Table B-1: Groundwater Sampling Results - Perfluorinated Compounds (Golder, 2016)

Perfluorinated Compounds in Groundwater [1]									
Sample Name	MW West	MW East	MW4	MW5	Provisional Drinking Water Guidelines		Non Potable water / contact recreation [4]	Ecological Freshwater Guidelines [5]	
Laboratory Reference	ES1608774-010	ES1608774-011	ES1601475-001	ES1601475-002					
Sample Location	MW1	MW2	MW4	MW5					
Date	18/04/2016	18/04/2016	18/01/2016	18/01/2016	MDH [2] & US EPA [3]	AGDoH [4]		95% ecosystem protection	80% ecosystem protection
Perfluoroalkylsulfonic acids									
Perfluorobutanesulfonic acid (PFBS)	0.345	0.88	0.306	1.50	7 [2]	-	-	-	-
Total Perfluorohexanesulfonic acid (T-PFHxS)	3.21	5.84	2.63	15.4	-	-	-	-	-
Perfluorooctanesulfonic acid (PFOS)									
Total Perfluorooctanesulfonic acid (T-PFOS)	37.9	53.2	24.0	39.6	0.027 [2]	-	-	0.13	31
Summation Guideline Values									
Sum of Total PFOS & PFHxS [6]	**41.11**	**59.04**	**26.63**	**55.00**	-	0.07	0.7	-	-
Sum of Total PFOS & PFOA [6]	38.02	53.5	24.5	41.0	0.07 [3]	-	-	-	-
Perfluoroalkylcarboxylic acids									
Perfluorohexanoic acid (PFHxA)	0.538	1.32	1.16	6.6	-	-	-	-	-
Perfluoroheptanoic acid (PFHpA)	0.245	0.324	0.917	3.18	-	-	-	-	-
Perfluorooctanoic acid (PFOA)	0.118	0.346	0.474	1.38	0.035 [2]	0.56	5.6	220	1.824
Perfluorononanoic acid (PFNA)	0.014	0.01	0.071	0.127	-	-	-	-	-
Perfluorodecanoic acid (PFDA)	0.0040	0.0030	0.018	0.029	-	-	-	-	-
Perfluoroundecanoic acid (PFUnDA)	<0.005	<0.005	0.006	0.007	-	-	-	-	-
Perfluorododecanoic acid (PFDoDA)	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-
Perfluorotridecanoic acid (PFTrDA)	<0.005	<0.005	<0.005	0.01	-	-	-	-	-
Perfluorotetradecanoic acid (PFTeDA)	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-
Perfluorooctanesulfonamides (FOSAs)									
Perfluorooctanesulfonamide (PFOSA)	0.036	0.157	0.029	0.275	-	-	-	-	-
N-ethylperfluoro-1-octanesulfonamide (NEtFOSA-M)	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-
N-methylperfluoro-1-octanesulfonamide (NMeFOSA-M)	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-
Perfluorooctanesulfonamidoethanols (FOSEs)									
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol (NEtFOSE-M)	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
2-(N-methylperfluoro-1-octanesulfonamido)-ethanol (NMeFOSE-M)	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Telomer Sulfonic acids (FTSs)									
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTS)	1.39	1.85	4.46	17.3	-	-		-	-
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2 FTS)	0.05	0.06	0.48	2.73	-	-		-	-
Perfluorodecane sulfonate (PFDcS)	0.06	0.04	<0.005	0.015	-	-	-	-	-

Notes:

1. Results in ug/L
2. Guideline values for PFBS and PFBA (derived 2011) PFOS, PFOA (derived 2017) have been obtained from Minnesota Department of Health (MDH) (see http://www.health.state.mn.us/divs/eh/risk/guidance/hrltypo.html).
3. US EPA PFOA and PFOS Drinking Water Health Advisories (see https://www.epa.gov/sites/production/files/2016-05/documents/2016-12361.pdf).
4. Australian Government Department of Health - Health Based Guidance Values for PFAS accessed 01/05/2017 (https://www.health.gov.au/internet/main/publishing.nsf/Content/2200FE085D480353CA2580C900817CDC/$File/fs-Health-Based-Guidance-Values.pdf).
5. WA Department of Environment Regulation (2017). (https://www.der.wa.gov.au/images/documents/your-environment/contaminated-sites/guidelines/Guideline_on_Assessment_and_Management_of_PFAS_v2.1.pdf).
6. Summations are made by adding compounds together, where one compound is below detection limit it is not included in the summation.

