Government of **Western Australia**
Department of **Water and Environmental Regulation**

Ambient concentrations of Perfluoroalkyl and polyfluoroalkyl substances (PFAS) in rivers and estuaries of south-west Western Australia

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Executive Summary

Ambient concentrations of per- and poly-fluoroalkyl substances (PFAS) were measured in rivers and streams within 24 catchments, and in 12 estuaries across the south-west of Western Australia. The sampling program was carried out by incorporating PFAS-specific sampling and analysis into selected sampling events within broader ongoing surface water monitoring programs undertaken by the Aquatic Science Branch and several regional offices of the Department of Water and Environmental Regulation. Between January 2020 and March 2022 a total of 131 locations were sampled, comprising 69 sites in freshwater rivers or streams and 62 sites within estuaries.

Ten PFAS compounds were detected above limits of reporting, with all concentrations being close to the limit of reporting in most cases. At the majority of sites where PFAS detections were recorded, PFOS was the only species detected, and in most instances concentrations of PFOS were below, or close to the laboratory limit of reporting. Consequently, the frequencies of PFOS detection were used to compare relative PFAS impacts within different waterways, estuaries or catchments.

PFOS was detected at 52% of all freshwater sites sampled in this study. However, the PFOS detection frequency at sites in catchments with agriculture as the dominant land use was approximately twice as high (55%) as sites in catchments dominated by uncleared bushland (26%). PFOS was detected in 100% of sites with a predominantly urban catchment.

PFOS was detected at 61% of estuarine sites, with highest PFOS concentrations, and the highest detection frequencies observed in larger estuaries, which also tended to be the estuaries with more urban development in their catchments.

Overall, the results of this investigation align with the findings of other Australian studies of ambient PFAS impacts in showing a trend in which ambient PFAS impacts increase with increasing landuse intensity. This study has shown that ambient PFAS concentrations in rivers and estuaries across the south-west of Western Australia are generally relatively low. In almost all cases, concentrations were below current environmental thresholds for the protection of aquatic species for PFOS, and below Australian health-based guideline values, indicating a low risk of toxic effects. Detections of PFAS were much more likely in agricultural and partially-urbanised catchments than in undeveloped areas. Ambient concentrations are, in most instances, below the limits of reporting in catchments that are dominated by uncleared bushland.

1 Context and Objectives

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals of global environmental concern, due to their properties of environmental persistence, toxicity, bioaccumulation and biomagnification. PFAS have been used since the 1950s in a range of industrial and consumer products. The most significant environmental releases of PFAS usually arise from their use in Aqueous Film-Forming Foams (AFFF), used for fighting liquid-based fires, including frequent environmental releases of AFFF in fire-fighting training activities. For this reason, airports, defence facilities and fuel terminals are major point sources of PFAS contamination. PFAS have also been used in a range of consumer products as stain-resistant or water-repellent surface treatments, and this has led to their ubiquitous occurrence in domestic waste streams, including emissions from wastewater treatment plants and landfills.

The PFAS National Environmental Management Plan (PFAS NEMP), developed by the Heads of EPAs Australia and New Zealand (HEPA) is Australia's primary source of guidance on the assessment and management of PFAS in the environment. The PFAS NEMP (HEPA, 2025) was developed to provide nationally-consistent guidance on PFAS, including the investigation and assessment of PFAS impacts; prevention of environmental harm from PFAS; and the management and remediation of PFAS contamination. The PFAS NEMP identifies the need for broadscale monitoring of environmental media to understand the nature and extent of low-level PFAS impacts, and to gather data on ambient concentrations in areas that are not directly impacted by known PFAS point sources.

To address this, in 2019, the Department of Water and Environmental Regulation carried out a program of surface water and groundwater sampling to assess ambient concentrations of per- and polyfluoroalkyl substances (PFAS) across the Perth metropolitan area (Richmond, 2022). The investigation program, which included sampling of surface water at 42 locations and groundwater at 35 locations, identified widespread low-level PFAS impacts in urbanised areas of the Swan Coastal Plain. Surface water bodies (urban lakes) were found to have slightly higher concentrations of PFAS than groundwater. PFAS concentrations measured across different land use types indicated that PFAS concentrations appeared to increase in line with the degree and time period of urbanisation of the surrounding land.

The objective of the current study was to expand the scope of ambient PFAS investigation in Western Australia across the south-west of the state. The aim was to provide a more comprehensive picture of PFAS distribution across the region, and to understand potential impacts on aquatic receptors such as streams, rivers and estuaries. The findings of this investigation are intended to provide valuable information to inform and support decisions in relation to the assessment and management of regional water bodies with respect to known potential PFAS impacts.

2 Background

2.1 What are PFAS?

PFAS are a broad class encompassing thousands of man-made chemicals that are generally based around a chemical structure including a fully- or partially-fluorinated chain of carbon atoms with a charged functional head group attached at one end. The functional groups are most commonly carboxylates or sulfonates, but other forms are also known. Their structure gives PFAS unique chemical properties, which include being resistant to chemical oxidation and, under different conditions, being either water or oil repellent.

These properties have led to PFAS being used in a wide range of industrial and consumer product applications (Gluge et al., 2020). Some examples include uses as protective coatings for textiles and paper; as additives in ski waxes; as components of aqueous film-forming foams (AFFF) used for firefighting; as mist-suppressants for electroplating; and as surfactants in herbicide and insecticide formulations (Kotthoff et al., 2015, Smith et al., 2016).

Perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS) and perfluorohexane sulfonic acid (PFHxS) have been the most extensively produced and studied PFAS chemicals, but many others are present in product formulations. PFAS detected in the environment typically include perfluoroalkyl sulfonates and perfluoroalkyl carboxylates with alkyl chain lengths ranging from 4 to 12 carbon atoms.

There are over 4000 discrete PFAS chemicals known, but most commercial laboratories in Australia currently offer analytical suites including at most 50 - 60 PFAS, while ‘standard’ analytical suites using liquid chromatography/tandem mass spectrometry typically report 30-40 PFAS compounds (HEPA, 2020). Various methodologies are available to detect and quantify a broader range of PFAS, but standard analytical suites are applied for most analysis of environmental samples. The chemical names, abbreviations and structures of some of the commonly analysed PFAS compounds are listed in Table 1.

Table 1 Chemical names, abbreviations and Chemical Abstracts Service (CAS) numbers of some commonly-analysed perfluoroalkyl substances

Abbreviation	Name	CAS number
Perfluoroalkyl carboxylic acids (PFCAs)		
PFBA	Perfluorobutanoic acid	375-22-4
PFPeA	Perfluoropentanoic acid	2706-90-3
PFHxA	Perfluorohexanoic acid	307-24-4
PFHpA	Perfluoroheptanoic acid	375-85-9
PFOA	Perfluorooctanoic acid	335-67-1
PFNA	Perfluorononanoic acid	375-95-1
PFDA	Perfluorodecanoic acid	335-76-2

Perfluoroalkyl sulfonic acids (PFSAs)		
PFBS	Perfluorobutanesulfonic acid	375-73-5
PFPeS	Perfluoropentanesulfonic acid	2706-91-4
PFHxS	Perfluorohexanesulfonic acid	335-46-4
PFHpS	Perfluoroheptanesulfonic acid	375-92-8
PFOS	Perfluorooctanesulfonic acid	1763-23-1
Fluorotelomer sulfonic acids (FTSAs)		
4:2 FTSA	1H.1H.2H.2H-perfluorohexanesulfonic acid	757124-72-4
6:2 FTSA	1H.1H.2H.2H-perfluorooctanesulfonic acid	27619-97-2
8:2 FTSA	1H.1H.2H.2H-perfluorodecanesulfonic acid	39108-34-4
10:2 FTSA	1H.1H.2H.2H-perfluorododecanesulfonic acid	120226-60-0

2.2 PFAS in the environment

In addition to being persistent, PFAS are known to bioaccumulate and biomagnify in food webs (D'Hollander et al., 2014). The persistence and bioaccumulative properties of PFAS have led to PFOS being listed as a persistent organic pollutant under Annex B (restriction of use) of the Stockholm Convention on Persistent Organic Pollutants in 2010 (UNEP, 2017). PFOA and PFHxS have been added to Annex A (elimination of production and use) (UNEP, 2023). Australia has not yet ratified the amendments to Annex A and Annex B of the Stockholm Convention in regard to PFOS, PFOA and PFHxS. However, the use of long chain (> 6 carbon atoms) PFAS-containing firefighting foams has been undergoing phase-out in Australia since 2010, and some Australian jurisdictions have placed bans on the use of such foams.

Although evidence relating to environmental risks of PFAS is still evolving, some adverse effects of PFAS on aquatic organisms are quite well documented (Lewis et al., 2022, Banyoi et al., 2022). Experimental evidence indicates trans-generational toxicity of perfluoroalkyl acids, suggesting that long-term consequences for aquatic ecosystems should be a matter of concern (Lee et al., 2019). The majority of ecotoxicity studies to date have focussed on PFOS, and PFOA, but other PFAS have received some attention. In general, long-chain (>C7) PFAS are considered to be more toxic than short-chain compounds, and the longer chain species also have a greater tendency to bioaccumulate (e.g. Chambers et al 2021).

Sources of environmental release of chemicals may be categorised as either point sources, or diffuse sources. Point sources have a single identifiable origin and generally impact a defined and localised area. Because PFAS have been used in foams for the suppression of flammable liquid fires, fire-fighting training activities at airports or defence bases are the most common cause of major point-source PFAS contamination in Australia. Large fuel storage facilities are also potential point sources due to the use of foam-based deluge systems for fire control. Since PFAS are also found in consumer products that people use daily, PFAS

enter domestic waste streams and are present in landfill leachate, wastewater and biosolids (Smith et al., 2016, UNEP, 2017).

Ambient PFAS in the environment can arise from diffuse sources – that is, from long-range dispersion of PFAS through aerial transport. Some point sources, for example, fire-training exercises, fire emergency response or aeration of wastewater treatment ponds can give rise to the formation of aerosols containing PFAS compounds which can then disperse over a wide area. Rainfall and surface water flow can also transport and disperse PFAS over long distances, and as a result PFAS can be detected in soil and water in areas far removed from any point sources (Xie et al., 2015, Ahrens and Bundschuh, 2014). Many international studies have investigated ambient concentrations of PFAS in areas far removed from any point sources, and detectable concentrations of PFAS have been found in soils (Vedagiri et al., 2018), freshwater (Zushi et al., 2008), marine water (Yamashita et al., 2005) and even arctic snow (Xie et al., 2015). A study investigating the distribution and transport of trace PFAS in the Indian Ocean reported that the highest PFAS concentrations were observed in the north-west Indian ocean, due to transport by ocean current from the north-west Pacific Ocean through the South China Sea (Han et al., 2022).

In this report, the term ‘ambient concentration’ is used to refer to the concentration of PFAS identified in locations where the impacts are understood to be reasonably uniform over a wide area and cannot be attributed to a single point source.

2.3 Ambient PFAS investigations in Australia

A small number of studies has been published on the assessment of background PFAS concentrations in an Australian context. A study of perfluorinated alkyl acids in the waters and biota of Sydney Harbour found PFOS and PFOA concentrations in water ranged from 0.0075 to 0.021 μg/L and 0.0042 to 0.0064 μg/L, respectively (Thompson et al., 2011). An investigation into PFAS concentrations in the Brisbane River system following a major flood event in 2011 returned similar findings, with mean PFOS concentrations in the range 0.00018 to 0.015 μg/L and mean PFOA concentrations ranging from 0.00013 to 0.0061 μg/L (Gallen et al., 2014).

A snapshot survey of PFAS in two freshwater and five estuarine sites around Port Phillip Bay, Victoria, was undertaken in September 2012 (Allinson et al., 2019). Of the 19 compounds in the analysis suite, results were reported for 18, with PFOS and PFHxS reported at higher concentrations than other PFAS at both freshwater and estuarine sites, followed by PFOA and PFHxA.

A study carried out for the Northern Territory Department of Health measured PFAS in sediments and edible biota in creeks around the Darwin urban area and a reference area (Munksgaard et al., 2016). They found concentrations of PFAS in sediment and biota to be higher in creeks around the Darwin urban area compared to the reference site nearby.

Ambient concentrations of PFAS compounds and various other contaminants of emerging concern were measured in soil, surface water and sediments within five urban regions of Victoria, including the Melbourne urban area (Sardiña et al., 2019). The study found that PFAS (especially PFOS) were detected most frequently in sediment samples, with more

variable results between regions and across land use gradients for soil and surface water samples. Concentrations of PFAS in surface water were also temporally variable due to changes in rainfall and streamflow inputs, and the study concluded that seasonal monitoring was important to fully understand the risks to aquatic ecosystems from legacy environmental PFAS. Additional investigations on the occurrence, concentration, and spatial distribution of PFAS across a gradient of land-use intensity have been published in a summary report by EPA Victoria (EPA Victoria, 2022).

The Queensland Government undertook a state-wide sampling program between May 2019 and March 2020, with water samples collected every two months at 55 sites covering the coast from the Wet Tropics to South East Queensland (Baddiley et al., 2020).

While ambient studies in Australia detect low concentrations of PFAS across a wide range of land use categories, there is a general trend of higher concentrations being detected in proximity to urbanised areas. DWER's ambient sampling in the Perth metropolitan area in 2019-20 (DWER, 2022) has indicated that concentrations of PFAS in urban lakes and groundwater tend to be higher in areas with a higher degree of urbanisation in their catchment.

3 Investigation program

3.1 Site selection

Sampling was conducted on an opportunistic basis in conjunction with periodic sampling carried out through the Department of Water and Environmental Regulation's Healthy Rivers Program, the Regional Estuaries Initiative and various additional regional monitoring programs. Sampling locations comprise sites within estuarine waters, brackish tidal rivers and freshwater rivers and streams.

For the purposes of this study, sampling sites are categorised as either "estuarine" or "freshwater" based on the salinity of the water at the time of sampling. Where the salinity in the sampling location was measured as saline or brackish (total dissolved solids [TDS] > 1500 mg/L) then the site was considered an estuarine site. All other sites (TDS < 1500 mg/L) were categorised as freshwater sites.

The geospatial range of estuarine and freshwater sites sampled in this study is shown on the maps in Appendix A. Twelve estuaries were sampled ranging from the Moore River estuary north of Perth, to the Wellstead Estuary near Bremer Bay. Freshwater sites included locations in 24 catchments across a similar geographical area.

3.2 Assigning land use categories

PFAS concentrations in the environment are likely to reflect the type and intensity of surrounding land uses (Breitmeyer et al., 2023, Sim et al., 2021). Land use classification allows the assessment of the ambient data within its broader land use setting. Freshwater sampling sites were each assigned to a broad land use class based on assessment of the dominant land use in the upstream catchment for each site (see Table 2).

The approach to assigning land use classes was consistent with that applied in ambient studies carried out by EPA Victoria (Victoria, 2022) (Sardiña et al., 2024). A land use classification of *remote-ambient* was assigned to sampling locations having > 85% conservation areas, state forest or national parks in their upstream catchment. The land use classification of *agricultural-ambient* was assigned to sampling locations where the upstream catchment contained >60% high- or low-intensity agriculture and <10% commercial and industrial land and/or <25% residential land. Three sampling locations with urban residential or industrial land use comprising >50% of the upstream catchment were assigned an *urban-ambient* classification.

Table 2 Freshwater rivers and streams sampled in this investigation, showing the land use categories sampled in each catchment

Catchment	Number of sites	Land use category		
		Agric.	Remote	Urban
Moore River	2	2	0	0
Brunswick River	4	4	0	0
Collie River	13	7	6	0
Preston River	2	2	0	0
Capel River	2	2	0	0
Sabina River	1	1	0	0
Annie Brook	1	1	0	0
Vasse River	2	2	0	0
Blackwood River	1	1	0	0
Donnelly River	7	1	6	0
Warren River	8	5	3	0
Walpole River	1	0	1	0
Little River	1	1	0	0
Denmark River	6	1	4	1
Hay River	1	1	0	0
Sleeman River	1	1	0	0
Unndiup Creek	1	1	0	0
Marbellup Brook/Lake Powell	5	5	0	0
Robinson Drain	2	2	0	0
Yakkamia Brook	2	0	0	2
King River	3	3	0	0
Kalgan River	1	1	0	0
Goodga River	1	0	1	0
Betty’s Beach (King Creek)	1	1	0	0
Totals	**69**	**45**	**21**	**3**

Land use categories were not assigned to the estuarine sites, as most estuaries included in this study had catchments subject to a wide range of land uses, although agriculture is the dominant land use in most cases. Estuarine catchments also sometimes included likely point sources of PFAS such as landfills, wastewater treatment plants or fuel storage facilities. However, none of the estuaries included in this study were located close to a major airport or defence base (known to be PFAS hotspots).

3.3 Sample collection

Sampling was carried out by direct-filling sample bottles attached to an extendable sampling pole, either from a boat (when sampling in estuaries or deep rivers) or from the bank of a watercourse. Grab samples were taken by inserting the sample bottle (volume 500 ml) beneath the water surface with the opening pointing downwards to avoid the collection of surface films. The sample bottle was then inverted while ensuring, wherever possible, a distance of approximately 10 cm below the water level and more than 10 cm from the sediment bed. In conjunction with sample collection, field parameters such as water temperature, pH, specific conductivity and dissolved oxygen were measured at the sampling point using a YSI Pro-DSS multiprobe water quality meter.

