

West Gate Tunnel Project

Assessment of PFAS in Groundwater

09-Jul-2021
West Gate Tunnel

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Client: West Gate Tunnel Project

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Quality Information

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Glossary of Abbreviations and Acronyms

Term	Description
EPA	Environment Protection Authority Victoria
LOR	Limit of reporting. The lowest concentration of an analyte that can be determined with acceptable precision (repeatability) and accuracy under the standard conditions of the laboratory test
NEMP	National Environmental Management Plan
NHMRC	National Health and Medical Research Council
PFAS	Per- and poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PFOS+PFHxS	The sum of detected concentrations of PFOS and PFHxS. Assumes that concentrations reported below the LOR are equal to zero.

1.0 Introduction

1.1 Preamble

AECOM Australia Pty Ltd (AECOM) was engaged to provide Transurban with this factual comparison of analytical results for per- and poly-fluoroalkyl substances (PFAS) in groundwater samples, reported as part of the West Gate Tunnel Project, against relevant regulatory screening criteria. Figure F1 shows the approximate location of the tunnel alignment and subject groundwater sampling locations (Appendix A).

All data referenced by AECOM in this report were provided to Transurban by the CPB John Holland Joint Venture, the builder of the West Gate Tunnel Project.

1.2 Background

1.2.1 What are PFAS?

PFAS are a group of manufactured chemicals which have been used in a wide range of industrial and consumer products for many decades, including firefighting foam, fabric and carpet treatments, personal care products, non-stick cookware and food packaging (Interstate Technology Regulatory Council, 2020, *History and Use of Per- and Polyfluoroalkyl Substances*). Urban populations across the globe can be exposed to PFAS in their daily life due to their wide use, environmental persistence, and chemical properties that allow widespread dispersal through the environment (ITRC – Section 6 <https://pfas-1.itrcweb.org/6-media-specific-occurrence/>).

The PFAS subject to regulatory guidance in Australia, are:

- perfluorooctane sulfonate (PFOS)
- perfluorohexane sulfonate (PFHxS)
- perfluorooctanoic acid (PFOA).

2.0 Human Health Guidelines for PFAS in Groundwater

The Heads of EPAS (HEPA, 2020) *PFAS National Environmental Management Plan* (NEMP) provides human health-based guideline values for PFOS, PFHxS and PFOA in water, which were utilised in this data assessment and include the following:

- Drinking water (based on Department of Health [DoH], 2019 *Health based guidance values for PFAS* which are founded on National Health and Medical Research Council, 2019 *Guidance on Per and Polyfluoroalkyl substances (PFAS) in Drinking Water*). The DoH (2019) guidelines are based on a person drinking 2 L of water every day and include a 10-fold margin of safety (refer to Table 1 below). PFOS and PFHxS are assumed to have similar toxicity and therefore the guideline values apply to the sum of detected concentrations of PFOS+PFHxS
- Recreational water (National Health and Medical Research Council, 2019 *Guidance on Per and Polyfluoroalkyl substances (PFAS) in Recreational Water*). The NHMRC (2019) recreational water guidelines are based on a person accidentally ingesting 200 mL of water each time they swim, with 150 swimming events per year (i.e. ingesting an average of 30 L of water during swimming each year). The NHMRC (2019) guideline values also include a 10-fold margin of safety (refer to Table 1 below)

As stated by DoH in their Health Based Guidance Value for PFAS Factsheet (20190911), “*Both the recreational water and the drinking water guideline values are precautionary and protective of human health. The guideline values include a wide margin of safety.*”

Table 1 Human Health Water Guidelines

Human Health Water Guidelines	Criteria	
	Sum of PFOS & PFHxS	PFOA
Drinking water (DoH (2019) guideline referenced in the HEPA [2020] PFAS NEMP)	0.07 µg/L	0.56 µg/L
Recreational water quality (NHMRC (2019) guideline referenced in the HEPA [2020] PFAS NEMP)	2 µg/L*	10 µg/L*
Recreational water quality (DoH (2017) guideline referenced in the HEPA [2018] PFAS NEMP)	0.7 µg/L*	5.6 µg/L*

Note: * “*The recreational water quality values have been updated from the values published in the NEMP 1.0 and are based on revised numbers derived by NHMRC (2019). The revised numbers are based on change in the assumption for the frequency and likelihood of exposure during recreational activities.*” (HEPA (2020) PFAS NEMP). Although the HEPA [2018] PFAS NEMP Recreational Values are no longer applicable, these criteria have been considered for completeness of assessing the data.

3.0 West Gate Tunnel Project Groundwater Data Review

All data referenced by AECOM in this report were provided to Transurban by the CPB John Holland Joint Venture, the builder of the West Gate Tunnel Project. AECOM has not conducted a separate quality assurance / quality control (QAQC) evaluation of the data but understands this was completed as per standard industry practice during the original sampling and analysis effort.

3.1 Groundwater Data Set

The groundwater data set comprises samples collected since 2016 and was sourced from 201 monitoring wells located along the entire tunnel alignment. The most recent data for each of the 201 monitoring wells located along the tunnel alignment was compiled into Table T1 (Appendix B) and compared against the HEPA (2020) PFAS NEMP regulatory criteria for drinking water and recreational water (refer to Figure F1 in Appendix A and Table 1 above).