<LOR = Result is Less than Limit of Reporting
NR = Result Not Reportable
- Denotes No Guideline Value Available

0.48	Concentration exceeds provisional non-potable water guidelines
0.40	Concentration exceeds provisional drinking water guidelines
0.48	Concentration exceeds 95% ecological guidelines

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Table B-2: Soil and Sediment Analysis Results - Perfluorinated Compounds (Golder, 2016)

Perfluorinated Compounds in Soil and Sediment[1]													
Sample Name	Mangrove 01-0.1	Mangrove 01-0.3	Mangrove 02-0.1	Mangrove 02-0.3	Mangrove 03-0.1	Mangrove 03-0.3	Mangrove 04-0.1	Mangrove 04-0.3	Mangrove QC1	SB2-0.5	SB5-1.25	WA DER FINAL HEALTH BASED SOIL GUIDANCE VALUES [2]	US EPA PFC SOIL SCREENING LEVELS [3]
Laboratory Reference	ES1608774-001	ES1608774-002	ES1608774-003	ES1608774-004	ES1608774-005	ES1608774-006	ES1608774-007	ES1608774-008	ES1608774-009	-	-		
Sample Location	Mangrove 01	Mangrove 01	Mangrove 02	Mangrove 02	Mangrove 03	Mangrove 03	Mangrove 04	Mangrove 04	Mangrove QC1	SB2	SB5		
Date	18/04/2016	18/04/2016	18/04/2016	18/04/2016	18/04/2016	18/04/2016	18/04/2016	18/04/2016	18/04/2016	28/09/2015	23/09/2015		
Depth	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	-	0.5	1.25		
Perfluoroalkylsulfonic acids													
Perfluorobutanesulfonic acid (PFBS)	<0.2	<0.2	<0.2	<0.2	0.5	<0.2	<0.2	0.3	0.2	0.5	<0.2	-	-
Perfluorohexanesulfonic acid (PFHxS)													
Total Perfluorohexanesulfonic acid (T-PFHxS)	<0.2	<0.2	2	2.1	5.2	1.8	0.4	0.5	2.4	35	1.6	-	-
Perfluorooctanesulfonic acid (PFOS)													
Branched Perfluorooctanesulfonic acid (B-PFOS)	-	-	-	-	-	-	-	-	-	674	17.4	-	-
Linear Perfluorooctanesulfonic acid (L-PFOS)	-	-	-	-	-	-	-	-	-	<0.5	<0.5	-	-
Total Perfluorooctanesulfonic acid (T-PFOS)	1.6	5.7	60	22	109	16.6	<0.5	0.6	75	674	17.4	-	6,000
Sumation Guideline Values													
Sum of Total PFOS & PFHxS [4]	1.6	5.7	62	25	114	18.4	0.4	1.1	77	709	19	100,000	-
Sum of Total PFOS & PFOA [4]	1.6	5.7	60	22	110	16.6	<LOR	0.6	75	676	17.4	-	-
Perfluoroalkylcarboxylic acids													
Perfluorohexanoic acid (PFHxA)	<0.2	<0.2	1.0	1.7	1.0	0.8	<0.2	<0.2	1.6	5	2.2	-	-
Perfluoroheptanoic acid (PFHpA)	<0.2	<0.2	0.6	0.8	0.7	0.4	<0.2	<0.2	0.9	0.4	0.4	-	-
Perfluorooctanoic acid (PFOA)	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	2.0	<0.5	1,000,000	16,000
Perfluorononanoic acid (PFNA)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	-	-
Perfluorodecanoic acid (PFDA)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.1	<0.2	-	-
Perfluoroundecanoic acid (PFUnDA)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-
Perfluorododecanoic acid (PFDoDA)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-
Perfluorotridecanoic acid (PFTrDA)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-
Perfluorotetradecanoic acid (PFTeDA)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-
Perfluorooctanesulfonamides (FOSAs)													
Perfluorooctanesulfonamide (PFOSA)	<0.2	<0.2	0.9	0.2	2.3	<0.2	<0.2	<0.2	1.0	64	0.7	-	-
N-ethylperfluoro-1-octanesulfonamide (NEtFOSA-M)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-
N-methylperfluoro-1-octanesulfonamide (NMeFOSA-M)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-
Perfluorooctanesulfonamidoethanols (FOSEs)													
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol (NEtFOSE-M)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-
2-(N-methylperfluoro-1-octanesulfonamido)-ethanol (NMeFOSE-M)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-
Telomer Sulfonic acids (FTSs)													
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTS)	<5.0	<5.0	8.0	8.0	24	7.0	<5.0	<5.0	10	62	5.0	-	-
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2 FTS)	<1.0	<1.0	2.0	<1.0	4	<1.0	<1.0	<1.0	2.0	148	<1.0	-	-
Perfluorodecane sulfonate (PFDcS)	<0.2	<0.2	0.4	<0.2	5.8	<0.2	<0.2	<0.2	0.3	6.2	0.3	-	-