3.4 Laboratory analysis

Samples were analysed by a commercial laboratory using solid phase liquid extraction and liquid chromatography/tandem mass spectrometry (LC/MS/MS) methodology in accordance with USEPA Method 537. A suite of 30 PFAS compounds was analysed and the laboratory limits of reporting for each analyte are listed in Appendix B The concentration of each analyte was determined using the isotope dilution technique. Quantification of linear and branched isomers was conducted as a single total response using the relative response factor for the corresponding linear standard. A branched PFOS standard and branched PFHxS standards were used for quantification of PFOS and PFHxS respectively.

Target limits of reporting (LORs) for the majority of PFAS analysed were 0.001 mg/L with a lower target LOR of 0.0001 μg/L for PFOS. In few instances target LORs, particularly for perfluorocarboxylic acids, were not achieved due to high levels of suspended solids in some samples.

3.5 Quality assurance and quality control (QA/QC)

Quality control procedures were adopted during the fieldwork in accordance with guidance provided in the PFAS NEMP. The purpose of QA/QC procedures is to provide evidence that the data obtained is fit for interpretative use.

Field blanks were collected at a rate of one each sampling day using PFAS-free water supplied by the analytical laboratory. A total of 17 field blanks were collected and field blank results confirmed the absence of any extraneous field or laboratory sources of PFAS on any sampling day.

Blind intra-laboratory duplicates and triplicates were submitted to the primary analytical laboratory at a rate of approximately one in every 6 samples, and very good agreement

between multiple samples was observed. At some sites, field replicates were also collected for intra-laboratory validation. Field duplicates and triplicates were obtained through additional sampling events, while replicates were obtained by splitting the sample collected in a single sampling event.

To obtain inter-laboratory validation for 5 locations in the sampling program, duplicate samples were submitted to a secondary laboratory. Intra-laboratory duplicates displayed minor inconsistencies, with the secondary laboratory occasionally detecting some PFAS compounds that were not detected by the primary laboratory. All detections were very low and close to the laboratory limits of reporting, and Relative Percentage Differences (RPDs) were high. However, as the concentrations of all species detected were very close to the limits of reporting, it is considered unlikely that the quality of the data is adversely impacted. Overall, the data presented within this investigation are considered to be of adequate quality and completeness to meet the project objectives.

Table 3 QA/QC samples collected in this study

	# sites	Field blanks	Field duplicates/ replicates	Inter-laboratory duplicates
Estuary sites	62	10	13	4
Freshwater sites	69	7	12	1

3.6 Data Analysis

For calculation of median concentrations as described in this report, data points with a value below the LOR were assigned a value equal to half the LOR. This simple approach may provide an overestimate of ambient concentrations in data sets with a large proportion of values below the LOR, but this slightly conservative outcome is considered acceptable for the purposes of this study[1].

Data will be compared to the Australian Drinking Water Guidelines (ADWG) and the revised draft Default Guideline Values for PFOS for the protection of aquatic species (ANZG 2023). Note that PFOS is the only PFAS compound for which aquatic Default Guideline Values are currently available.

[1] Further discussion regarding methods of dealing with values below LORs is provided in USEPA. 2000. Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9, QA00 UPDATE [Online]. Available: www.epa.gov/quality/guidance-data-quality-assessment (accessed 2024).

4 Results and discussion

4.1 General trends

Ten different PFAS compounds were detected across the 131 sites sampled in this study. All compounds detected were, in most instances, present at concentrations close to the limits of reporting. The numbers of detections for each of the PFAS compounds in estuarine sites and freshwater sites are listed in Table 4 below.

Table 4 Number of detections above the limit of reporting for the ten PFAS compounds found in this study

PFAS	Detections in estuary sites	Detections in freshwater sites	Total
PFPrS	0	1	1
PFBS	1	1	2
PFBA	1	4	5
PFPeA	1	2	3
PFHxS	2	2	4
PFHxA	4	2	6
PFHpA	2	2	4
PFOS	38	34	72
PFOA	1	4	5
PFDA	0	2	2

PFOS was by far the compound most frequently detected in samples, being identified at 72 sites, comprising 38 estuarine sampling locations and 34 freshwater locations. It should be noted that PFOS was also the dominant PFAS compound observed in ambient PFAS investigations carried out in the Perth metropolitan area, where concentrations of all PFAS were generally at higher levels (Richmond, 2022). Compounds other than PFOS were detected in relatively few samples, and the incidence of those detections did not suggest any obvious relationship to specific locations – i.e. there were no evident clusters of detections of a specific compound within a particular waterway or spatial region.

Consequently, discussion of the results of the investigation focusses on the observations relating to detections of PFOS, and those observations are framed in the context of relative detection frequencies rather than relative concentrations.

4.2 Rivers and streams

The frequencies of PFAS detection at freshwater sites within the three landuse categories sampled in this study are presented in Table 5. PFOS was detected at 52% of freshwater sites sampled in this study. However, the PFOS detection frequency at sites within catchments in the *agricultural-ambient* landuse category was approximately twice as high as for sites with catchments in the *remote-ambient* landuse category. Although only three sites within urban catchments were sampled, PFOS was detected at all three of those sites at concentrations higher than those observed in other locations. The results reflect a general trend that is evident in many studies of environmental PFAS in which increasing concentrations of ambient PFAS are observed to align with an increasing degree of land use intensity (Sardiña et al., 2019, Breitmeyer et al., 2023, Richmond, 2022, Baddiley et al., 2020).

PFOS was detected above the limit of reporting at over 50% of the sites sampled within agricultural catchments, although concentrations were consistently very low. Agricultural landuse may include various broad-scale sources of PFAS, with surface run-off or leaching to groundwater providing pathways for widespread diffuse and low-level presence of PFAS in waterways. Such sources may include application of PFAS-containing herbicides or pesticides, or leaching from minor waste disposal sites, septic tanks or leach drains.

The urban catchment sites were notable for having detections of a wider range of PFAS compounds than sites in other landuse categories. PFOA was detected in all three sites in the *urban-ambient* category but was detected at only one other freshwater site in the whole investigation.

Table 5 PFOS detection frequencies, maximum and minimum concentrations, for freshwater sites according to land use categories

PFOS detections	Agricultural-ambient catchment	Remote-ambient catchment	Urban-ambient catchment
Total sites	47	19	3
Sites with detections	27	5	3
% detections	55.1	26.3	100
Maximum Concentration (μg/L)	0.0033	0.0007	0.0067
Minimum Concentration (μg/L)	<0.0001	<0.0001	0.0021

Note: Draft Freshwater Default Guideline Values - 99% species protection: 0.0091 µg/L; 95% species protection: 0.48 µg/L; 90% species protection: 2.7 µg/L; and 80% species protection: 17 µg/L (ANZG 2023).
Current ADWG - PFOS + PFHxS: 0.07ug/L; Draft revised ADWG - PFOS (only): 0.004 ug/L.

The maximum PFOS concentration in freshwater sites across all sampling locations was 0.0067 μg/L (at a site with an urban catchment, see Table 5 and Appendix B), which is below all human health-based assessment levels at the time of publication, indicating that the low detection rates and low concentrations do not present a risk to human health. PFOS

concentrations observed in all freshwater sites were also below the Australian Drinking Water Guideline value published in June 2025[2]. PFOS concentrations were also below environmental thresholds for the protection of aquatic species, indicating a low risk of toxic effects. Notwithstanding, the full range of toxic effects from PFAS, including PFOS, are not yet understood, particularly from low-level exposures over an extended period, especially given the potential for bioaccumulation.

Table 6 PFOS concentrations (range and median concentrations) for sites in the agricultural-ambient landuse category (LoR for PFOS: 0.0001 µg/L)

Catchment (Water Body)	# sites	PFOS Concentrations (µg/L)	
		Range	Median
Moore River	2	0.0002 - 0.0002	0.0002
Preston River	2	0.0004 – 0.0009	0.00065
Collie River	9	<LOR – 0.0033	0.0006
Capel River	2	<LOR	<LOR
Vasse	2	<LOR – 0.0015	0.000525
Annie Brook	1	<LOR	<LOR
Sabina River	1	<LOR	<LOR
Warren River	5	0.0002 – 0.0007	0.0002
Yanmah Brook	1	0.0003 – 0.0003	0.0003
Denmark River	1	<LOR	<LOR
Little River	1	<LOR	<LOR
Hay River	1	<LOR	<LOR
Sleeman River	1	<LOR	<LOR
Marbellup/Lake Powell	5	<LOR – 0.0005	0.00005
Unndiup	1	<LOR	<LOR
Robinson Drain	2	<LOR – 0.0018	0.00115
King River	3	<LOR – 0.0008	0.00005
Kalgan River	1	<LOR	<LOR
King Creek	1	<LOR	<LOR
Brunswick River	4	0.0006 – 0.0007	0.0007
Blackwood River	1	0.0002 – 0.0002	0.0002

[2] NHMRC review of per- and poly-fluoroalkyl substances (PFAS) in Australian drinking water.

Table 7 PFOS concentrations (range and median concentrations) for sites in the 'remote-ambient', and urban-ambient landuse categories (LoR for PFOS: 0.0001µg/L)

Catchment (water body)	# sites	PFOS Concentrations (µg/L)	
		Range	Median
Remote-ambient sites			
Collie River	4	<LOR – 0.0002	0.00005
Warren River	3	<LOR – 0.0007	0.00005
Donnelly River	6	<LOR – 0.0001	0.000075
Walpole River	1	<LOR	<LOR
Denmark River	4	<LOR	<LOR
Goodga Brook	1	<LOR	<LOR
Urban-ambient sites			
Denmark River	1	0.0021	0.0021
Yakkamia Brook	2	0.005 – 0.0067	0.00585

The PFOS detection frequency at sites within the *ambient-remote* landuse category was 26.3% and all detections in this land use category were only marginally above the limit of reporting. This is consistent with the expectation that very few potential sources of PFAS are likely to be present within catchments predominantly comprised of uncleared bushland. Apart from long-range aerial transport, potential minor sources associated with emergency firefighting response may occur in areas of native forest within the south-west that are, or have been, subject to logging or mining activities.

4.3 Estuaries

Samples were obtained from 62 locations within twelve estuaries across the south-west of Western Australia.

It is problematic to interpret any general trends in the frequency of detection and maximum PFOS concentrations across the different estuaries given the wide range of factors that may influence PFAS levels in estuarine systems. There appears to be some indication that estuaries with larger catchments have higher detection frequencies and higher PFOS concentrations, and that the PFAS impacts in estuaries increase with the degree of urban development within estuary catchments. The estuaries sampled in this study are listed in Table 8, in order of decreasing maximum PFOS concentration, and it is notable that the four estuaries with the highest PFOS concentration all have regional urban areas within their catchments, and also have relatively large catchments. The remaining estuaries are smaller, with relatively small catchments in locations remote from urban development.

In almost all cases, PFOS concentrations (Table 8 and Appendix B) were below environmental thresholds for the protection of aquatic species, indicating a low risk of toxic effects. The exception was a single sample collected from the Vasse-Wonnerup Estuary that yielded a concentration range of 0.035 µg/L which is greater than the 99% species protection level (ANZG 2023), indicating the potential for a toxic effect in a very small proportion of species. It should be noted that there are no estuarine default guideline values for PFOS and marine guideline levels are currently being developed. Therefore the guideline for freshwater systems is applied as an interim measure, as per the guidance in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018).

The observations described above are not surprising, but it should be noted that many other characteristics could affect the observed PFAS concentrations and some of these will vary on a seasonal basis. For example, some estuaries will have a much greater degree of seasonal freshwater flushing and/or tidal flushing than others. In addition, seasonal changes to salinity in estuaries may impact the distribution of PFOS between sediment-bound and dissolved forms. As estuaries are likely to act as 'sinks' for the PFAS load in their catchment, more comprehensive sampling programs, including sediment and biota sampling, would be required to fully characterise PFAS impacts in estuarine systems.

Table 8 PFOS detection frequencies, concentration range and median PFOS concentrations for the 12 estuaries sampled in this study, ordered according to maximum observed PFOS concentration

Estuary	# sample locations	# detections	% detections	Concentration range (µg/L)	Median (µg/L)
Vasse-Wonnerup	1	1	100	0.035	0.035
Oyster Harbour	7	3	42.8	<LOR – 0.0061	0.00005
Leschenault	7	7	100	0.0001 – 0.0022	0.0002
Peel/Harvey	10	8	80	<LOR – 0.0018	0.0002
Wilson Inlet	5	4	80	<LOR – 0.0004	0.0001
Princess Royal Harbour	8	5	62.5	<LOR – 0.0002	0.0001
Hardy Inlet	13	5	38.4	<LOR -0.0002	0.00005
Moore River	5	3	60	<LOR – 0.0002	0.0001
Irwin Inlet	2	2	100	0.0001	0.0001
Walpole Inlet	1	0	0	<LOR	<LOR
Wellstead Inlet	2	0	0	<LOR	<LOR
Beaufort Inlet	1	0	0	<LOR	<LOR

Note: Draft Default Guideline Values: 99% species protection: 0.0091 µg/L; 95% species protection: 0.48 µg/L; 90% species protection: 2.7 µg/L; and 80% species protection: 17 µg/L (ANZG 2023)

5 Conclusions

PFAS are often considered to be widely distributed throughout the environment; however, the findings of this investigation indicate that PFAS are not consistently present at detectable levels in rivers, streams and estuaries across the south-west of Western Australia.

PFAS were detected at 51% of freshwater sites and 61% of estuarine sites, and when detected, PFAS concentrations were generally very low (close to the respective LOR). At most sampling locations PFOS was the only compound detected.

The trend of PFOS detections in freshwater sites observed in this study indicate that the presence of trace PFAS at a site is influenced by current or historical land uses in the upstream catchment. The frequency of detections was higher in sites within agricultural catchments, compared with those in 'remote' catchments where the upstream land use was predominantly uncleared land and/or conservation reserves.

Concentrations in estuaries displayed a trend of higher detection frequencies and higher PFOS concentrations occurring in the estuaries with urban development within their catchments. Larger estuaries and those with the largest catchments tended to display higher detection frequencies, than smaller estuaries remote from urban development.

In findings consistent with many other investigations of ambient PFAS, the results of this study show that ambient PFAS concentrations in remote undeveloped locations are most often below the reporting limits of routine laboratory analysis. A general trend of increasing detection frequencies and higher concentration is observed as the intensity of land use increases, with more frequent and higher PFOS detections observed in proximity to urbanised areas. In almost all cases, PFOS concentrations were below current environmental thresholds for the protection of aquatic species for PFOS, indicating a low risk of toxic effects. However, there are currently no Australian aquatic guideline values for PFAS compounds other than PFOS, and the full range of toxic effects from PFAS are not yet understood, particularly from low-level exposures over an extended period, especially given the potential for bioaccumulation.