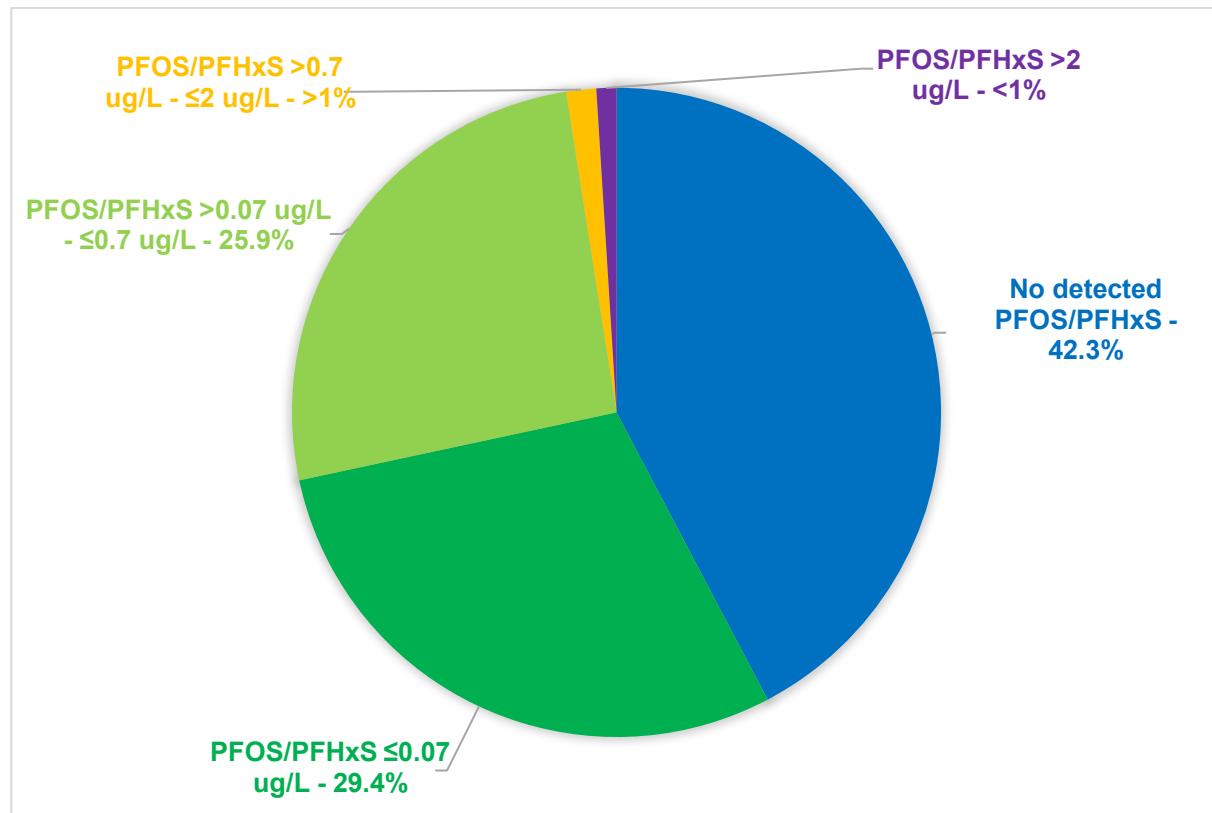
For reference, groundwater in this subject area generally flows towards the Maribyrnong River and/or Yarra River.

3.1.1 PFOS+PFHxS Groundwater Data

The screening assessment of the most recent groundwater data from each of the 201 groundwater monitoring well locations identified the following (refer to Figure F1 in Appendix A):

- 2 samples reported only PFHxS and not PFOS
- 85 samples reported no detectable PFOS or PFHxS
- 116 samples reported detectable concentrations of PFOS and/or PFHxS. Of those:
 - 59 of the reported PFOS+PFHxS concentrations were less than the DoH (2019) / HEPA (2020) PFAS NEMP health-based guideline value for drinking water (0.07 micrograms per litre [$\mu\text{g}/\text{L}$])
 - 55 of the reported PFOS+PFHxS concentrations were less than the NHMRC (2019) / HEPA (2020) PFAS NEMP health-based guideline value for recreational water (2 $\mu\text{g}/\text{L}$), of which 52 did not exceed the HEPA (2018) PFAS NEMP health-based guideline value for recreational water (0.7 $\mu\text{g}/\text{L}$)
 - Of the two reported PFOS+PFHxS concentrations that exceeded the NHMRC (2019) / HEPA (2020) PFAS NEMP health-based guideline value for recreational water:
 - The concentrations of PFOS+PFHxS reported in these two samples were 3.94 $\mu\text{g}/\text{L}$ and 4.74 $\mu\text{g}/\text{L}$
 - Both samples were collected from locations in excess of 350 m from the tunnel alignment.

Figure 1 below provides a breakdown of the most recent results for PFOS+PFHxS concentrations reported for the 201 monitoring wells and compared to current health-based guideline values.

Figure 1 PFOS+PFHxS concentrations compared to health-based guideline values

3.1.2 PFOA Groundwater Data

The screening assessment of the most recent groundwater data from each of the 201 groundwater monitoring well locations identified the following:

- 1 sample did not have a reported PFOA result
- 129 samples reported no detectable PFOA above the laboratory limit of reporting (LOR)
- 71 samples reported detectable concentrations of PFOA above the laboratory LOR. However, none of the reported PFOA concentrations exceeded the adopted guideline values considered to be protective of human health (DoH (2019) / HEPA (2020) PFAS NEMP – 0.56 µg/L and NHMRC (2019) guideline referenced in the HEPA [2020] PFAS NEMP - 10 µg/L).

