for different population groups.

This advice is particularly important for pregnant women and those women intending to become pregnant because the unborn baby is more vulnerable than others to the harmful effects of mercury. Young children are also included in this advice because they are growing rapidly and eat more food per kilogram of body weight than adults or older children. Their exposure to mercury may therefore be higher than adults.

Food Standards Australia New Zealand has prepared the ‘Advice on Fish Consumption’ based on the latest scientific information. The advice has been specifically developed for the Australian population and reflects local knowledge of our diets, the fish we eat and their mercury content.

The details of the advice given for other countries may vary because the risk of mercury exposure from the diet depends on the environment in that country, the type of fish commonly caught and eaten, the patterns of fish consumption and the consumption of other foods that may also contain mercury.

NUMBER OF SERVES OF DIFFERENT TYPES OF FISH THAT CAN BE SAFELY CONSUMED

Pregnant women and women planning pregnancy	Children (up to 6 years)	Rest of the population
1 serve equals 150 grams [#]	1 serve equals 75 grams [#]	1 serve equals 150 grams [#]
2 – 3 serves per week of any fish and seafood not listed in the column below		2 – 3 serves per week of any fish and seafood not listed in the column below
OR		OR
1 serve per week of Orange Roughy (Deep Sea Perch) or Catfish and no other fish that week		1 serve per week of Shark (Flake) or Billfish (Swordfish/ Broadbill, and Marlin) and no other fish that week
OR		OR
1 serve per fortnight of Shark (Flake) or Billfish (Swordfish/Broadbill, and Marlin) and no other fish that fortnight		

[#] A 150 g serve for adults and older children is equivalent to approximately 2 frozen crumbed fish portions, and a 75 gram serve for children is approximately 3 fish fingers (Hake or Hoki is used in fish fingers). Canned fish is sold in various sizes; for example, the snack size cans of tuna are approximately 95 g.

PLEASE NOTE
The Australian Dietary Guidelines advise eating one or two fish meals per week
If you are in doubt about the type of fish or boneless fish fillets you are purchasing, FSANZ recommends that you ask the retailer and confirm the name of the fish being supplied. This also applies when eating out.

FACTS ABOUT MERCURY

Mercury occurs naturally in the environment and accumulates in the aquatic food chain, including fish, as methylmercury. This means all fish will contain some methylmercury. Because of this, fish is the main source of methylmercury in the diet for most people.

The good news is that the level of methylmercury in most fish is very low. As most people consume only moderate amounts of fish, the benefits of eating fish far outweigh the risk posed by the small amount of methylmercury present. Regulations are also in place that set a limit on the amount of mercury that can be present in fish that is sold.

The amount of methylmercury in fish depends on how long the fish lives and what it eats. The big, long living or predatory fish, such as swordfish and shark/flake, tend to accumulate higher levels of methylmercury.

High levels of methylmercury can damage the nervous system. Unborn babies are particularly vulnerable because their brains are developing very rapidly. Some studies of populations that eat large amounts of fish have reported a link between consumption of fish by mothers and subtle developmental delays in their children. These changes could only be detected using special tests that measure learning and behaviour. In contrast, for adults, the first sign of excessive exposure to methylmercury is usually numbness and tingling in the fingers, lips and toes. Effects in adults occur at much higher levels of intake than that linked to effects in children following exposure in the womb.

For more information visit FSANZ website www.foodstandards.gov.au or contact the Information Officer and ask for the fact sheet *Further Information: Mercury in Fish*.

ABOUT US

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