Shortened forms

ADWG	Australian Drinking Water Guidelines
AFFF	Aqueous Film-Forming Foam
ALUM	Australian land use and management (classification system)
LOR	Limit of reporting
DWER	Department of Water and Environmental Regulation
HEPA	Heads of EPAs Australia and New Zealand
PFAS	Per- and polyfluorinated alkyl substances
PFAS NEMP	PFAS National Environmental Management Plan
PFHxS	Perfluorohexane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid
QA/QC	Quality analysis and quality control
RPD	Relative percentage difference
TDS	Total Dissolved Solids

Glossary

ambient concentration	contaminant concentration arising from diffuse or non-point sources by general anthropogenic activity
analyte	the chemical being measured in a sample
aquifer	rock or sediment in a geological formation, group of formations or part of a formation which is saturated and sufficiently permeable to store and transmit quantities of water
bioaccumulation	accumulation of a substance in organisms from water, soil/sediment and/or food so that the concentration of the substance in or on the organism is increased relative to the concentration in the surrounding medium
biomagnification	increase in concentration of a substance in organisms with each trophic level of a food chain
biota	living organisms in a given area
contaminant	substance which causes contamination
contamination	condition of land or water in which chemical substance is present at above background levels and presents, or has the potential to present, a risk to human health, the environment or any environmental value
diffuse	widespread without a single identifiable point source
ecosystem	a community of organisms and their environment with all the interactions that transfer energy and recycle resources
guideline values	concentrations that indicate a potential risk to the environment or human health
landfill	a facility for the disposal of waste by burial
leaching	the release of contaminants from solid materials, such as soil or waste, into liquids
pathway	the route by which a contaminant can reach a receptor
per- and poly-fluoroalkyl substances	group of manufactured chemicals, containing a component with multiple fluorine atoms, with many specialty applications – examples are perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA)
persistent	a chemical substance that has a half-life in water greater than two months, or a half-life in soil greater than six months, or a half-life in sediment greater than six months, or a half-life in air greater than two days, taking into account environmentally relevant considerations

point source	contamination coming from a single identifiable point and therefore not diffuse
receptor	living organisms including humans, the habitat which supports such organisms, or natural resources that could be adversely affected by environmental contamination resulting from a release at, or migration from, a site
risk	the probability of adverse effects caused under specified circumstances by an agent, in an organism, a population, or an ecological system, based on the hazard of a chemical and its level of exposure for a specific use and location
toxicity	the degree to which a substance is toxic (that is, has an adverse biochemical effect)

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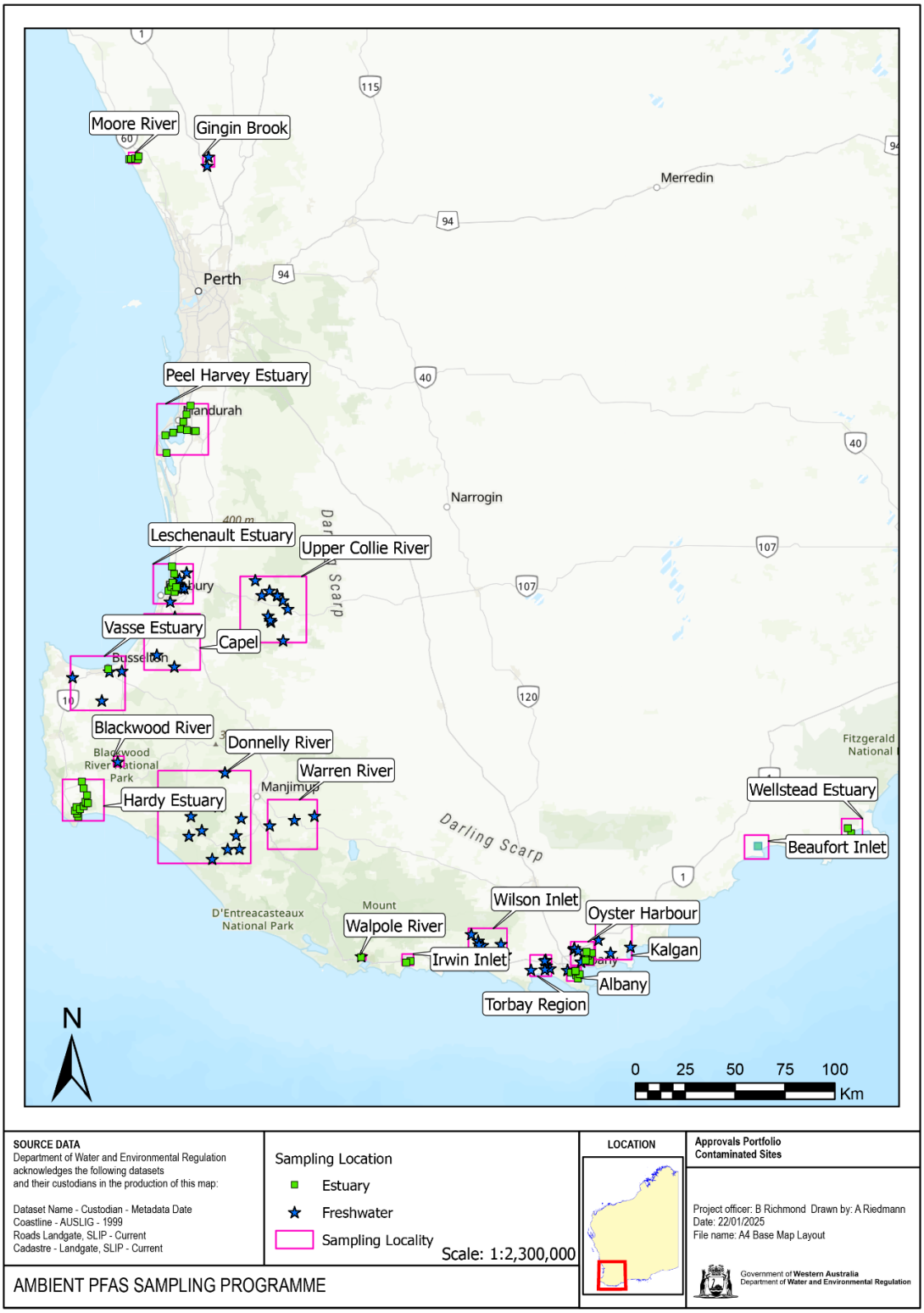
Appendices

Appendix A: Sampling location maps

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Munsterhill Drain
ALBANY
Robinson Drain
Munster Hill Drain
Princess Royal Harbour
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Entrance
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APRH2
APRH5
APRH3
APRH4
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PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
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Km
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Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
Local Road
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LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
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Government of Western Australia
Department of Water and Environmental Regulation
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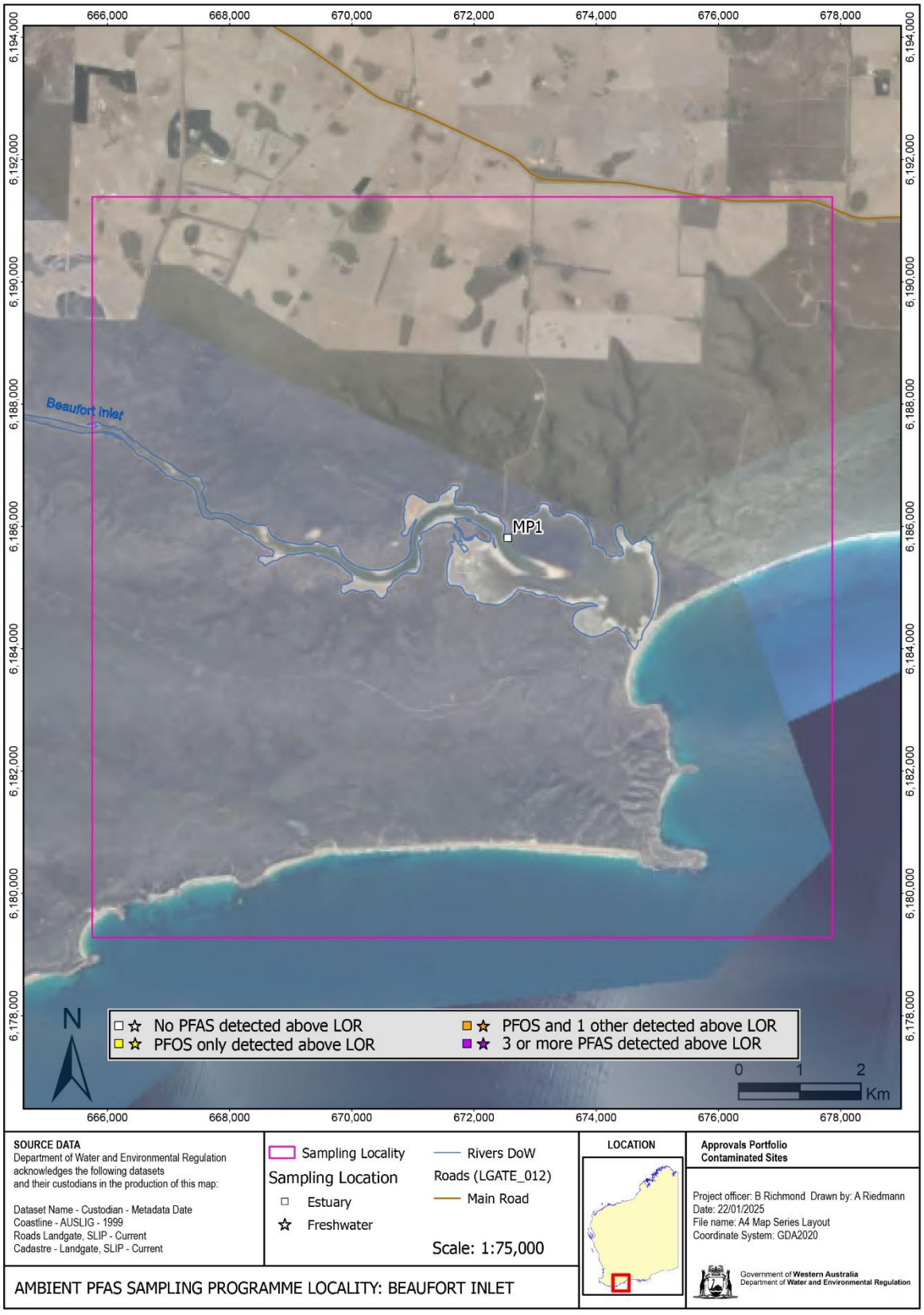
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PFOS only detected above LOR
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Cadastre - Landgate, SLIP - Current
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Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Main Road
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Department of Water and Environmental Regulation
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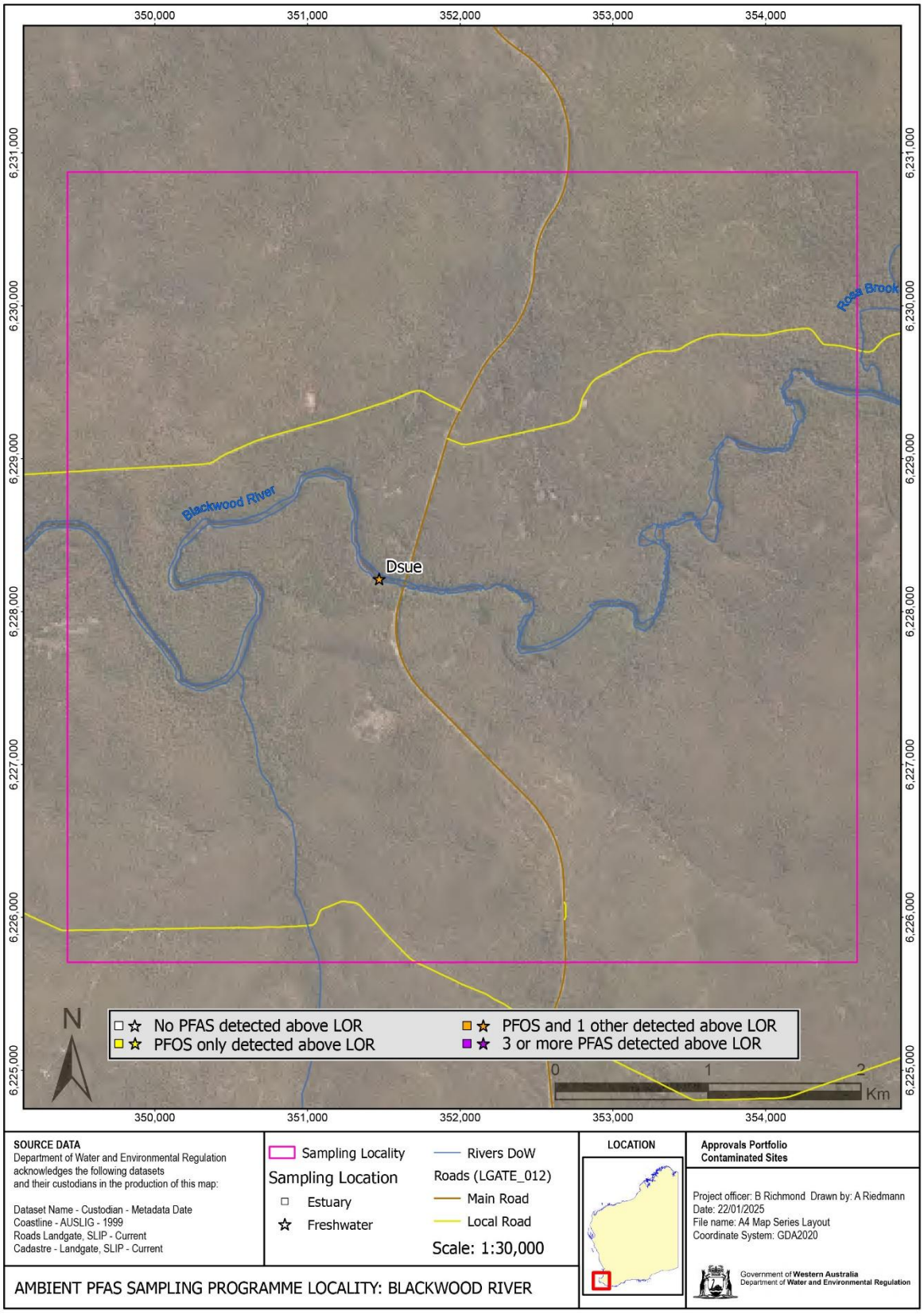
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PFOS and 1 other detected above LOR
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Sampling Location
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Freshwater
Rivers DoW
Roads (LGATE_012)
Main Road
Local Road
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Government of Western Australia
Department of Water and Environmental Regulation
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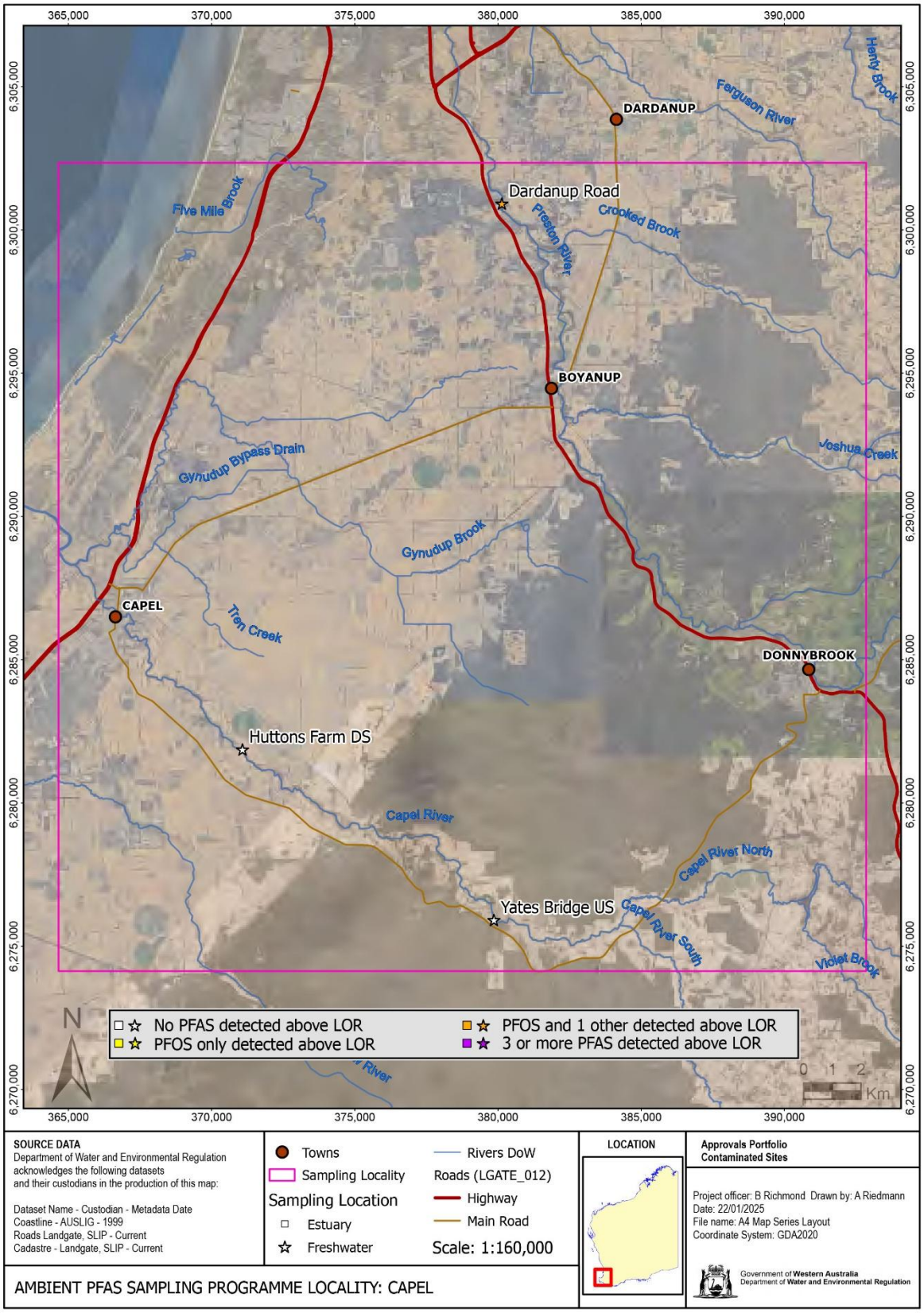
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DARDANUP
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DONNYBROOK
Huttons Farm DS
Yates Bridge US
Ferguson River
Henty Brook
Five Mile Brook
Preston River
Crooked Brook
Gynudup Bypass Drain
Joshua Creek
Gynudup Brook
Ten Creek
Capel River
Capel River North
Capel River South
Violet Brook
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No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
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SOURCE DATA
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Sampling Location
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Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
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Government of Western Australia
Department of Water and Environmental Regulation
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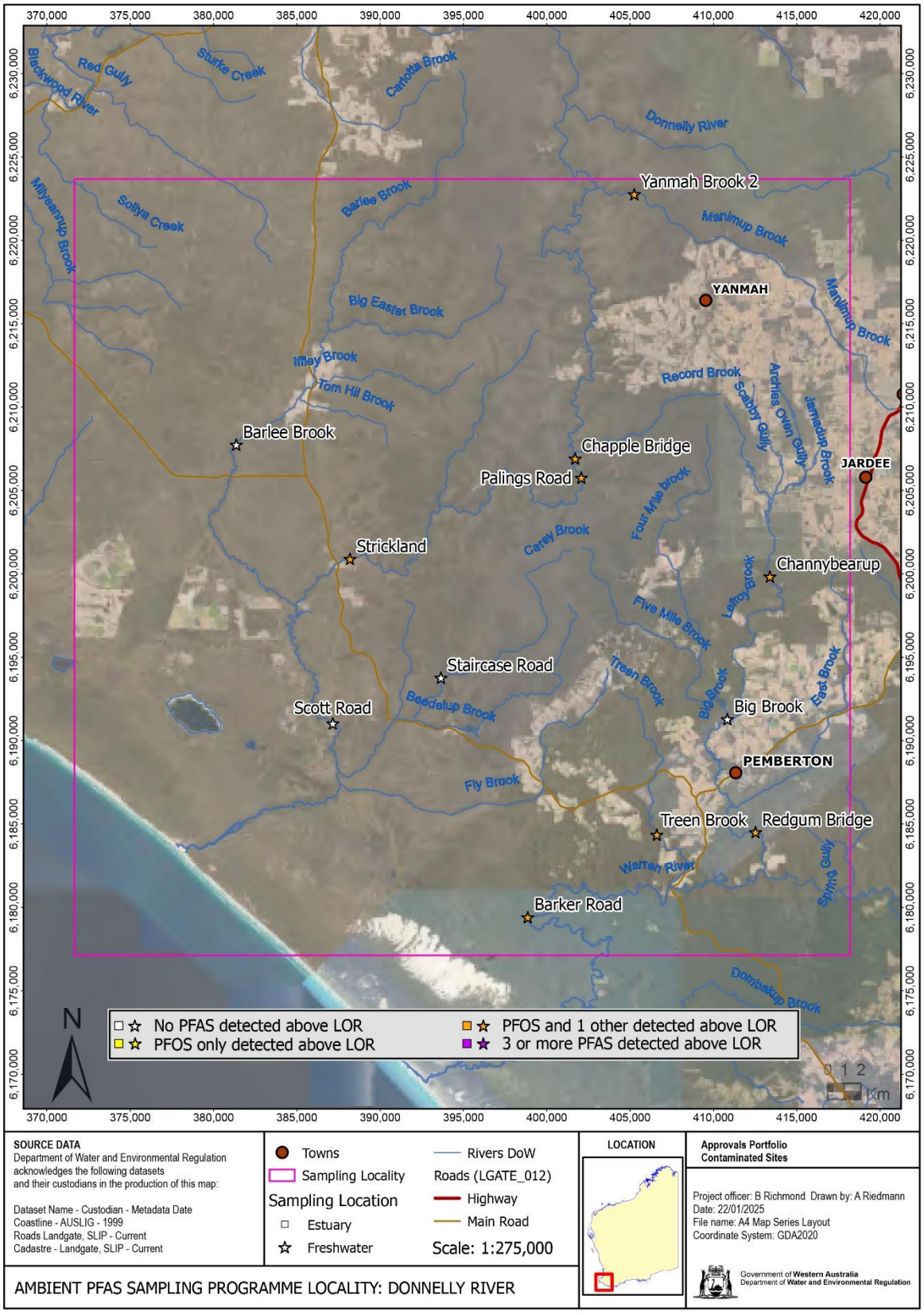