4.0 Summary

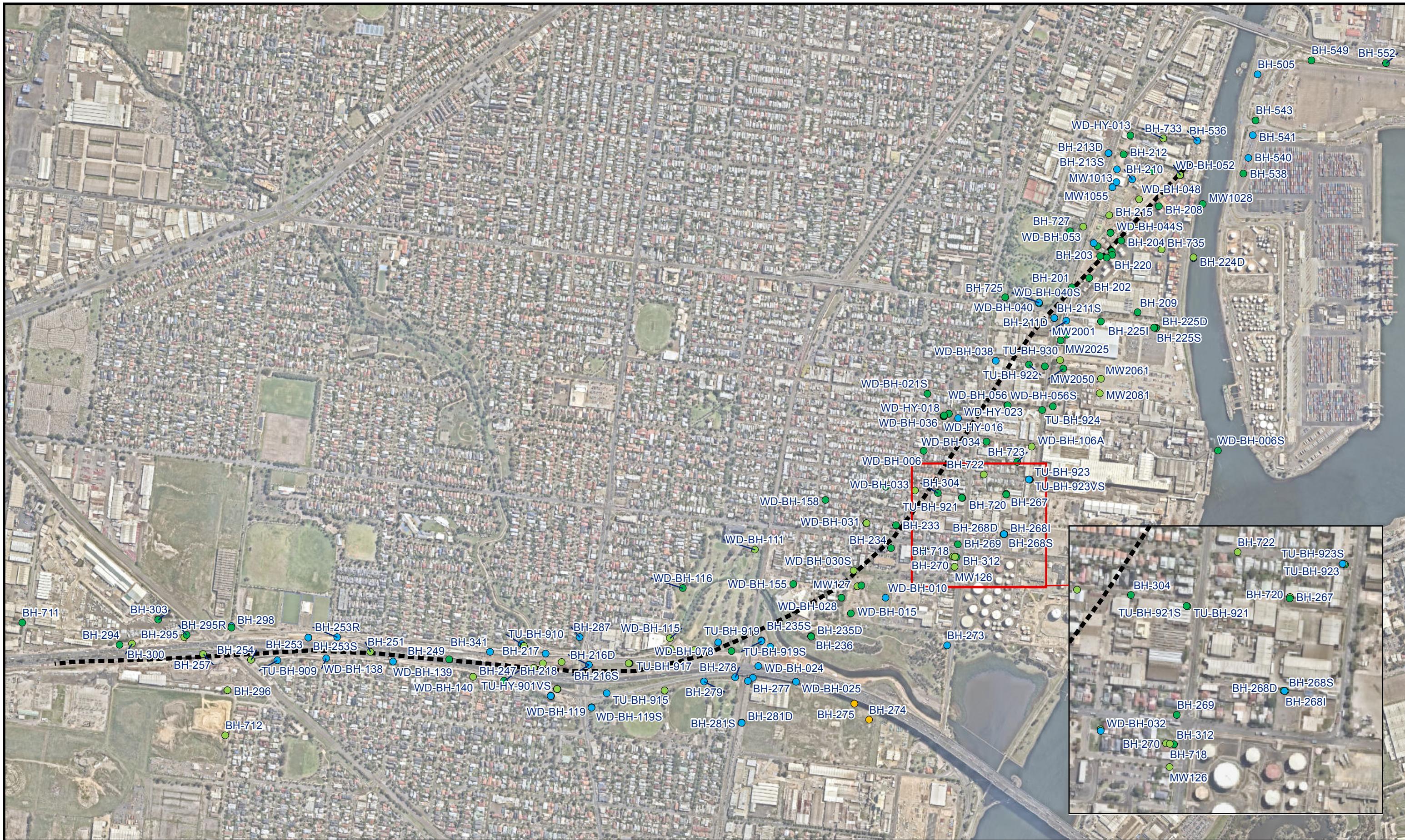
4.1 Most Recent Groundwater Data for 201 Monitoring Wells

Of the subject 201 groundwater samples assessed against regulatory criteria:

- 100 % of these samples did not exceed the DoH (2019) / HEPA (2020) PFAS NEMP drinking water guidelines for PFOA (0.56 µg/L)
- 71.7 % of these samples did not exceed the DoH (2019) / HEPA (2020) PFAS NEMP drinking water guidelines for PFOS+PFHxS (0.07 µg/L)
- 99 % of these samples did not exceed the NHMRC (2019) / HEPA (2020) PFAS NEMP recreational water guideline values (PFOS+PFHxS – 2 µg/L and PFOA – 10 µg/L)
- 97.5 % of these samples did not exceed the HEPA (2018) PFAS NEMP recreational water guideline values (PFOS+PFHxS – 0.7 µg/L and PFOA – 5.6 µg/L).

Appendix A

Figure



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Legend

- < LOR (85)
- ≤ 0.07 µg/L (58)
- > 0.07 - 2 µg/L (53)
- > 2 µg/L (2)

■ ■ ■ Approximate Tunnel Alignment

No detectable PFOS or PFHxS (< LOR)
PFOS/PFHxS detected ≤ 0.07 µg/L (below PFAS NEMP 2020 Human Health Drinking Water)
PFOS/PFHxS detected > 0.07 - 2 µg/L (above PFAS NEMP 2020 Human Health Drinking Water, below PFAS NEMP 2020 Recreational Water)
PFOS/PFHxS detected > 2 - 4.74 µg/L (above PFAS NEMP 2020 Recreational Water, below PFAS NEMP 99% Species Protection)

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Coordinate System: GDA 1994 MGA Zone 55
0 137.5 275 550
metres
1:11,650 (when printed at A3)

Note:

- The LOR is the lowest concentration of an analyte that can be determined with acceptable precision (repeatability) and accuracy under the standard conditions of the laboratory test.
- The coordinates of "TU-BH-119", "TU-BH-119S" and "WD-HY-135S" were not provided to Transurban and are therefore not shown on the figure.
- Where a monitoring location has been sampled more than once, the maximum reported PFOS+PFHxS concentration for that location has been used in this figure.
- PFHxS: Perfluorohexane sulfonic acid
- PFOS: Perfluorooctane sulfonic acid
- LOR: Limit of Reporting

GROUNDWATER PFOS/PFHxS RESULTS (2015 – 2020)

Transurban

West Gate Tunnel Project

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Figure

F1

Appendix B

Analytical Result Table

Table 1

Most Recent PFAS Analytical for Westgate Tunnel Project

AECOM

	PFAS																			
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	N-Ethyl perfluorooctane sulfonamide (EfFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EfFOsAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EfFOSE)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOsAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	Perfluorobutane sulfonic acid (PFBS)	Perfluorobutanoic acid (PBA)	Perfluorodecane sulfonic acid (PFDS)	Perfluorodecanoic acid (PDDA)	Perfluoroheptane sulfonate (PFHps)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexane sulfonate (PFHxs)	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (FOSA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL																				
Location Code	Date	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1
BH-201	7/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1
BH-202	4/10/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1
BH-203	3/10/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1
BH-204	9/11/2017	<0.001	<0.001	0.1	<0.001	<0.01	<0.002	<0.05	<0.005	<0.002	<0.005	<0.001	<0.002	-	<0.002	<0.005	<0.001	<0.001	0.004	<0.001
BH-205	2/10/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1
BH-208	9/11/2017	<0.001	<0.001	0.002	<0.001	<0.01	<0.002	<0.05	<0.005	<0.002	<0.005	<0.001	<0.002	-	<0.002	<0.005	<0.001	<0.001	<0.001	<0.01
BH-209	9/11/2017	<0.001	<0.001	0.002	<0.001	<0.01	<0.002	<0.05	<0.005	<0.002	<0.005	<0.001	<0.002	-	<0.002	<0.005	<0.001	<0.001	0.001	<0.01
BH-210	10/11/2017	<0.01	<0.01	0.03	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	0.05	-	0.02	<0.05	<0.01	<0.01	0.02	0.04
BH-211D	10/05/2018	-	<0.01	-	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	<0.01	<0.02	<0.002	-	<0.004	<0.004	<0.01	<0.002	<0.01	<0.004
BH-211S	10/05/2018	-	<0.01	-	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	0.03	0.016	-	<0.004	<0.004	<0.01	0.005	0.07	0.015	<0.004
BH-212	19/11/2020	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-
BH-213D	20/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	<0.02	-	-
BH-213S	19/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	0.04	<0.02	-
BH-215	4/10/2017	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-216D	10/12/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	0.02	<0.02	-	<0.02	<0.05	<0.01	0.09	0.02	<0.01
BH-217	5/10/2017	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	0.01	<0.02	-	<0.02	<0.05	<0.01	0.06	0.01	<0.01	<0.1
BH-218	5/10/2017	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	0.03	<0.01	<0.01	<0.1
BH-220	9/11/2017	<0.001	<0.001	0.004	<0.001	<0.01	<0.002	<0.05	<0.005	<0.002	<0.005	<0.001	0.003	-	<0.002	<0.005	<0.001	<0.001	<0.001	<0.01
BH-221	3/10/2017	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-224D	24/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	0.03	<0.02	-
BH-224S	18/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-
BH-225D	16/11/2020	<0.05	<0.05	0.07	<0.05	-	-	-	-	-	0.03	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-
BH-225I	16/11/2020	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-
BH-225S	16/11/2020	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-
BH-233	7/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-234	26/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-235D	27/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-235S	27/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	-	-
BH-236	27/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-240	8/03/2018	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01</td									