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Cadastre - Landgate, SLIP - Current

Towns
Sampling Locality
Sampling Location
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Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
Scale: 1:275,000

LOCATION

Approvals Portfolio
Contaminated Sites

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Date: 22/01/2025
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Government of Western Australia
Department of Water and Environmental Regulation

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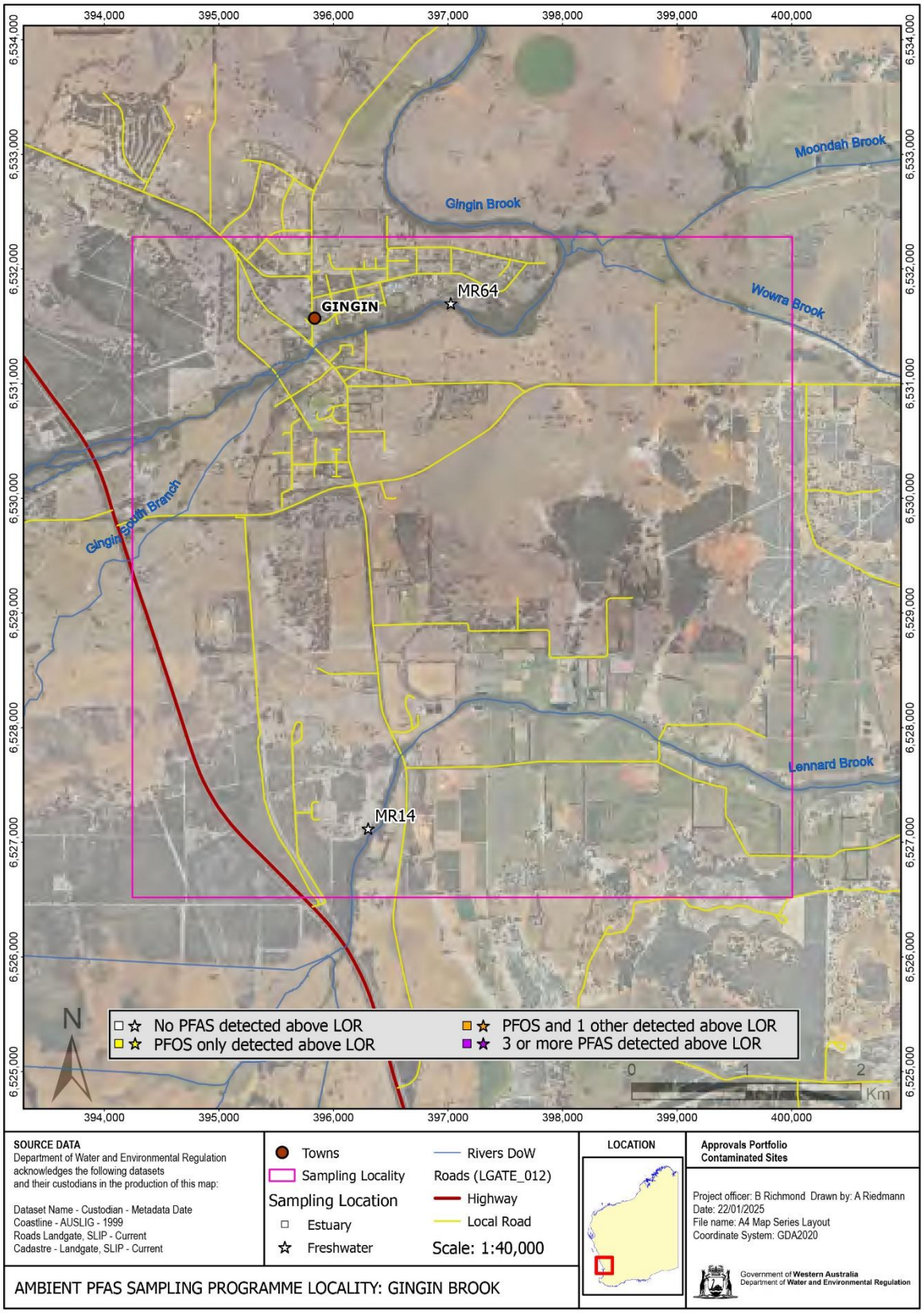
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Moondah Brook
Gingin Brook
Wowra Brook
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MR64
Gingin South Branch
Lennard Brook
MR14
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No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
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Coastline - AUSLIG - 1999
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Cadastre - Landgate, SLIP - Current
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Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Local Road
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Date: 22/01/2025
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Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: GINGIN BROOK


McLeod Creek
Reedia Creek West
BRF02
BRF08
Turner Brook
KARRIDALE
Glenarty Creek
Blackwood River
Beenup
BRF06
Turnwood Creek
BRF01
MIF03
SRF01
Scott River
MIF01
HF05
West Bay Creek
HF06
HF04
HF03
HF02
Hardy Inlet
AUGUSTA
HF01
Redman Brook
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PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
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SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
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Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
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Sampling Location
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Rivers DoW
Roads (LGATE_012)
Highway
Main Road
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Date: 22/01/2025
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Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
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Bow River
BOW BRIDGE
IRW001
IRW002
King River
Kent River
Irwin Inlet
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
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Km
SOURCE DATA
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Sampling Location
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Rivers DoW
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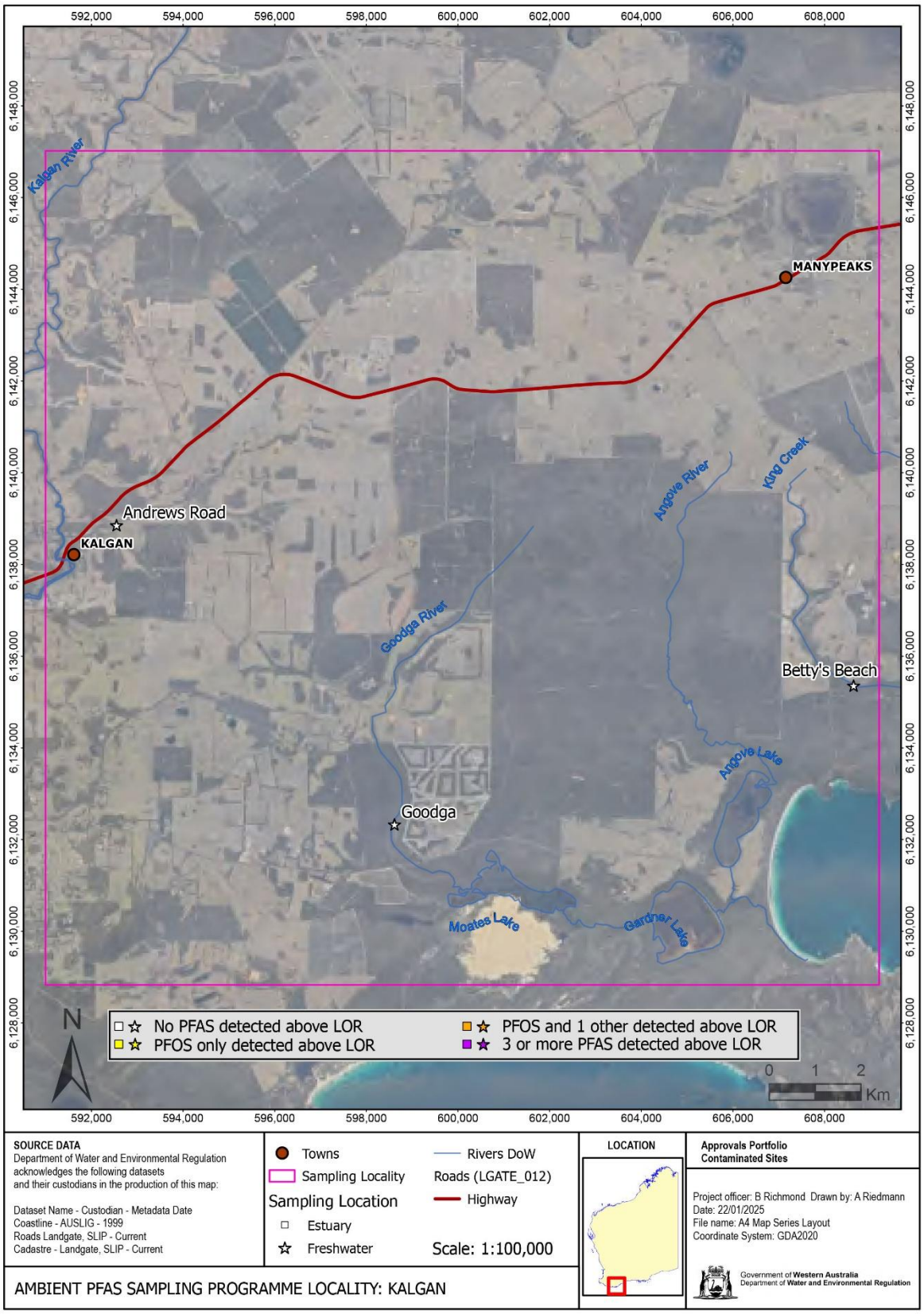
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: IRWIN INLET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6,142,000
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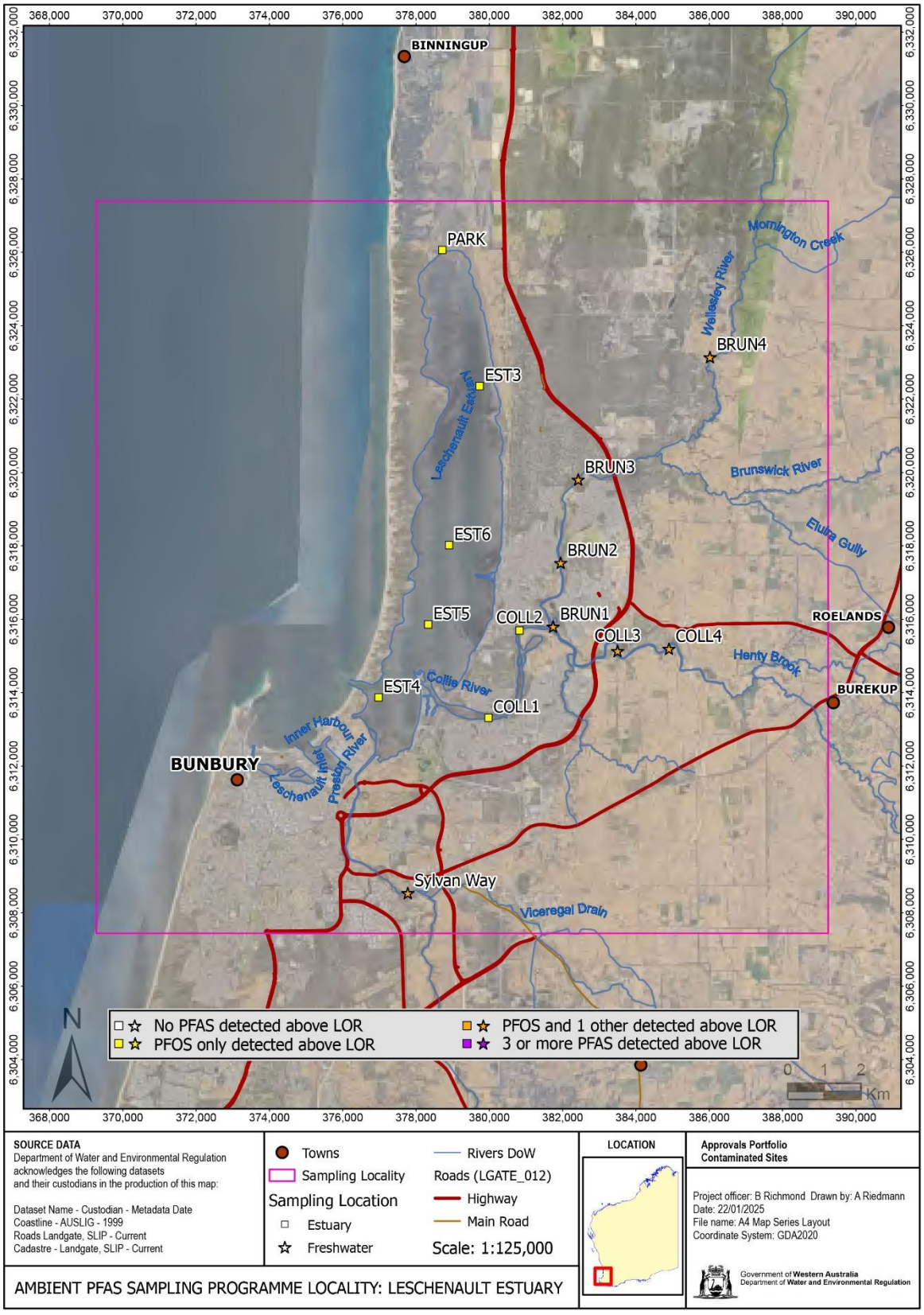
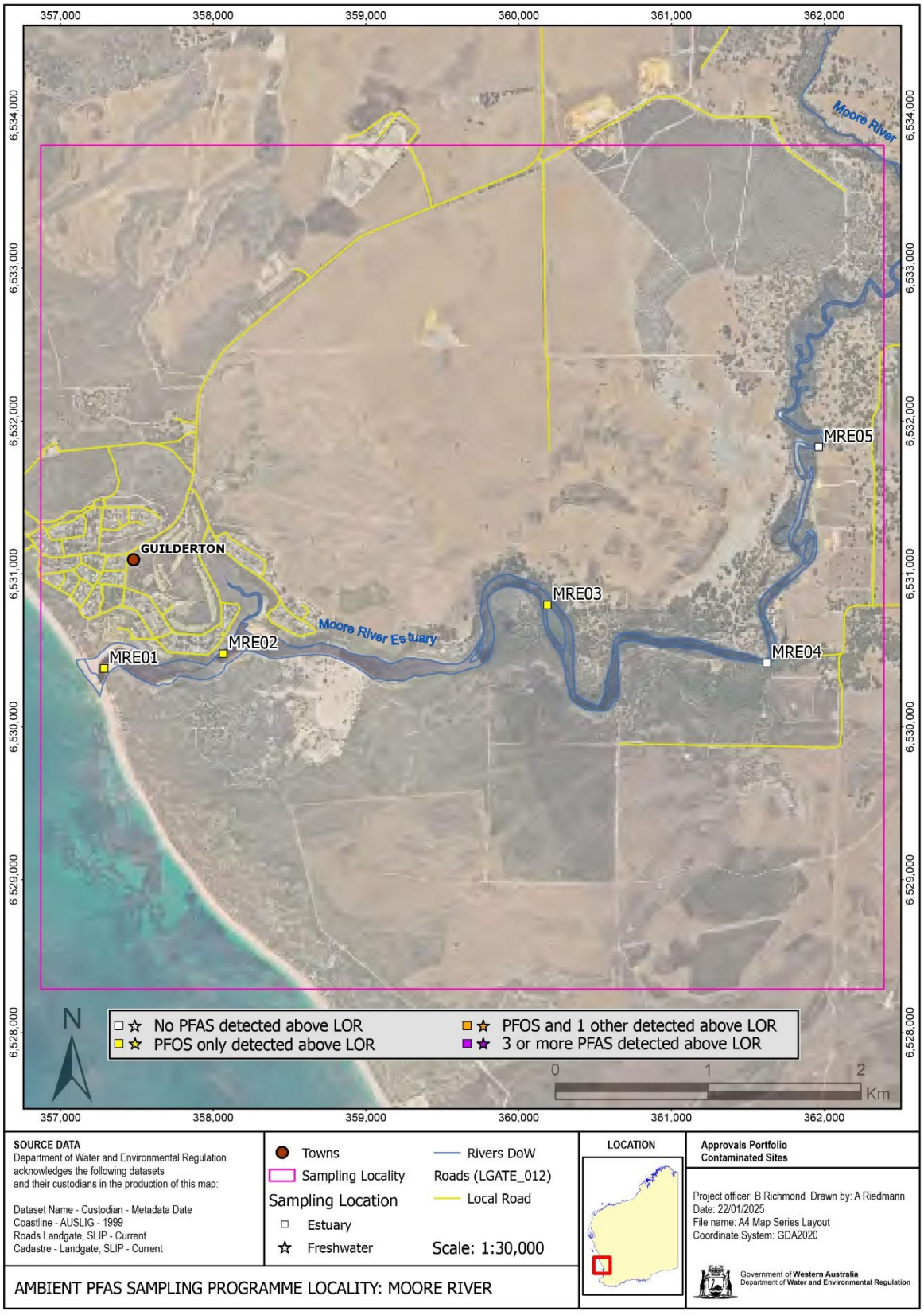
6,132,000
6,130,000
6,128,000
Kalgan River
MANYPEAKS
Andrews Road
KALGAN
Angove River
King Creek
Goodga River
Betty's Beach
Angove Lake
Goodga
Moates Lake
Gardner Lake
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0 1 2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Scale: 1:100,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: KALGAN


BINNINGUP
PARK
EST3
EST6
EST5
EST4
BRUN4
BRUN3
BRUN2
BRUN1
COLL2
COLL3
COLL4
COLL1
ROELANDS
BUREKUP
BUNBURY
Sylvan Way
Leschenault Estuary
Wellesley River
Mornington Creek
Brunswick River
Elulra Gully
Henty Brook
Collie River
Inner Harbour
Preston River
Leschenault Inlet
Viceregal Drain
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0 1 2 Km
368,000 370,000 372,000 374,000 376,000 378,000 380,000 382,000 384,000 386,000 388,000 390,000
6,332,000 6,330,000 6,328,000 6,326,000 6,324,000 6,322,000 6,320,000 6,318,000 6,316,000 6,314,000 6,312,000 6,310,000 6,308,000 6,306,000 6,304,000
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
Scale: 1:125,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: LESCHENAULT ESTUARY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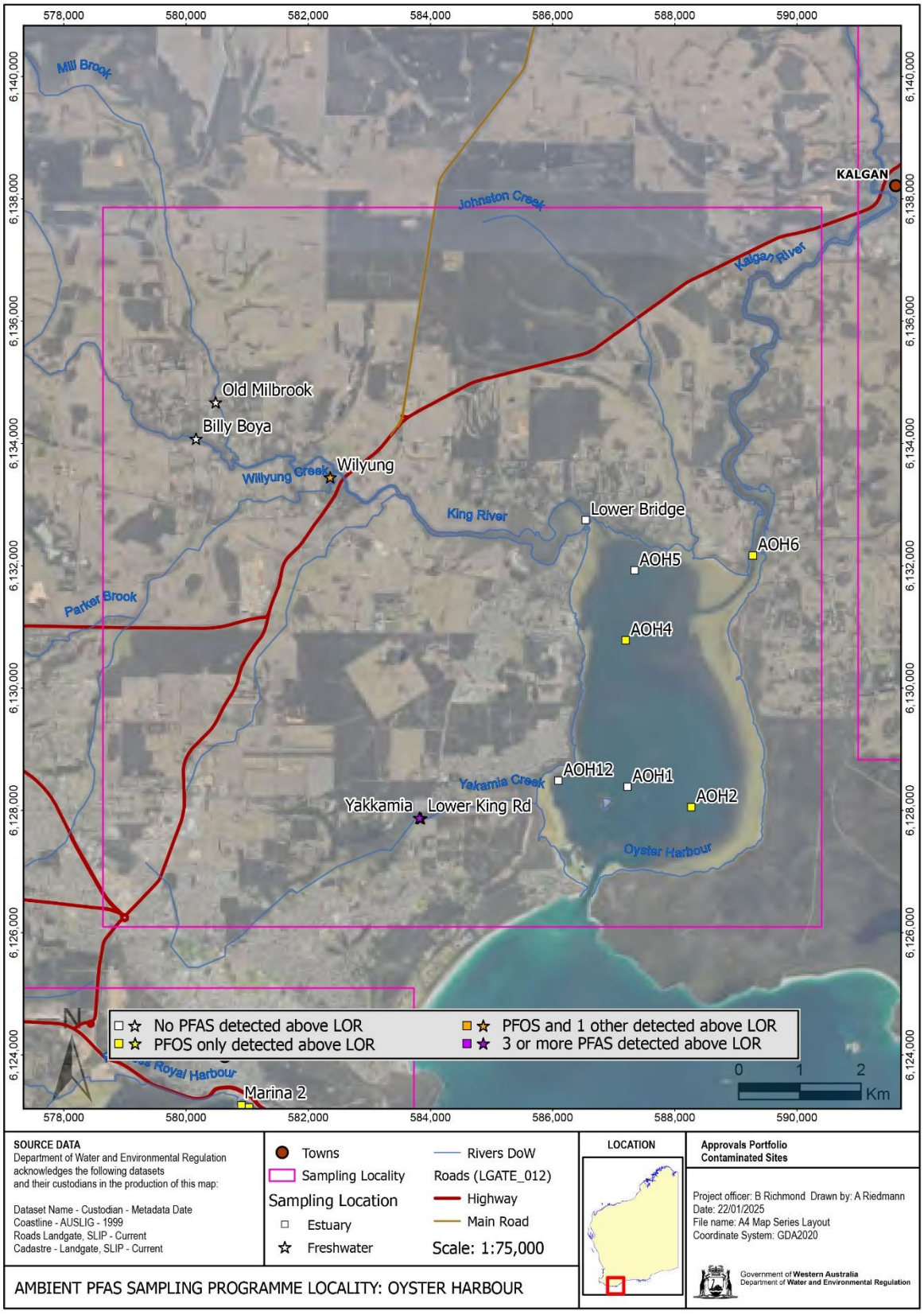
6,529,000
6,528,000
Moore River
MRE05
GUILDERTON
MRE03
Moore River Estuary
MRE02
MRE01
MRE04
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0
1
2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Local Road
Scale: 1:30,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: MOORE RIVER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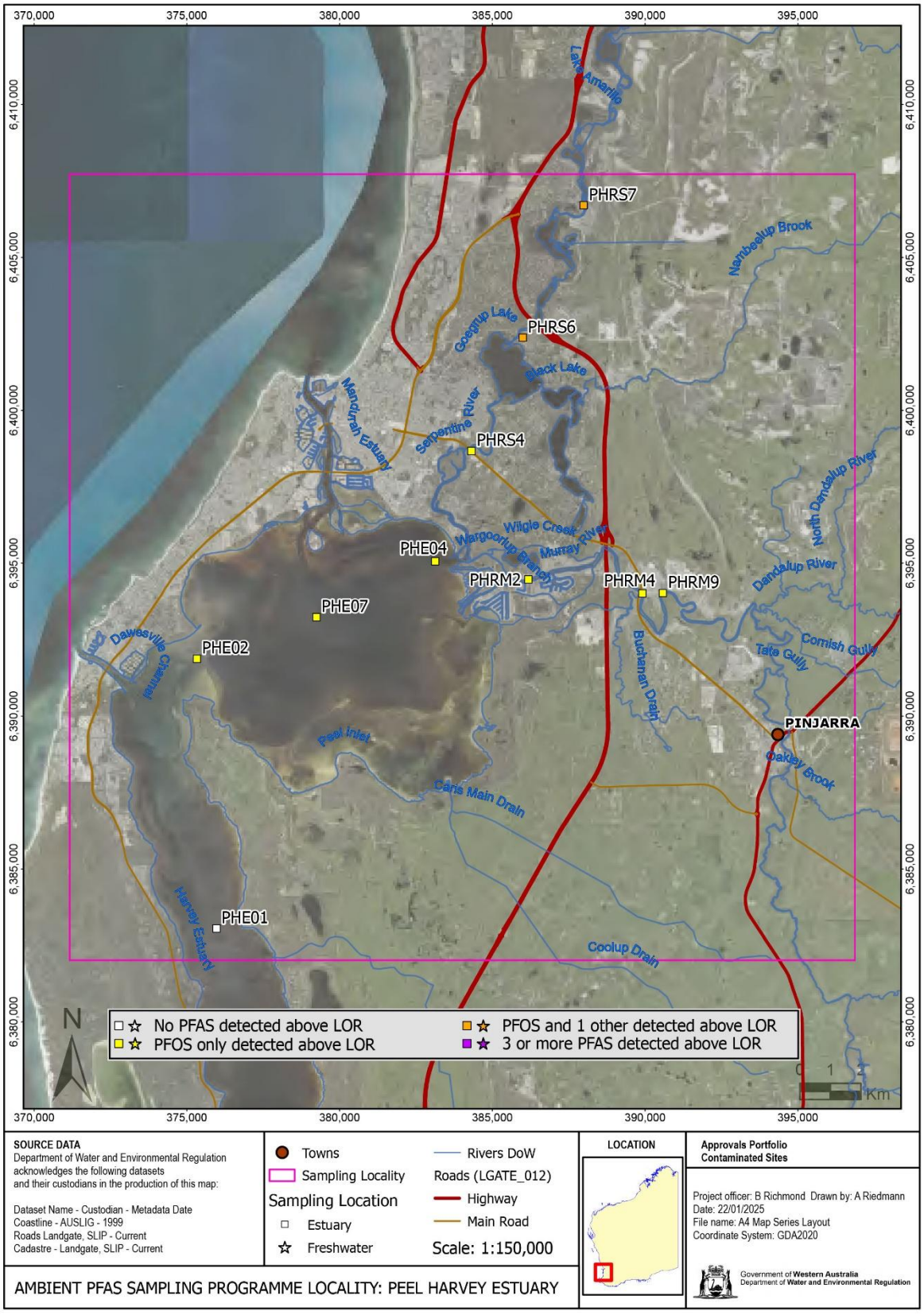
6,134,000
6,132,000
6,130,000
6,128,000
6,126,000
6,124,000
Mill Brook
KALGAN
Johnston Creek
Kalgan River
Old Milbrook
Billy Boya
Wilyung
Wilyung Creek
King River
Lower Bridge
AOH6
AOH5
AOH4
Parker Brook
AOH12
AOH1
AOH2
Yakamia Creek
Yakkamia
Lower King Rd
Oyster Harbour
Royal Harbour
Marina 2
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0
1
2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
Scale: 1:75,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: OYSTER HARBOUR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395,000
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6,400,000
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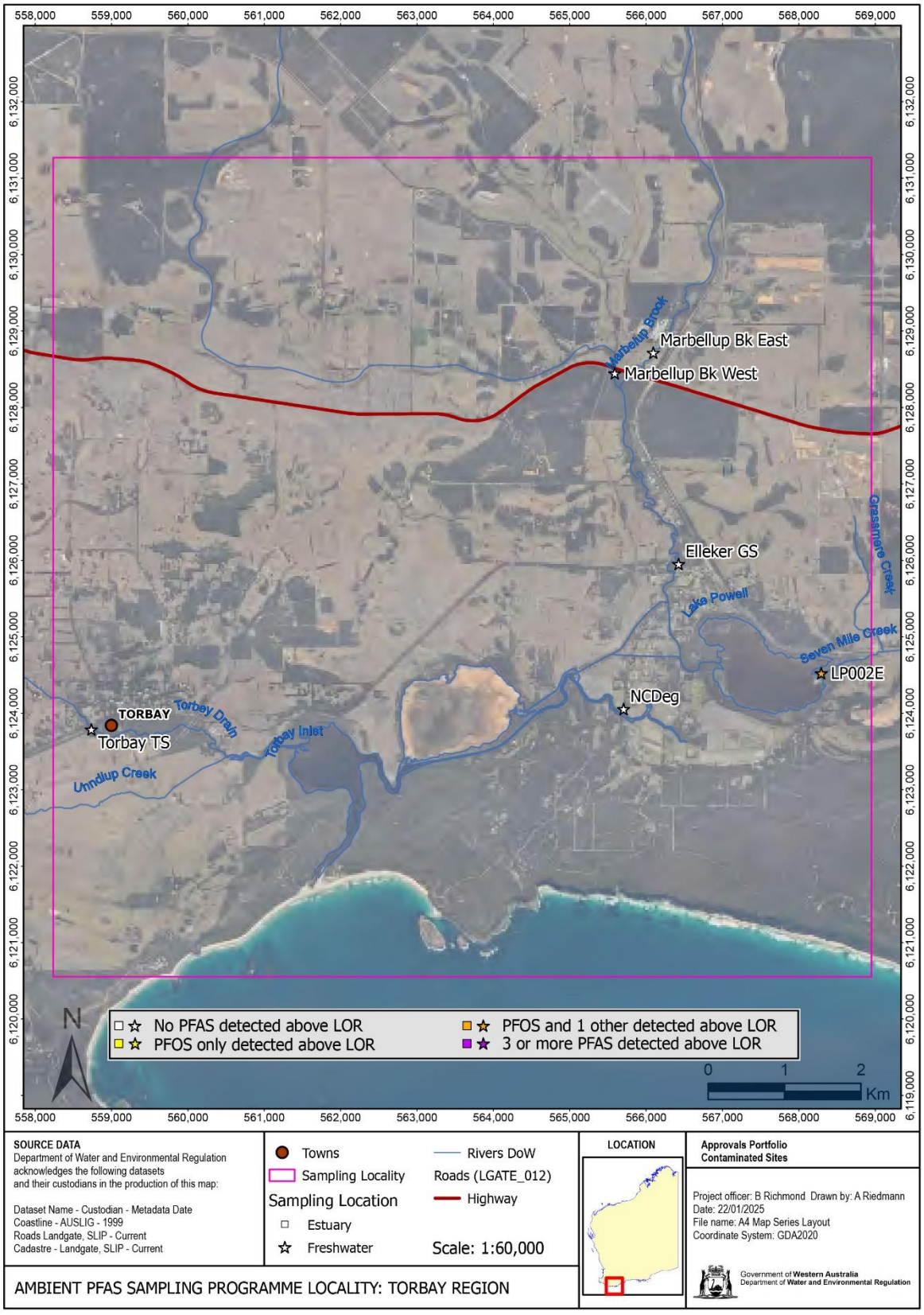
6,390,000
6,385,000
6,380,000
Lake Amarillo
PHRS7
Nambeelup Brook
Goegrup Lake
PHRS6
Black Lake
Mandurah Estuary
Serpentine River
PHRS4
North Dandalup River
Wilgie Creek
Murray River
Wargoorup Brook
PHE04
PHRM2
PHRM4
PHRM9
Dandalup River
PHE07
Dawesville Channel
PHE02
Buchanan Drain
Tate Gully
Cornish Gully
PINJARRA
Peel Inlet
Oakley Brook
Cans Main Drain
Harvey Estuary
PHE01
Coolup Drain
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0 1 2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
Scale: 1:150,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: PEEL HARVEY ESTUARY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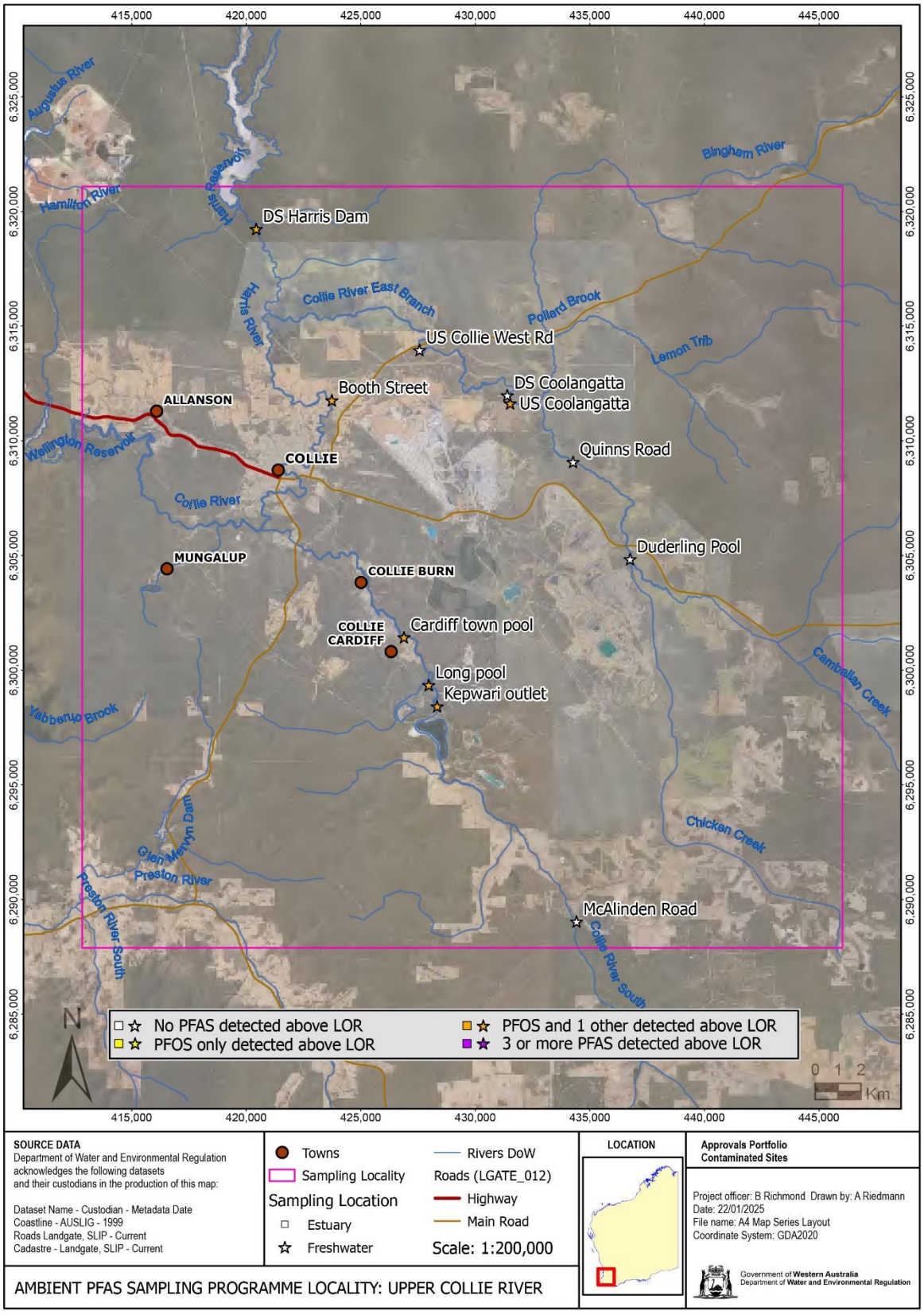
6,127,000
6,126,000
6,125,000
6,124,000
6,123,000
6,122,000
6,121,000
6,120,000
6,119,000
Marbellup Brook
Marbellup Bk East
Marbellup Bk West
Elleker GS
Lake Powell
Seven Mile Creek
LP002E
NCDeg
TORBAY
Torbay TS
Torbay Drain
Torbay Inlet
Umndiup Creek
Cressmere Creek
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0
1
2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Scale: 1:60,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: TORBAY REGION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425,000
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435,000
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445,000
6,325,000
6,320,000
6,315,000
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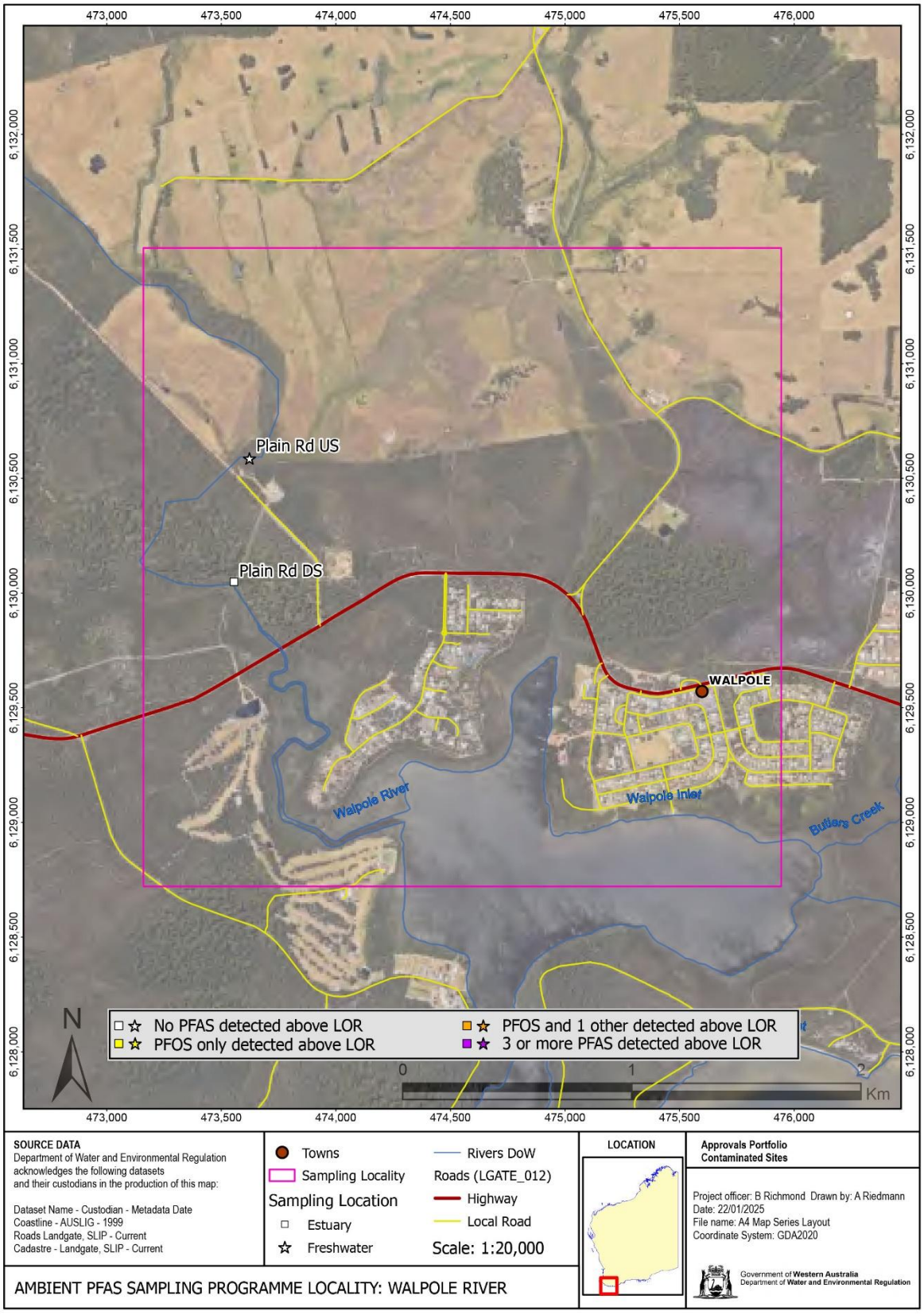
6,305,000
6,300,000
6,295,000
6,290,000
6,285,000
Augustus River
Hamilton River
Harris Reservoir
Harris River
Bingham River
DS Harris Dam
Collie River East Branch
Pollard Brook
US Collie West Rd
Lemon Trib
Booth Street
DS Coolangatta
US Coolangatta
ALLANSON
Wellington Reservoir
COLLIE
Quinns Road
Collie River
Duderling Pool
MUNGALUP
COLLIE BURN
COLLIE CARDIFF
Cardiff town pool
Long pool
Kepwari outlet
Camballan Creek
Yabberup Brook
Glen Mervyn Dam
Preston River
Preston River South
Chicken Creek
McAlinden Road
Collie River South
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0 1 2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
Scale: 1:200,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: UPPER COLLIE RIVER