Table 1

Most Recent PFAS Analytical for Westgate Tunnel Project

AECOM

		PFAS																			
		10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	N-Ethyl perfluoro-octane sulfonamide (EfFOSA)	N-Ethyl perfluoro-octane sulfonamidoacetic acid (EfFOsAA)	N-Ethyl perfluoro-octane sulfonamidoethanol (EfFOSE)	N-Methyl perfluoro-octane sulfonamide (MeFOSA)	N-Methyl perfluoro-octane sulfonamidoacetic acid (MeFOsAA)	N-Methyl perfluoro-octane sulfonamidoethanol (MeFOSE)	Perfluorobutane sulfonic acid (PFBS)	Perfluorobutanoic acid (PBA)	Perfluorodecane sulfonic acid (PFDS)	Perfluorodecanoic acid (PDODA)	Perfluoroheptane sulfone (PFHPS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexane sulfonate (PFHxS)	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid (PFNA)	Perfluoro-octane sulfonamide (FOSA)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
BH-287	2/12/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.14	-	-	-	
BH-294	17/09/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-	
BH-295	4/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	<0.1	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	
BH-295R	25/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	<0.02	<0.1	-	-	-	<0.02	<0.02	<0.02	-	-	
BH-296	26/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	<0.02	<0.1	-	-	-	<0.02	<0.02	<0.02	-	-	
BH-298	18/09/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06	-	-	-	
BH-300	27/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	<0.02	<0.1	-	-	-	<0.02	<0.02	<0.02	-	-	
BH-303	17/09/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-	
BH-304	22/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-	
BH-312	14/08/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-341	25/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	0.02	<0.1	-	-	-	<0.02	0.04	0.04	-	-	
BH-505	23/02/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	0.12	<0.01	<0.01
BH-529	23/02/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-530	7/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	0.02	0.02	<0.01	
BH-536	13/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	0.1	<0.01	
BH-538	18/06/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<6.7	<1.8	-	<0.02	<0.05	<1.1	<1.5	<0.01	<7.7	<0.03
BH-540	7/05/2018	<0.01	<0.01	0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	0.02	<0.02	-	<0.02	<0.05	<0.01	0.1	0.04	<0.01	
BH-541	7/05/2018	<0.01	<0.01	0.19	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	0.27	0.1	-	<0.02	<0.05	0.04	0.07	1	0.51	<0.01
BH-543	8/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-549	4/04/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-552	21/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-558	23/04/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-562D	3/06/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-562S	3/06/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	0.01	<0.01	
BH-563	18/06/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	0.02	0.03	<0.01	
BH-572D	7/05/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	<0.02	<0.05	<0.01	<0.01	<0.01	<0.1	
BH-572S	7/05/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	<0.02	-	0.07	<0.05	<0.01	0.02	0.02	<0.01	
BH-597	14/08/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.05	<0.02	<0.05	<0.01	0.04	-	<0.02	<0.05	<0.01	0.02	0.04	0.07	<0.01
BH-711	17/09/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	
BH-712	18/09/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	-	-	-	
BH-718	28/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	-	-	-	
BH-720	17/11/2020	<0.05	<0.05																		