330,000
335,000
340,000
345,000
350,000
355,000
6,285,000
6,280,000
6,275,000
6,270,000
6,265,000
6,260,000
6,255,000
6,250,000
BUSSELTON
Lower Vasse 1
Lower Vasse 2
Sabina River
Annie Brook Pools
CARBUNUP RIVER
Upper Vasse
Toby Inlet
Vasse Estuary
Wonnerup Estuary
Abba River
Vasse Diversion Drain
Station Gully
Sabina River (Lower)
Sabina Main Drain
Sabina River
Annie Brook
Mary Brook
Carbunup River
Vasse River
Buayanyup River
Walsall Brook
Margaret River North Branch
Ornamental Gully
Dawson Gully
Margaret River
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0 1 2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
Scale: 1:160,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: VASSE ESTUARY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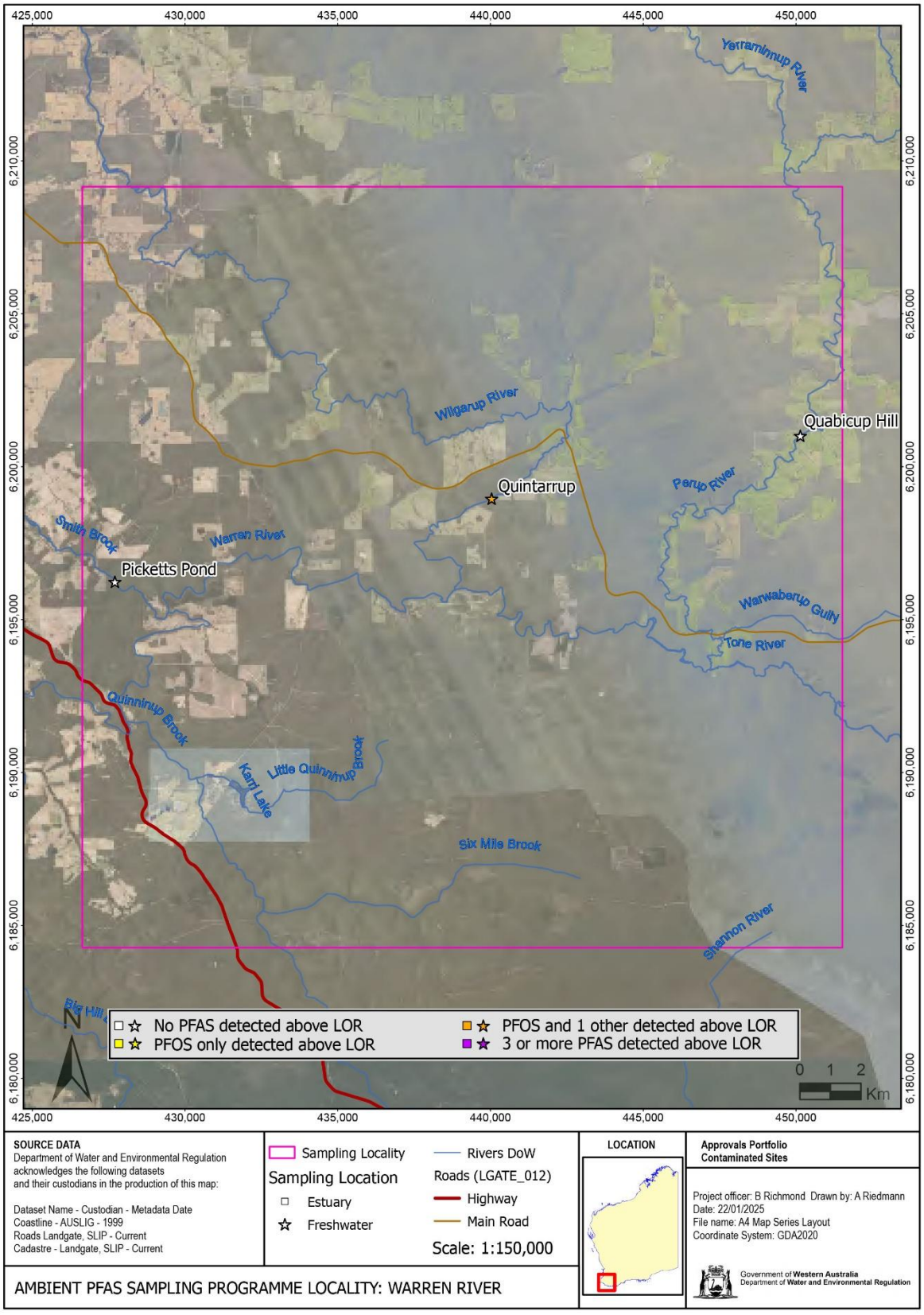
6,130,000
6,129,500
6,129,000
6,128,500
6,128,000
Plain Rd US
Plain Rd DS
WALPOLE
Walpole River
Walpole Inlet
Butlers Creek
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0
1
2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Local Road
Scale: 1:20,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: WALPOLE RIVER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450,000
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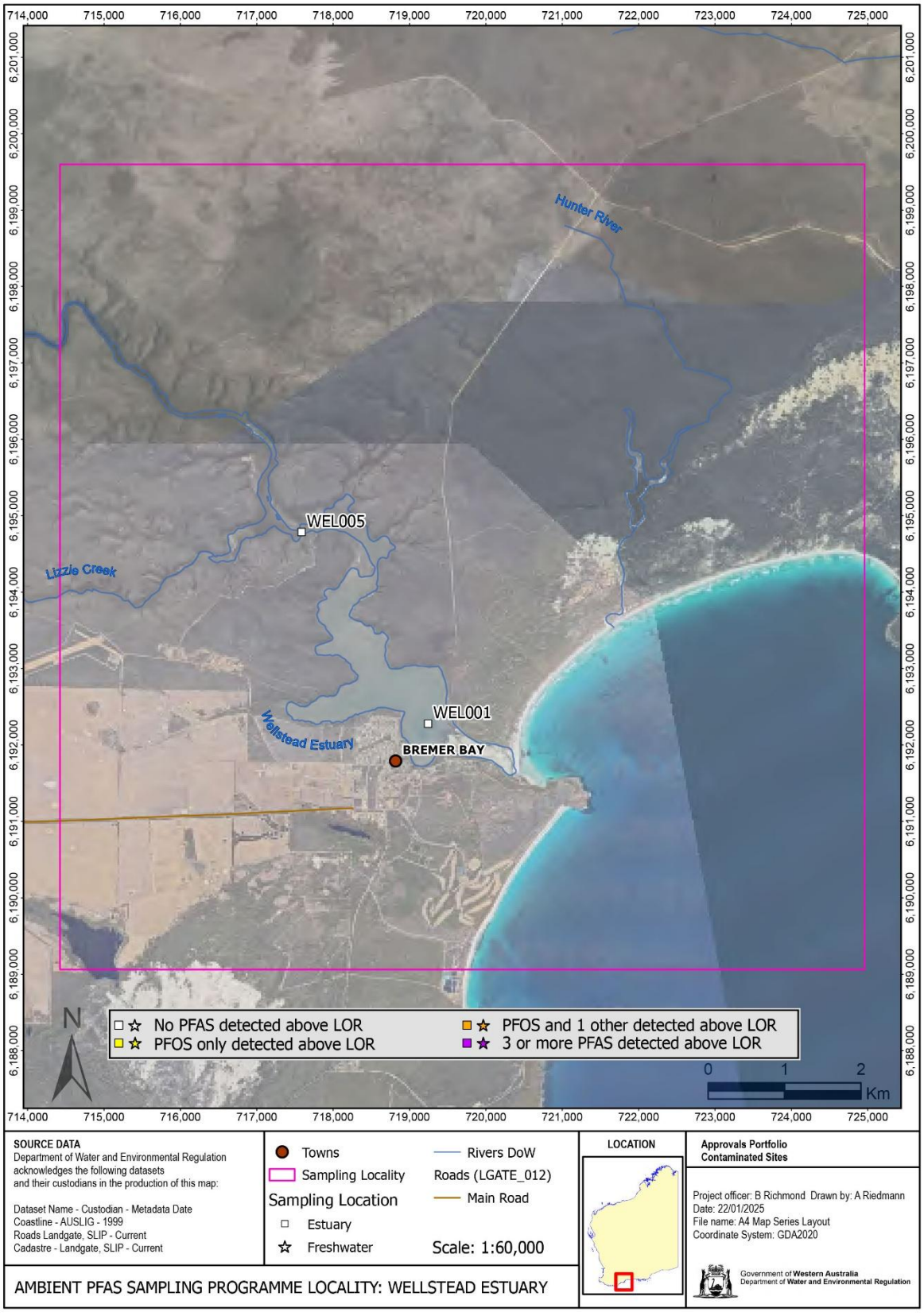
6,200,000
6,195,000
6,190,000
6,185,000
6,180,000
Yerraminnup River
Wilgarup River
Quabicup Hill
Quintarrup
Perup River
Smith Brook
Warren River
Picketts Pond
Warwaberup Gully
Tone River
Quinninup Brook
Little Quinninup Brook
Karri Lake
Six Mile Brook
Shannon River
Big Hill
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0 1 2
Km
N
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
Scale: 1:150,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: WARREN RIVER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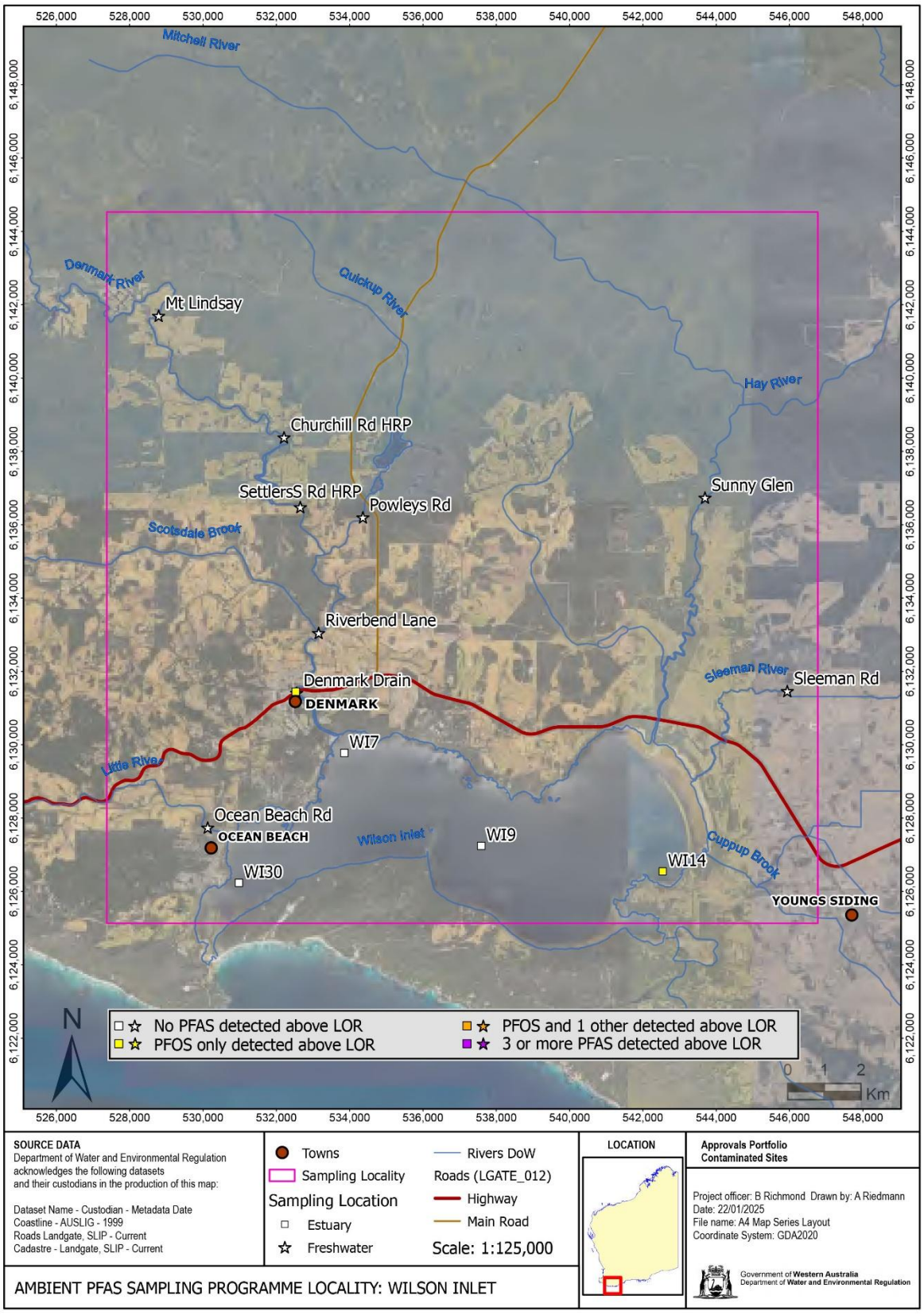
6,194,000
6,193,000
6,192,000
6,191,000
6,190,000
6,189,000
6,188,000
Hunter River
WEL005
Lizzie Creek
WEL001
Wellstead Estuary
BREMER BAY
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0
1
2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Main Road
Scale: 1:60,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: WELLSTEAD ESTUARY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6,136,000
6,134,000
6,132,000
6,130,000
6,128,000
6,126,000
6,124,000
6,122,000
Mitchell River
Denmark River
Quickup River
Mt Lindsay
Hay River
Churchill Rd HRP
SettlersS Rd HRP
Powleys Rd
Sunny Glen
Scotsdale Brook
Riverbend Lane
Sleeman River
Sleeman Rd
Denmark Drain
DENMARK
WI7
Little River
Ocean Beach Rd
OCEAN BEACH
Wilson Inlet
WI9
Cuppup Brook
WI14
WI30
YOUNGS SIDING
N
No PFAS detected above LOR
PFOS only detected above LOR
PFOS and 1 other detected above LOR
3 or more PFAS detected above LOR
0 1 2
Km
SOURCE DATA
Department of Water and Environmental Regulation acknowledges the following datasets and their custodians in the production of this map:
Dataset Name - Custodian - Metadata Date
Coastline - AUSLIG - 1999
Roads Landgate, SLIP - Current
Cadastre - Landgate, SLIP - Current
Towns
Sampling Locality
Sampling Location
Estuary
Freshwater
Rivers DoW
Roads (LGATE_012)
Highway
Main Road
Scale: 1:125,000
LOCATION
Approvals Portfolio
Contaminated Sites
Project officer: B Richmond Drawn by: A Riedmann
Date: 22/01/2025
File name: A4 Map Series Layout
Coordinate System: GDA2020
Government of Western Australia
Department of Water and Environmental Regulation
AMBIENT PFAS SAMPLING PROGRAMME LOCALITY: WILSON INLET

Appendix B: Tabulated results

MOORE RIVER ESTUARY RESULTS							FIELD QA/QC					
	Limit of Reporting (µg/L)											
Site ID		MRE01	MRE02	MRE03	MRE04	MRE05		MRE02	MRE02	MRE02	MRE02	MRE02
Site Type (saline/brackish/fresh)		Brackish	Brackish	Brackish	Brackish	Brackish			Brackish	Brackish	Brackish	Brackish
							Sample Type	Field Blank	Primary	Field Duplicate	Field Replicate	Field Replicate
Sample Date		12/06/20	12/06/20	12/06/20	12/06/20	12/06/20		12/06/20	12/06/20	12/06/20	12/06/20	12/06/20
PFAS ANALYSIS												
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)												
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)												
Perfluorobutanoic acid (PFBA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropentanoic acid (PFPeA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroalkyl sulfonamido substances												
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl sulfonic acids (PFSAs)												
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	**0.0002**	**0.0001**	**0.0001**	< 0.0001	< 0.0001		< 0.0001	**0.0001**	**0.0001**	**0.0001**	**0.0001**
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations												
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

GINGIN BROOK AND PEEL HARVEY ESTUARY RESULTS													
	Limit of Reporting (µg/L)	Gingin Brook		Peel - Harvey Estuary									
Site ID		MR14	MR64	PHE01	PHE02	PHE04	PHE07	PHRM2	PHRM4	PHRM9	PHRS4	PHRS6	PHRS7
Site Type (saline/brackish/fresh)		Fresh	Fresh	Saline	Saline	Saline	Saline	Saline	Saline	Saline	Saline	Saline	Saline
Land Use Category		Ag	Ag										
Sample Date		22/04/20	22/04/20	7/07/20	7/07/20	7/07/20	7/07/20	7/07/20	7/07/20	7/07/20	8/07/20	8/07/20	8/07/20
PFAS ANALYSIS													
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)													
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.006	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)													
Perfluorobutanoic acid (PFBA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanoic acid (PFDA)	0.001	**0.001**	**0.001**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.002**	**0.002**
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropentanoic acid (PFPeA)	0.001	< 0.001	**0.001**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroalkyl sulfonamido substances													
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl sulfonic acids (PFSAs)													
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	**0.0002**	**0.0002**	< 0.0001	**0.0001**	**0.0002**	**< 0.0001**	**0.0002**	**0.0002**	**0.0002**	**0.0005**	**0.0018**	**0.0017**
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	**0.002**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations													
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0018**	**0.0017**
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0018**	**0.0017**
Sum of PFASs (n=30)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	**0.0098**	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0018**	0.0017
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	**0.0098**	**< 0.005**

	PEEL-HARVEY ESTUARY FIELD QA/QC						INTER-LABORATORY DUPLICATES							
Site ID		PHRM9	PHRM9	PHRM9	PHRM9	PHRM9	PHRM9	PHRM9	PHRS4	PHRS4	PHRS6	PHRS6	PHRS7	PHRS7
Site Type (saline/brackish/fresh)		Saline	Saline	Saline	Saline		Saline	Saline	Saline	Saline	Saline	Saline	Saline	Saline
	Sample Type	Field duplicate	Field duplicate	Field Replicate	Field Replicate	Field Blank	Lab 1	Lab2	Lab 1	Lab 2	Lab 1	Lab 2	Lab 1	Lab 2
Sample Date		7/07/20	7/07/20	7/07/20	7/07/20	7/07/20	7/07/20	7/07/20	8/07/20	8/07/20	8/07/20	8/07/20	8/07/20	8/07/20
PFAS ANALYSIS														
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)														
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.001	< 0.005	<0.001	**0.006**	<0.001	< 0.005	<0.001
Perfluoroalkyl carboxylic acids (PFCAs)														
Perfluorobutanoic acid (PFBA)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	< 0.005	<0.005	< 0.005	<0.005	< 0.005	<0.005
Perfluorodecanoic acid (PFDA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluorododecanoic acid (PFDoDA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.005	< 0.001	<0.005	< 0.001	<0.005	< 0.001	<0.005
Perfluoroheptanoic acid (PFHpA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluorohexanoic acid (PFHxA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	**0.002**	<0.001	**0.002**	<0.001
Perfluorononanoic acid (PFNA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluorooctanoic acid (PFOA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0004	< 0.001	<0.0004	< 0.001	**0.0006**	<0.001	**0.0009**
Perfluoropentanoic acid (PFPeA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluorotetradecanoic acid (PFTeDA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluorotridecanoic acid (PFTrDA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluoroundecanoic acid (PFUnDA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluoroalkyl sulfonamido substances														
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001
Perfluorooctane sulfonamide (FOSA)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001	< 0.005	<0.001
Perfluoroalkyl sulfonic acids (PFSAs)														
Perfluorobutanesulfonic acid (PFBS)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluorodecanesulfonic acid (PFDS)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluoroheptanesulfonic acid (PFHpS)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluorohexanesulfonic acid (PFHxS)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0002	< 0.001	**0.0005**	< 0.001	**0.0009**	< 0.001	**0.001**
Perfluorononanesulfonic acid (PFNS)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluorooctanesulfonic acid (PFOS)		**0.0002**	**0.0002**	**0.0002**	**0.0002**	< 0.0001	**0.0002**	<0.0002	**0.0005**	**0.0002**	**0.0018**	**0.0009**	**0.0017**	**0.0011**
Perfluoropentanesulfonic acid (PFPeS)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001
Perfluoropropanesulfonic acid (PFPrS)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.005	< 0.001	<0.005	< 0.001	<0.005	< 0.001	<0.005
PFAS Summations														
Sum (PFHxS + PFOS)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.005	< 0.001	<0.005	**0.0018**	<0.005	**0.0017**	<0.005
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001		**0.0018**		**0.0017**	
Sum of PFASs (n=30)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	< 0.005	<0.005	**0.0098**	<0.005	< 0.005	<0.005
Sum of US EPA PFAS (PFOS + PFOA)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001		**0.0018**		**0.0017**	
Sum of WA DWER PFAS (n=10)		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	< 0.005	<0.005	**0.0098**	<0.005	< 0.005	<0.005

LESCHENAULT ESTUARY RESULTS										FIELD QA/QC			INTER-LABORATORY DUPLICATES	
	Limit of Reporting (µg/L)	Leschenault Estuary												
Site ID		EST3	EST4	EST5	EST6	COLL1	COLL2	PARK		EST5	COLL2	COLL2	COLL2	COLL2
Site Type (saline/brackish/fresh)		saline	saline	saline	saline	brackinsh	brackish	saline			brackish	brackish	brackish	brackish
									Sample Type	Field Bland	Primary	Field Duplicate	Lab 1	Lab 2
Sample Date		11/01/22	11/01/22	11/01/22	11/01/22	11/01/22	11/01/22	12/01/22		11/01/22	11/01/22	11/01/22	11/01/22	11/01/22
PFAS ANALYSIS														
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)														
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.001
Perfluoroalkyl carboxylic acids (PFCAs)														
Perfluorobutanoic acid (PFBA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.005
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0004
Perfluoropentanoic acid (PFPeA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluoroalkyl sulfonamido substances														
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.001
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.001
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.001
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.001
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.001
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.001
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.001
Perfluoroalkyl sulfonic acids (PFSAs)														
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	**0.0006**
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	**0.0002**	**0.0001**	**0.0001**	**0.0002**	**0.0005**	**0.0005**	**0.0022**		< 0.0001	**0.0005**	**0.0005**	**0.0005**	**0.0002**
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.001
PFAS Summations														
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0022**		< 0.001	< 0.001	< 0.001	< 0.001	<0.005
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0022**		< 0.001	< 0.001	< 0.001	< 0.001	
Sum of PFASs (n=30)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0022**		< 0.001	< 0.001	< 0.001	< 0.001	
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.005

LOWER COLLIE, BRUNSWICK AND PRESTON RIVERS RESULTS										FIELD QA/QC		INTER-LABORATORY DUPLICATES	
	Limit of Reporting (µg/L)	Preston River		Lower Collie and Brunswick Rivers									
Site ID		Sylvan Way	Dardanup Road	COLL3	COLL4	BRUN1	BRUN2	BRUN3	BRUN4		BRUN2	BRUN2	BRUN2
Site Type (saline/brackish/fresh)		Fresh	Fresh	fresh	fresh	fresh	fresh	fresh	fresh			fresh	fresh
Land Use Category		Ag	Ag	Ag	Ag	Ag	Ag	Ag	Ag	Sample Type	Field Blank	Lab 1	Lab2
Sample Date		26/02/20	26/02/20	11/01/22	11/01/22	11/01/22	11/01/22	12/01/22	12/01/22		11/02/22	11/01/22	11/01/22
PFAS ANALYSIS													
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)													
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.001
Perfluoroalkyl carboxylic acids (PFCAs)													
Perfluorobutanoic acid (PFBA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.005
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.0004
Perfluoropentanoic acid (PFPeA)	0.001	< 0.001	< 0.01	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001		< 0.001	< 0.001	<0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluoroalkyl sulfonamido substances													
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.001
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.001
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.001
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.001
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.001
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.001
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.001
Perfluoroalkyl sulfonic acids (PFSAs)													
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001		< 0.001	< 0.001	0.0003
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	0.0009	0.0004	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007		< 0.0001	0.0007	0.0002
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	<0.001
PFAS Summations													
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.0017		< 0.001	< 0.001	<0.005
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.0017		< 0.001	< 0.001	
Sum of PFASs (n=30)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	<0.005

UPPER COLLIE RIVER RESULTS																FIELD QA/QC				
	Limit of Reporting (µg/L)	Upper Collie River																		
Site ID		DS Coolangatta	DS Coolangatta	Duderling Pool	Duderling Pool	Cardiff town pool	Long pool	Kepwari outlet	McAlinden Road	DS Harris Dam	Booth Street	US Collie West Rd	Quinns Road	US Coolangatta	Quinns Road		Quinns Road	Quinns Road	Quinns Road	Quinns Road
Site Type (saline/brackish/fresh)		Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Sample Type	Field Replicate	Field Duplicate	Field Duplicate	Field Blank
Land Use Category		Rem	Rem	Rem	Rem	Ag	Ag	Ag	Rem	Rem	Ag	Ag	Ag	Ag	Ag					
Sample Date		27/02/20	1/03/22	27/02/20	3/03/22	3/03/22	3/03/22	3/03/22	3/03/22	4/03/22	1/03/22	1/03/22	27/02/20	1/03/22	3/03/22		3/03/22	3/03/22	3/03/22	3/03/22
PFAS ANALYSIS																				
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)																				
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)																				
Perfluorobutanoic acid (PFBA)	0.005	< 0.005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanoic acid (PFPeA)	0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroalkyl sulfonamido substances																				
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
Perfluoroalkyl sulfonic acids (PFSAs)																				
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	**0.0015**	**0.001**	**0.0005**	< 0.0001	**0.0002**	**0.0033**	< 0.0001	< 0.0001	**0.0003**	**0.0001**		**0.0001**	**0.0002**	**0.0001**	< 0.0001
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations																				
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0015**	**0.001**	< 0.001	< 0.001	< 0.001	0.0053	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0015**	**0.001**	< 0.001	< 0.001	< 0.001	0.0053	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0053	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0015**	**0.001**	< 0.001	< 0.001	< 0.001	0.0033	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0053	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005