Table 1

Most Recent PFAS Analytical for Westgate Tunnel Project

AECOM

		PFAS																				
		10:2 Fluorotelomer sulfonic acid (10:2 FTS) μg/L	4:2 Fluorotelomer sulfonic acid (4:2 FTS) μg/L	6:2 Fluorotelomer sulfonic acid (6:2 FTS) μg/L	8:2 Fluorotelomer sulfonic acid (8:2 FTS) μg/L	N-Ethyl perfluoro-octane sulfonamide (EfFOSA) μg/L	N-Ethyl perfluoro-octane sulfonamidoacetic acid (EfFOsAA) μg/L	N-Ethyl perfluoro-octane sulfonamidoethanol (EfFOSE) μg/L	N-Methyl perfluoro-octane sulfonamide (MeFOSA) μg/L	N-Methyl perfluoro-octane sulfonamidoacetic acid (MeFOsAA) μg/L	N-Methyl perfluoro-octane sulfonamidoethanol (MeFOSE) μg/L	Perfluorobutane sulfonic acid (PFBS) μg/L	Perfluorobutanoic acid (PBA) μg/L	Perfluorodecane sulfonic acid (PFDS) μg/L	Perfluorodecanoic acid (PDODA) μg/L	Perfluoroheptane sulfone (PFHps) μg/L	Perfluoroheptanoic acid (PFHpA) μg/L	Perfluorohexane sulfonate (PFHxs) μg/L	Perfluorohexanoic acid (PFHxA) μg/L	Perfluorononanoic acid (PFNA) μg/L	Perfluoro-octane sulfonamide (FOSA) μg/L	
TU-BH-915VS	25/08/2016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	-	<0.001	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	0.0012	0.0007	<0.0005	<0.0005	
TU-BH-917	11/05/2018	-	<0.01	-	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	<0.01	0.008	-	<0.004	<0.004	<0.01	<0.02	0.02	0.003	<0.004	<0.008	
TU-BH-917S	23/10/2017	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	<0.05	-	-	<0.01	<0.01	0.07	-	<0.01	<0.05	
TU-BH-917VS	11/05/2018	-	<0.01	-	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	<0.01	0.021	-	<0.004	<0.004	<0.01	<0.002	0.02	0.006	<0.004	<0.008	
TU-BH-919	29/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	
TU-BH-919S	29/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	-	-	-	
TU-BH-921	20/02/2018	-	<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
TU-BH-921S	17/04/2018	-	<0.01	-	<0.01	<0.01	<0.02	<0.01	<0.01	0.16	<0.01	0.056	-	<0.004	<0.004	<0.01	<0.002	0.003	<0.01	0.008	<0.004	<0.008
TU-BH-922	21/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-
TU-BH-923	17/11/2020	<0.05	<0.05	0.06	<0.05	-	-	-	-	-	-	0.04	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-	-
TU-BH-923S	17/11/2020	<0.05	<0.05	0.05	<0.05	-	-	-	-	-	-	0.02	<0.1	-	-	-	-	<0.02	0.02	0.04	-	-
TU-BH-923VS	1/06/2016	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	-	<0.001	0.0042	<0.002	<0.0005	<0.0005	0.0047	0.0047	0.0423	0.0084	<0.0005	<0.0005	-	-
TU-BH-924	20/11/2020	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-	-	
TU-BH-925	23/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	
TU-BH-930	23/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	
TU-HY-901	26/08/2016	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	-	<0.001	0.0006	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	0.0033	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
TU-HY-901S	26/08/2016	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	-	<0.001	0.0033	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	0.0091	0.0009	<0.0005	<0.0005	<0.0005	<0.0005
TU-HY-901VS	29/08/2016	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	-	<0.001	0.0052	<0.002	<0.0005	<0.0005	<0.0005	0.0005	0.0078	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
TU-HY-903	24/11/2020	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-	-	
TU-HY-903S	24/11/2020	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	0.03	<0.02	-	-	
TU-HY-903VS	24/11/2020	<0.05	<0.05	<0.05	-	-	-	-	-	-	0.06	<0.1	-	-	-	-	<0.02	0.05	<0.02	-	-	
U803	29/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	-	-	-	-	
WD-BH-006	21/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-	
WD-BH-006S	21/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-	
WD-BH-010	26/11/2020	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	0.06	<0.1	-	-	-	-	0.06	0.2	0.07	-	-
WD-BH-015	26/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-	
WD-BH-020	6/12/2017	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	0.07	-	-	<0.01	0.01	0.03	0.11	0.1	<0.01	<0.05	
WD-BH-021S	17/04/2018	-	<0.01	-	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	<0.01	<0.002	-	<0.004	<0.004	<0.01	<0.002	<0.01	<0.002	<0.004	<0.008	
WD-BH-024	27/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	-	-	-	
WD-BH-025	27/11/2020	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	0.12	<0.02	-	-	
WD-BH-028	25/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-	
WD-BH-030S	23/04/2018	-	<0.01	-	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	<0.01	0.004	-	<0.004	<0.004	<0.01	0.003	<0.01	0.006	<0.004	<0.008	

Table 1

Most Recent PFAS Analytical for Westgate Tunnel Project

AECOM

		PFAS																				
		10:2 Fluorotelomer sulfonic acid (10:2 FTS) μg/L	4:2 Fluorotelomer sulfonic acid (4:2 FTS) μg/L	6:2 Fluorotelomer sulfonic acid (6:2 FTS) μg/L	8:2 Fluorotelomer sulfonic acid (8:2 FTS) μg/L	N-Ethyl perfluorooctane sulfonamide (EtFOOSA) μg/L	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOOSAA) μg/L	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOOSE) μg/L	N-Methyl perfluorooctane sulfonamide (MeFOOSA) μg/L	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOOSAA) μg/L	N-Methyl perfluorooctane sulfonamidoethanol (MeFOOSE) μg/L	Perfluorobutane sulfonic acid (PFBS) μg/L	Perfluorobutanoic acid (PBA) μg/L	Perfluorodecane sulfonic acid (PFDS) μg/L	Perfluorodecanoic acid (PFDoDA) μg/L	Perfluoroheptane sulfone (PFHPS) μg/L	Perfluoroheptanoic acid (PFHpA) μg/L	Perfluorohexane sulfonate (PFHxS) μg/L	Perfluorononanoic acid (PFNa) μg/L	Perfluoroctanoic acid (PFoNa) μg/L	Perfluorooctane sulfonamide (FOSA) μg/L	
WD-BH-106A	17/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	0.04	<0.02	-	-
WD-BH-108	18/11/2020	<0.05	<0.05	0.06	<0.05	-	-	-	-	-	-	0.02	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-	-
WD-BH-111	8/03/2018	-	<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
WD-BH-114	6/12/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-
WD-BH-114S	26/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04	-	-	-	-
WD-BH-115	5/12/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	-	-	-	-
WD-BH-116	26/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-
WD-BH-119	25/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	0.17	0.03	-	-
WD-BH-119S	28/11/2019	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	0.02	<0.1	-	-	-	-	<0.02	0.2	0.03	-	-
WD-BH-135	24/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	0.04	0.46	-	-
WD-BH-135S	23/04/2018	-	<0.01	-	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	<0.01	0.003	-	<0.004	<0.004	<0.01	<0.002	0.02	0.002	<0.004	<0.008
WD-BH-138	18/04/2018	-	<0.01	-	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	0.02	0.013	<0.01	<0.004	<0.004	<0.01	0.01	0.07	0.025	0.007	<0.008
WD-BH-139	25/10/2019	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	0.02	<0.1	-	-	-	-	<0.02	0.14	0.04	-	-
WD-BH-140	25/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	0.04	0.03	-	-
WD-BH-155	18/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-	-
WD-BH-157	26/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-
WD-BH-158	22/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-
WD-BH-159	19/09/2016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	-	<0.001	0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	0.0069	0.0006	<0.0005	<0.0005	<0.0005
WD-BH-160	26/11/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-
WD-BH-300	7/12/2017	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	-	-	<0.01	<0.01	<0.01	<0.01	<0.05
WD-BH-304	5/12/2017	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	
WD-HY-013	16/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	<0.02	<0.02	-	-
WD-HY-016	23/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.02	<0.1	-	-	-	-	<0.02	0.06	0.02	-	-
WD-HY-018	7/12/2017	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
WD-HY-019	24/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-
WD-HY-021	2/12/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-
WD-HY-022	23/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-
WD-HY-023	24/10/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	-	-	-	-
WD-HY-135S	2/12/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	-	-	-	-
WD-PH-110	25/11/2020	<0.05	<0.05	0.13	<0.05	-	-	-	-	-	-	0.03	<0.1	-	-	-	-	<0.02	<0.02	0.04	-	-

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	10:2 Fluorotelomer sulfonic acid (10:2 FTS) µg/L	4:2 Fluorotelomer sulfonic acid (4:2 FTS) µg/L	6:2 Fluorotelomer sulfonic acid (6:2 FTS) µg/L	8:2 Fluorotelomer sulfonic acid (8:2 FTS) µg/L	N-Ethyl perfluorooctane sulfonamide (EFOSA) µg/L	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSSAA) µg/L	N-Ethyl perfluorooctane sulfonamidoethanol (EFOSE) µg/L	Perfluorooctane sulfonic acid (PFOS) µg/L	Perfluorooctanoic acid (PFOA) µg/L	Perfluoropentane sulfonic acid (PFPeS) µg/L	Perfluoropentanoic acid (PPeA) µg/L	Perfluorotetradecanoic acid (PFTeDA) µg/L	Perfluorotridecanoic acid (PFTrDA) µg/L	Perfluoroundecanoic acid (PFUnDA) µg/L	Sum of PFHxS and PFOS µg/L	Sum of enHealth PFAS (PFHxS + PFOS + PFOA) µg/L	Sum of PFAS µg/L	Sum of PFAS (WA DER List) µg/L	PFOS & PFHxS (Calculated) µg/L	Calculated Totals µg/L	
EQL																					

Location Code	Date	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0	0
BH-201	7/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0	0
BH-202	4/10/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0	0
BH-203	3/10/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0	0
BH-204	9/11/2017	<0.001	<0.001	0.1	<0.001	<0.01	<0.002	<0.05	<0.001	0.002	<0.001	0.002	<0.05	<0.01	<0.002	-	-	-	-	0	0.108
BH-205	2/10/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0	0
BH-208	9/11/2017	<0.001	<0.001	0.002	<0.001	<0.01	<0.002	<0.05	<0.001	<0.001	<0.001	<0.001	<0.05	<0.01	<0.002	-	-	-	-	0	0.002
BH-209	9/11/2017	<0.001	<0.001	0.002	<0.001	<0.01	<0.002	<0.05	<0.001	0.005	<0.001	0.006	<0.05	<0.01	<0.002	-	-	-	-	0	0.014
BH-210	10/11/2017	<0.01	<0.01	0.03	<0.01	<0.1	<0.02	<0.5	0.07	0.02	0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.09	0.26
BH-211D	10/05/2018	-	-	<0.01	-	<0.01	<0.01	<0.02	<0.01	<0.001	<0.01	<0.002	<0.004	<0.004	<0.004	-	-	-	-	0	0
BH-211S	10/05/2018	-	-	<0.01	-	<0.01	<0.01	<0.02	0.02	0.008	0.03	0.014	<0.004	<0.004	<0.004	-	-	-	-	0.09	0.208
BH-212	19/11/2020	<0.05	<0.05	<0.05	-	-	-	<0.01	<0.01	-	<0.02	-	-	-	<0.01	<0.05	-	<0.01	0	0	
BH-213D	20/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.01	<0.01	-	<0.02	-	-	<0.01	<0.05	-	<0.01	0	0	
BH-213S	19/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	0.17	0.04	-	0.02	-	-	-	0.21	<0.05	-	0.27	0.21	0.27
BH-215	4/10/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	0.02	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.02	0.02
BH-216D	10/12/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.02	0.02
BH-216S	10/12/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	0.02	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.09	0.15
BH-217	5/10/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	0.06	<0.01	0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.12	0.15
BH-218	5/10/2017	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.04	0.04
BH-220	9/11/2017	<0.001	<0.001	0.004	<0.001	<0.01	<0.002	<0.05	<0.001	0.006	<0.001	0.003	<0.05	<0.01	<0.002	-	-	-	-	0	0.016
BH-221	3/10/2017	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.05	<0.1	<0.02	-	-	-	-	0	0	
BH-224D	24/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	0.26	<0.01	-	<0.02	-	-	-	0.29	<0.05	-	0.29	0.29	0.29
BH-224S	18/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	0.03	<0.01	-	<0.02	-	-	-	0.03	<0.05	-	0.03	0.03	0.03
BH-225D	16/11/2020	<0.05	<0.05	0.07	<0.05	-	-	-	<0.01	<0.01	-	<0.02	-	-	-	<0.01	<0.05	-	0.1	0	0.1
BH-225I	16/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.01	<0.01	-	<0.02	-	-	-	<0.01	<0.05	-	<0.01	0	0
BH-225S	16/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.01	<0.01	-	<0.02	-	-	-	<0.01	<0.05	-	<0.01	0	0
BH-233	7/11/2019	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-	-	0	0
BH-234	26/11/2019	-	-	-	-	-	-	-	<0.01	0.01	-	-	-	-	-	<0.01	-	-	-	0	0.01
BH-235D	27/11/2019	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-	-	0	0
BH-235S	27/11/2019	-	-	-	-	-	-	-	0.19	0.08	-	-	-	-	-	0.26	-	-	-	0.26	0.34
BH-236	27/11/2019	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-				