VASSE REGION RESULTS									FIELD QA/QC				
Note that ultratrace limits of reporting were not achieved for some PFAS species in this batch of samples, due to difficulties in removing suspended solids.	Limit of Reporting (µg/L)	Vasse Estuary	Vasse Streams										
Site ID		Lower Vasse 1	Upper Vasse	Lower Vasse 2	Annie Brook Pools	Yates Bridge US	Sabina River	Huttons Farm DS		Huttons Farm DS	Huttons Farm DS	Huttons Farm DS	Huttons Farm DS
Site Type (saline/brackish/fresh)		Brackish	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh		Fresh	Fresh	Fresh	
Land Use Category		Urb	Ag	Ag	Ag	Rem	Ag	Rem	Sample Type	Field Duplicate	Field Duplicate	Field Replicate	Field Blank
Sample Date		15/03/22	15/03/22	15/03/22	15/03/22	17/03/22	16/03/22	17/03/22		17/03/22	17/03/22	17/03/22	17/03/22
PFAS ANALYSIS													
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)													
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.01	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.01	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.01	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.05	< 0.005	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)													
Perfluorobutanoic acid (PFBA)	0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
Perfluorodecanoic acid (PFDA)	0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)	0.001	**0.02**	< 0.01	**0.02**	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)	0.001	**0.05**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)	0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)	0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanoic acid (PFPeA)	0.001	< 0.05	< 0.01	< 0.01	< 0.05	< 0.01	< 0.05	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroalkyl sulfonamido substances													
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05
Perfluoroalkyl sulfonic acids (PFSAs)													
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.01	< 0.001	0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.01	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.01	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	**0.043**	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.01	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	**0.035**	< 0.0001	**0.001**	< 0.01	< 0.0001	< 0.01	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.01	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.01	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations													
Sum (PFHxS + PFOS)	0.001	**0.078**	< 0.001	**0.001**	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	**0.078**	< 0.001	**0.001**	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	0.005	**0.148**	< 0.005	**0.026**	< 0.05	< 0.005	< 0.05	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	**0.035**	< 0.001	**0.001**	< 0.01	< 0.001	< 0.01	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	0.005	**0.148**	< 0.005	**0.026**	< 0.05	< 0.005	< 0.05	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005

HARDY ESTUARY AND BLACKWOOD RIVER RESULTS																	FIELD QA/QC						
	Limit of Reporting (µg/L)	Hardy Estuary													Blackwood River								
Site ID		HF01	HF02	HF03	HF04	HF05	HF06	MIF01	MIF03	BRF01	BRF02	BRF06	BRF08	SRF01	DSUE1		HF02	HF02	MIF01	MIF01	BRF02	DSUE1
Site Type (saline/brackish/fresh)		Saline	Saline	Saline	Saline	Saline	Saline	Saline	Saline	Saline	Brackish	Saline	Saline	Saline	Fresh		Saline	Saline	Saline	Saline		
Land Use Category															Ag	Sample Type	Primary	Field Duplicate	Primary	Field Duplicate	Field Blank	Field Blank
Sample Date		1/03/22	1/03/22	1/03/22	1/03/22	1/03/22	1/03/22	1/03/22	2/03/22	1/03/22	1/03/22	1/03/22	2/03/22	2/03/22	2/03/22		1/03/22	1/03/22	1/03/22	1/03/22	1/03/22	2/03/22
PFAS ANALYSIS																						
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)																						
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)																						
Perfluorobutanoic acid (PFBA)	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perfluorodecanoic acid (PFDA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanoic acid (PFPeA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroalkyl sulfonamido substances																						
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perfluorooctane sulfonamide (FOSA)	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoroalkyl sulfonic acids (PFSAs)																						
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	< 0.0001	**0.0002**	< 0.0001	< 0.0001	**0.0002**	< 0.0001	**0.0002**	**0.0002**	< 0.0001	< 0.0001	< 0.0001	**0.0001**	< **0.0001**	**0.0002**		< 0.0001	**0.0002**	**0.0002**	< 0.0001	< 0.001	< 0.0001
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations																						
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

WARREN AND DONNELLY RIVERS RESULTS																	FIELD QA/QC					
	Limit of Reporting (µg/L)	Donnelly River Catchment							Warren River Catchment													
Site ID		Chapple Bridge	Barlee Brook	Scott Road	Palings Road	Yanmah Brook 2	Staircase Road	Strickland	Quint-arrup	Quabicup Hill	Big Brook	Treen Brook	Redgum Bridge	Barker Road	Picketts Pond	Channy-bearup		Chapple Bridge	Chapple Bridge	Chapple Bridge	Chapple Bridge	Chapple Bridge
Site Type (saline/brackish/fresh)		Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh		Fresh	Fresh	Fresh	Fresh	
Land Use Category		Rem	Rem	Rem	Rem	Ag	Rem	Rem	Ag	Rem	Rem	Rem	Ag	Ag	Ag	Ag	Sample Type	Primary	Field Replicate	Field Duplicate	Field Triplicate	Field Blank
Sample Date		5/02/2020	6/02/20	6/02/20	5/02/20	5/02/20	6/02/20	6/02/20	10/02/20	10/02/20	12/02/20	12/02/20	10/02/20	10/02/20	12/02/20	12/02/20		5/02/20	5/02/20	5/02/20	5/02/20	5/02/20
PFAS ANALYSIS																						
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)																						
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)																						
Perfluorobutanoic acid (PFBA)	0.005	0.005	< 0.005	< 0.005	< 0.005	0.013	< 0.005	< 0.005	< 0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.009		0.005	0.006	0.006	< 0.005	< 0.005
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropentanoic acid (PFPeA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.001	0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroalkyl sulfonamido substances																						
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl sulfonic acids (PFSAs)																						
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	0.0001	< 0.0001	< 0.0001	0.0001	0.0003	< 0.0001	0.0001	0.0004	< 0.0001	< 0.0001	0.0007	0.0007	0.0002	0.0002	0.0002		0.0001	0.0002	0.0001	0.0002	< 0.0001
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations																						
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	0.005	0.0051	< 0.005	< 0.005	< 0.005	0.0133	< 0.005	< 0.005	< 0.005	0.009	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0092		0.0051	0.0062	0.0061	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	0.005	0.0051	< 0.005	< 0.005	< 0.005	0.0133	< 0.005	< 0.005	< 0.005	0.009	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0092		0.0051	0.0062	0.0061	< 0.005	< 0.005

WALPOLE - DENMARK ESTUARIES RESULTS												FIELD QA/QC						
	Limit of Reporting (µg/L)	Walpole River/Inlet		Irwin Inlet		Wilson Inlet												
Site ID		Plain Rd US	Plain Rd DS	IRW001	IRW002	Denmark VFS	WI14	WI9	WI30	WI7		IRW002	IRW002	WI14	WI14	WI14	WI14	WI14
Site Type (saline/brackish/fresh)		Fresh	Saline	Brackish	Brackish	Saline	Brackish	Brackish	Brackish	Brackish		Brackish	Brackish	Brackish	Brackish	Brackish	Brackish	
Land Use Category		Rem									Sample Type	Primary	Field Duplicate	Primary	Field Replicate	Field Duplicate	Field Triplicate	Field Blank
Sample Date		16/03/20	16/03/20	6/10/202	6/10/20	17/03/20	23/09/20	23/09/20	23/09/20	23/09/20		6/10/20	6/10/20	23/09/20	23/09/20	23/09/20	23/09/20	23/09/20
PFAS ANALYSIS																		
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)																		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)																		
Perfluorobutanoic acid (PFBA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropentanoic acid (PFPeA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroalkyl sulfonamido substances																		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl sulfonic acids (PFSAs)																		
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	< 0.0001	< 0.0001	0.0001	0.0001	0.0004	< 0.0001	0.0001	0.0001	0.0001		0.0001	0.0002	< 0.0001	0.0002	0.0001	0.0001	< 0.0001
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations																		
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

DENMARK RIVERS RESULTS										
	Limit of Reporting (µg/L)	Denmark River						Little River	Hay River	Sleeman River
Site ID		Mt Lindsay	Churchill Rd HRP	Settlers Rd HRP	Powleys Rd	Riverbend Lane	Denmark Drain	Ocean Beach Rd	Sunny Glen	Sleeman Rd
Site Type (saline/brackish/fresh)		Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh
Land Use Category		Rem	Rem	Rem	Rem	Rem	Urb	Ag	Ag	Ag
Sample Date		6/10/20	16/03/20	16/03/20	18/03/20	16/03/20	17/03/20	6/10/20	6/10/20	6/10/20
PFAS ANALYSIS										
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)										
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)										
Perfluorobutanoic acid (PFBA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.001**	< 0.001	< 0.001	< 0.001
Perfluoropentanoic acid (PFPeA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroalkyl sulfonamido substances										
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl sulfonic acids (PFSAs)										
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	**0.0021**	< 0.0001	< 0.0001	< 0.0001
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations										
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0021**	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0031**	< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0031**	< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

TORBAY REGION STREAMS RESULTS								TORBAY REGION STREAMS FIELD QA/QC							
	Torbay Region														
Site ID	Marbellup Bk West	Marbellup Bk East	Torbay TS	Elleker GS	NCDeg	LP002E		Torbay TS	Torbay TS	Torbay TS	Torbay TS	Marbellup Bk East	Marbellup Bk East	Marbellup Bk East	Marbellup Bk East
Site Type (saline/brackish/fresh)	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh			Fresh	Fresh	Fresh		Fresh	Fresh	Fresh
Land Use Category	Ag	Ag	Ag	Ag	Ag	Ag	Sample Type	Field blank	Field Replicate	Field Duplicate	Field Duplicate	Field blank	Field Replicate	Field Duplicate	Field Duplicate
Sample Date	10/03/20	10/03/20	7/10/20	10/03/20	7/10/20	7/10/20		7/10/20	7/10/20	7/10/20	7/10/20	10/03/20	10/03/20	10/03/20	10/03/20
PFAS ANALYSIS															
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)															
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)															
Perfluorobutanoic acid (PFBA)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanoic acid (PFDA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanoic acid (PFHpA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanoic acid (PFHxA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanoic acid (PFNA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanoic acid (PFOA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropentanoic acid (PFPeA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroalkyl sulfonamido substances															
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctane sulfonamide (FOSA)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl sulfonic acids (PFSAs)															
Perfluorobutanesulfonic acid (PFBS)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0005		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Perfluoropentanesulfonic acid (PFPeS)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations															
Sum (PFHxS + PFOS)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

ALBANY AREA RIVERS AND STREAMS RESULTS													FIELD QA/QC						
	Limit of Reporting (µg/L)	Yakkamia Creek		Robinson Drain		King River			Kalgan										
Site ID		Yakkamia	Lower King Rd	Robinson Drain	Munster Hill Drain	Wilyung	Billy Boya	Old Milbrook	Andrews Road	Goodga	Betty's Beach								
Site Type (saline/brackish/fresh)		Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh			Fresh	Fresh	Fresh	Fresh		
Land Use Category		Urb	Urb	Ag	Ag	Ag	Ag	Ag	Ag	Rem	Ag	Sample Type	Field Blank	Field Replicate	Field Duplicate	Field Duplicate	Field Replicate	Wilyung Field Blank	
Sample Date		29/09/20	18/03/20	29/09/20	29/09/20	29/09/20	10/03/20	12/03/20	12/03/20	12/03/20	12/03/20		18/03/20	18/03/20	18/03/20	18/03/20	29/09/20	29/09/20	
PFAS ANALYSIS																			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)																			
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
Perfluoroalkyl carboxylic acids (PFCAs)																			
Perfluorobutanoic acid (PFBA)	0.005	0.006	< 0.005	< 0.005	0.007	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluoroheptanoic acid (PFHpA)	0.001	0.003	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	0.002	0.002	0.002	< 0.001	< 0.001	
Perfluorohexanoic acid (PFHxA)	0.001	0.009	0.004	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	0.005	0.005	0.005	< 0.001	< 0.001	
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluorooctanoic acid (PFOA)	0.001	0.002	0.002	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	0.002	0.002	0.002	< 0.001	< 0.001	
Perfluoropentanoic acid (PFPeA)	0.001	0.01	0.009	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	0.008	0.009	0.009	< 0.001	< 0.001	
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluoroalkyl sulfonamido substances																			
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
Perfluoroalkyl sulfonic acids (PFSAs)																			
Perfluorobutanesulfonic acid (PFBS)	0.001	0.002	< 0.001	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluorohexanesulfonic acid (PFHxS)	0.001	0.006	0.002	< 0.001	0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	0.002	0.002	0.002	< 0.001	< 0.001	
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluorooctanesulfonic acid (PFOS)	0.0001	0.0067	0.005	0.0005	0.0018	0.0008	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	0.0057	0.006	0.0053	0.0006	< 0.0001	
Perfluoropentanesulfonic acid (PFPeS)	0.001	0.003	< 0.001	< 0.001	0.007	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
PFAS Summations																			
Sum (PFHxS + PFOS)	0.001	0.0127	0.007	< 0.001	0.0058	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	0.0077	0.008	0.0073	< 0.001	< 0.001	
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	0.0147	0.009	< 0.001	0.0068	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	0.0097	0.01	0.0093	< 0.001	< 0.001	
Sum of PFASs (n=30)	0.005	0.0477	0.024	< 0.005	0.0278	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	0.0247	0.026	0.0253	< 0.005	< 0.005	
Sum of US EPA PFAS (PFOS + PFOA)	0.001	0.0087	0.007	< 0.001	0.0028	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	0.0077	0.008	0.0073	< 0.001	< 0.001	
Sum of WA DWER PFAS (n=10)	0.005	0.0447	0.024	< 0.005	0.0208	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	0.0247	0.026	0.0253	< 0.005	< 0.005	

PRINCESS ROYAL HARBOUR RESULTS										FIELD QA/QC					
	Limit of Reporting (µg/L)	Princess Royal Harbour													
Site ID		APRH1	APRH2	APRH3	APRH4	APRH5	Entrance	Marina 2	Marina 3		APRH1	APRH1	APRH1	APRH1	APRH1
Site Type (saline/brackish/fresh)		saline	saline	saline	saline	saline	saline	saline	saline		saline	saline	saline	saline	
										Sample Type	Primary	Field Replicate	Field Duplicate	Field Duplicate	Field Blank
Sample Date		30/09/20	30/09/20	30/09/20	30/09/20	30/09/20	30/09/20	30/09/20	30/09/20		30/09/20	30/09/20	30/09/20	30/09/20	30/09/20
PFAS ANALYSIS															
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)															
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)															
Perfluorobutanoic acid (PFBA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.01
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropentanoic acid (PFPeA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.01
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroalkyl sulfonamido substances															
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroalkyl sulfonic acids (PFSAs)															
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	< 0.0001	0.0001	< 0.0001	0.0001	< 0.0001	0.0002	0.0001	0.0002		< 0.0001	< 0.0001	< 0.0001	0.0002	< 0.0001
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PFAS Summations															
Sum (PFHxS + PFOS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

ALBANY SOUTH COAST ESTUARIES RESULTS												FIELD QA/QC			
	Limit of Reporting (µg/L)	Oyster Harbour							Wellstead Estuary		Beaufort Inlet				
Site ID		AOH1	AOH2	AOH4	AOH5	AOH6	Lower Bridge	AOH12	WEL001	WEL005	MP1		AOH1	AOH1	Lower Bridge
Site Type (saline/brackish/fresh)		saline	saline	saline	saline	saline	saline	saline	saline	saline	saline		saline		
												Sample Type	Primary	Field Blank	Field Blank
Sample Date		12/10/20	12/10/20	12/10/20	12/10/20	12/10/20	12/11/20	12/10/20	1/10/20	1/10/20	1/10/20		12/10/20	12/10/20	12/11/20
PFAS ANALYSIS															
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)															
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005
Perfluoroalkyl carboxylic acids (PFCAs)															
Perfluorobutanoic acid (PFBA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05		< 0.005	< 0.005	< 0.005
Perfluorodecanoic acid (PFDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluoroheptanoic acid (PFHpA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorohexanoic acid (PFHxA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorononanoic acid (PFNA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorooctanoic acid (PFOA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluoropentanoic acid (PFPeA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.001**	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluoroalkyl sulfonamido substances															
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005
Perfluorooctane sulfonamide (FOSA)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005
Perfluoroalkyl sulfonic acids (PFSAs)															
Perfluorobutanesulfonic acid (PFBS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorodecanesulfonic acid (PFDS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)	0.0001	< 0.0001	**0.0061**	**0.0038**	< 0.0001	**0.0002**	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001
Perfluoropentanesulfonic acid (PFPeS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
PFAS Summations															
Sum (PFHxS + PFOS)	0.001	< 0.001	**0.0061**	**0.0038**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.001	< 0.001	**0.0061**	**0.0038**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Sum of PFASs (n=30)	0.005	< 0.005	**0.0061**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)	0.001	< 0.001	**0.0061**	**0.0038**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
Sum of WA DWER PFAS (n=10)	0.005	< 0.005	**0.0061**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005

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