Table 1

Most Recent PFAS Analytical for Westgate Tunnel Project

AECOM

		PFAS																Calculated Totals		
		10:2 Fluorotelomer sulfonic acid (10:2 FTS)				4:2 Fluorotelomer sulfonic acid (4:2 FTS)				6:2 Fluorotelomer sulfonic acid (6:2 FTS)				8:2 Fluorotelomer sulfonic acid (8:2 FTS)				PFOS		
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
BH-287	2/12/2019	-	-	-	-	-	-	-	-	0.09	0.03	-	-	-	-	-	0.23	-	-	
BH-294	17/09/2019	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-	0.0	
BH-295	4/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	0.03	<0.01	<0.02	<0.02	<0.05	<0.02	<0.02	0.07	<0.05	0.09	0.07 0.09
BH-295R	25/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.01	<0.01	-	<0.02	-	-	-	<0.01	<0.05	-	<0.01	0 0
BH-296	26/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	0.01	<0.01	-	<0.02	-	-	-	0.01	<0.05	-	0.01	0.01 0.01
BH-298	18/09/2019	-	-	-	-	-	-	-	0.06	0.06	-	-	-	-	-	0.12	-	-	-	0.12 0.18
BH-300	27/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	0.02	<0.01	-	<0.02	-	-	-	0.02	<0.05	-	0.02	0.02 0.02
BH-303	17/09/2019	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-	-	0 0
BH-304	22/10/2019	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-	-	0 0
BH-312	14/08/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	<0.01	<0.01	<0.01	-	0 0
BH-341	25/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	0.04	0.03	-	0.03	-	-	-	0.08	<0.05	-	0.2	0.08 0.2
BH-505	23/02/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	0.08	0.02	0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.2 0.24
BH-529	23/02/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0 0
BH-530	7/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	0.03	0.02	<0.01	0.02	<0.5	<0.1	<0.02	-	-	-	-	0.05 0.14
BH-536	13/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.1 0.1
BH-538	18/06/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<6	<2.5	<0.5	<0.1	<0.02	-	-	-	-	0 0
BH-540	7/05/2018	<0.01	<0.01	0.01	<0.01	<0.1	<0.02	<0.5	0.03	<0.01	0.02	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.13 0.22
BH-541	7/05/2018	<0.01	<0.01	0.19	<0.01	<0.1	<0.02	<0.5	0.29	0.07	0.25	0.24	<0.5	<0.1	<0.02	-	-	-	-	1.29 3.03
BH-543	8/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0 0
BH-549	4/04/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0 0
BH-552	21/03/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0 0
BH-558	23/04/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0 0
BH-562D	3/06/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0 0
BH-562S	3/06/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0 0.01
BH-563	18/06/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.03 0.08
BH-572D	7/05/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	<0.01	<0.01	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0 0
BH-572S	7/05/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	0.03	0.12	<0.01	<0.02	<0.5	<0.1	<0.02	-	-	-	-	0.03 0.28
BH-597	14/08/2018	<0.01	<0.01	<0.01	<0.01	<0.1	<0.02	<0.5	0.02	0.02	0.01	0.09	<0.5	<0.1	<0.02	0.06	-	0.31	-	0.06 0.31
BH-711	17/09/2019	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-	-	0 0	
BH-712	18/09/2019	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	0.03	-	-	-	0.03 0.04	
BH-718	28/11/2019	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	0.02	-	-	-	0.02 0.02	
BH-720	17/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.01	<0.01	-	<0.02	-	-	<0.01	<0.05	-	<0.01	0 0	
BH-722	22/10/2019	-	-	-	-	-	-	0.02	<0.01	-	-	-	-	-	0.07	-	-	-	0.07 0.07	
BH-723	7/11/2019	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-	-	0 0	
BH-725	22/10/2019	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-	-	0 0	
BH-727	18/11/2020	<0.05	<0.05	<0.05																

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AECOM

		PFAS																Calculated Totals																							
		10:2 Fluorotelomer sulfonic acid (10:2 FTS)		4:2 Fluorotelomer sulfonic acid (4:2 FTS)		6:2 Fluorotelomer sulfonic acid (6:2 FTS)		8:2 Fluorotelomer sulfonic acid (8:2 FTS)		N-Ethyl perfluoro-octane sulfonamide (EFOSA)		N-Ethyl perfluoro-octane sulfonamidoacetic acid (EFOSAA)		N-Ethyl perfluoro-octane sulfonamidoethanol (EFOSE)		Perfluoroctane sulfonic acid (PFOS)		Perfluorooctanoic acid (PFOA)		Perfluoropentane sulfonic acid (PFPeS)		Perfluoropentanoic acid (PPeA)		Perfluorotetradecanoic acid (PFTeDA)		Perfluorotridecanoic acid (PFTrDA)		Perfluoroundecanoic acid (PFUnDA)		Sum of PFHxS and PFOS		Sum of enHealth PFAS (PFHxS + PFOS + PFOA)		Sum of PFAS		Sum of PFAS (WA DER List)		PFOS & PFHxS (Calculated)		Sum PFAS (Calculated)	
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L										
TU-BH-915VS	25/08/2016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0003	0.0019	0.0026												
TU-BH-917	11/05/2018	-	<0.01	-	<0.01	<0.01	<0.01	<0.02	0.002	<0.01	<0.01	<0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	-	-	-	-	-	-	0.02	0.033												
TU-BH-917S	23/10/2017	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	0.07	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.14	-	0.16	0.15	0.14	0.16	-	-	-												
TU-BH-917VS	11/05/2018	-	<0.01	-	<0.01	<0.01	<0.01	<0.02	0.01	0.002	<0.01	0.007	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	-	-	-	-	-	-	0.03	0.066												
TU-BH-919	29/11/2019	-	-	-	-	-	-	-	0.17	0.03	-	-	-	-	-	-	-	-	-	-	0.28	-	-	-	-	-	-	0.28	0.31												
TU-BH-919S	29/11/2019	-	-	-	-	-	-	-	0.15	0.04	-	-	-	-	-	-	-	-	-	-	0.22	-	-	-	-	-	-	0.22	0.26												
TU-BH-921	20/02/2018	-	<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	0												
TU-BH-921S	17/04/2018	-	<0.01	-	<0.01	<0.01	<0.01	<0.02	0.01	0.003	<0.01	0.018	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	-	-	-	-	-	-	0	0.248												
TU-BH-922	21/10/2019	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	0	0													
TU-BH-923	17/11/2020	<0.05	<0.05	0.06	<0.05	-	-	-	<0.01	<0.01	-	-	<0.02	-	-	-	-	-	-	<0.01	<0.05	-	0.1	-	-	-	0	0.1													
TU-BH-923S	17/11/2020	<0.05	<0.05	0.05	<0.05	-	-	-	0.02	0.03	-	-	<0.02	-	-	-	-	-	-	0.04	<0.05	-	0.18	0.04	0.18	-	-	-													
TU-BH-923VS	1/06/2016	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	0.0715	0.0183	0.0037	0.0058	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.1138	<0.001	0.164	-	0.1138	0.1636	-	-	-													
TU-BH-924	20/11/2020	<0.05	<0.05	0.05	<0.05	-	-	-	<0.01	<0.01	-	-	<0.02	-	-	-	-	-	-	<0.01	<0.05	-	<0.01	0	0	-	-	-													
TU-BH-925	23/10/2019	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	0	0													
TU-BH-930	23/10/2019	-	-	-	-	-	-	-	0.02	<0.01	-	-	-	-	-	-	-	-	-	0.02	-	-	-	-	-	-	0.02	0.02													
TU-HY-901	26/08/2016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	0.003	0.0008	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0063	-	0.0083	-	0.0063	0.0083	-	-	-													
TU-HY-901S	26/08/2016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	0.007	0.0015	0.0022	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0161	-	0.024	-	0.0161	0.024	-	-	-													
TU-HY-901VS	29/08/2016	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.001	0.0214	0.0006	0.0019	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0292	-	0.0374	-	0.0292	0.0374	-	-	-													
TU-HY-903	24/11/2020	<0.05	<0.05	0.06	<0.05	-	-	-	<0.01	<0.01	-	-	<0.02	-	-	-	-	-	-	<0.01	<0.05	-	<0.01	0	0	-	-	-													
TU-HY-903S	24/11/2020	<0.05	<0.05	0.05	<0.05	-	-	-	0.02	<0.01	-	-	<0.02	-	-	-	-	-	-	0.05	<0.05	-	0.05	0.05	0.05	-	-	-													
TU-HY-903VS	24/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	0.13	0.03	-	-	<0.02	-	-	-	-	-	-	0.18	<0.05	-	0.27	0.18	0.27	-	-														

Table 1

Most Recent PFAS Analytical for Westgate Tunnel Project

AECOM

		PFAS																Calculated Totals																					
		10:2 Fluorotelomer sulfonic acid (10:2 FTS)				4:2 Fluorotelomer sulfonic acid (4:2 FTS)				6:2 Fluorotelomer sulfonic acid (6:2 FTS)				8:2 Fluorotelomer sulfonic acid (8:2 FTS)				Perfluoroctane sulfonic acid (PFOS)		Perfluorooctanoic acid (PFOA)		Perfluoropentane sulfonic acid (PFPeS)		Perfluoropentanoic acid (PPeA)		Perfluorotetradecanoic acid (PTeDA)		Perfluorotridecanoic acid (PTeDA)		Perfluoroundecanoic acid (PUtDA)		Sum of PFHxS and PFOS		Sum of enHealth PFAS (PFHxS + PFOS + PFOA)		Sum of PFAS (WA DER List)		PFOS & PFHxS (Calculated)	Sum PFAS (Calculated)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L																						
WD-BH-106A	17/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	<0.01	0.01	-	<0.02	-	-	-	0.04	<0.05	-	0.05	0.04	0.05	0.04	0.05	0.04	0.05	0.04	0.05	0.04	0.05									
WD-BH-108	18/11/2020	<0.05	<0.05	0.06	<0.05	-	-	-	-	<0.01	<0.01	-	<0.02	-	-	-	<0.01	<0.05	-	0.08	0	0.08	0	0.08	0	0.08	0	0.08	0	0.08									
WD-BH-111	8/03/2018	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02							
WD-BH-114	6/12/2019	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	-	<0.01	-	-	-	0	0	0	0	0	0	0	0	0	0	0							
WD-BH-114S	26/11/2019	-	-	-	-	-	-	-	-	0.02	<0.01	-	-	-	-	-	-	0.06	-	-	-	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06							
WD-BH-115	5/12/2019	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	-	0.02	-	-	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02							
WD-BH-116	26/11/2019	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	-	<0.01	-	-	-	0	0	0	0	0	0	0	0	0	0	0							
WD-BH-119	25/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	0.06	<0.01	-	<0.02	-	-	-	-	0.23	<0.05	-	0.26	0.23	0.26	0.23	0.26	0.23	0.26	0.23	0.26	0.23	0.26								
WD-BH-119S	28/11/2019	<0.05	<0.05	<0.05	<0.05	-	-	-	-	0.12	0.01	-	<0.02	-	-	-	-	0.32	<0.05	-	0.38	0.32	0.38	0.32	0.38	0.32	0.38	0.32	0.38	0.32	0.38								
WD-BH-135	24/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	0.17	0.02	-	0.09	-	-	-	-	0.22	<0.05	-	0.65	0.21	0.78	0.21	0.78	0.21	0.78	0.21	0.78	0.21	0.78								
WD-BH-135S	23/04/2018	-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.02	0.01	0.001	<0.01	0.002	<0.004	<0.004	<0.004	<0.004	-	-	-	-	0.03	0.038	0.03	0.038	0.03	0.038	0.03	0.038	0.03	0.038	0.03	0.038						
WD-BH-138	18/04/2018	-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.02	0.05	0.017	0.02	0.016	<0.004	<0.004	<0.004	<0.004	0.12	-	-	-	0.12	-	-	-	0.12	0.248	0.12	0.248	0.12	0.248	0.12	0.248	0.12	0.248	0.12	0.248		
WD-BH-139	25/10/2019	<0.05	<0.05	<0.05	<0.05	-	-	-	-	0.07	0.03	-	0.02	-	-	-	-	0.21	<0.05	-	0.32	0.21	0.32	0.21	0.32	0.21	0.32	0.21	0.32	0.21	0.32								
WD-BH-140	25/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	0.02	0.02	-	<0.02	-	-	-	-	0.06	<0.05	-	0.11	0.06	0.11	0.06	0.11	0.06	0.11	0.06	0.11	0.06	0.11								
WD-BH-155	18/11/2020	<0.05	<0.05	<0.05	<0.05	-	-	-	-	<0.01	<0.01	-	<0.02	-	-	-	-	<0.01	<0.05	-	<0.01	0	0	0	0	0	0	0	0	0	0	0							
WD-BH-157	26/11/2019	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	-	<0.01	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0						
WD-BH-158	22/10/2019	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	-	<0.01	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0						
WD-BH-159	19/09/2016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0001	0.0038	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0107	-	0.0124	0.0118	0.0107	0.0124	0.0107	0.0124	0.0107	0.0124	0.0107	0.0124	0.0107	0.0124	0.0107	0.0124						
WD-BH-160	26/11/2019	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-	-	-	<0.01	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WD-BH-300	7/12/2017	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.05	0	0	0	0	0	0	0	0	0	0	0	0	0				
WD-BH-304	5/12/2017	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	0	0	0	0	0	0	0	0	0	0	0	0	0					
WD-HY-013	16/11/2020	<0.05	<0.05	<0.05	<0.05																																		