Notes :

1. Results in ug/kg.
2. WA Department of Environment Regulation (2017) human health guidelines industrial/commercial. (https://www.der.wa.gov.au/images/documents/your-environment/contaminated-sites/guidelines/Guideline_on_Assessment_and_Management_of_PFAS_v2.1.pdf).
3. Residential Soil Screening Levels for Perfluorooctanoic Acid (PFOA) and Perfluorooctyl Sulfonate (PFOS) sourced from US EPA (2009) (no commercial/industrial levels available), (https://archive.epa.gov/pesticides/region4/water/documents/web/pdf/final_pfc_soil_screening_values11_20_09.pdf).
4. Summations are made by adding compounds together, where one compound is below detection limit it is not included in the summation.

<LOR = Result is Less than Limit of Reporting
- Denotes No Guideline Value Available

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Table B-3: Groundwater Sampling Results - Perfluorinated Compounds (T&T Results, 2017)

Perfluorinated Compounds in Groundwater [1]															
Sample Name	MW1	MW1	MW2	MW2	MW3	MW3	MW4	MW4	MW5	MW5	Provisional Drinking Water Guidelines		Non Potable water/ contact recreation [4]	Ecological Freshwater Guidelines [5]	
Laboratory Reference	ES1623916-001	Z17-My00447	ES1623916-002	Z17-My00448	ES1623916-003	Z17-My00449	ES1623916-004	Z17-My00450	ES1623916-005	Z17-My00451					
Sample Location	MW1	MW1	MW2	MW2	MW3	MW3	MW4	MW4	MW5	MW5					
Date	17/10/2016	28/04/2017	17/10/2016	28/04/2017	17/10/2016	28/04/2017	17/10/2016	28/04/2017	17/10/2016	28/04/2017	MDH [2] & US EPA [3]	AGDoH [4]		95% ecosystem protection	80% ecosystem protection
Easting NZTM															
Northing NZTM															
Perfluoroalkylsulfonic acids															
Perfluorobutanesulfonic acid (PFBS)	2.16	0.75	2.27	1.6	0.455	0.44	1.84	1.2	0.388	0.28	7 [2]	-	-	-	-
Perfluoropentanesulfonic acid (PFPeS)	-	1.3	-	2.7	-	0.92	-	1.9	-	0.44	-	-	-	-	-
Perfluorohexanesulfonic acid (PFHxS)															
Total Perfluorohexanesulfonic acid (T-PFHxS)	16.8	7.1	18.9	12	10.2	9.0	23	11	6.1	3.0	-	-	-	-	-
Perfluoroheptanesulfonic acid (PFHpS)	-	0.73	-	1.2	-	1.1	-	1.1	-	0.21	-	-	-	-	-
Perfluorooctanesulfonic acid (PFOS)															
Total Perfluorooctanesulfonic acid (T-PFOS)	42.9	32	79.6	56	9800	76	69.3	53	41.7	16	0.027 [2]	-	-	0.13	31
Perfluorodecanesulfonic acid (PFDS)	-	<0.3	-	<0.3	-	<0.3	-	<0.3	-	<0.005	-	-	-	-	-
Summation Guideline Values															
Sum of Total PFOS & PFHxS [6]	59.7	39.1	98.5	68	9810.2	85	92.3	64	47.8	19	-	0.07	0.7	-	-
Sum of Total PFOS & PFOA [6]	44.69	33.1	81.71	57.9	9801.54	77.5	71.98	55	42.44	16.66	0.07 [1]	-	-	-	
Perfluoroalkylcarboxylic acids															
Perfluorobutanoic acid (PFBA)	1.33	1.2	1.27	1.6	0.7	0.91	1.39	1.8	0.31	0.31	7 [2]	-	-	-	-
Perfluoropentanoic acid (PFPeA)	15.6	7.8	11.5	7.6	12.1	4.0	17.6	12	2.44	1.3	-	-	-	-	-
Perfluorohexanoic acid (PFHxA)	6.98	9.8	6.86	11.0	3.76	6.3	8.13	26	1.35	1.7	-	-	-	-	-
Perfluoroheptanoic acid (PFHpA)	2.76	2.0	2.73	2.8	1.82	0.99	2.54	2.5	0.739	0.56	-	-	-	-	-
Perfluorooctanoic acid (PFOA)	1.79	1.1	2.11	1.9	1.54	1.5	2.68	2.0	0.744	0.66	0.035 [2]	0.56	5.6	220	1,824
Perfluorononanoic acid (PFNA)	-	<0.3	-	<0.3	-	<0.3	-	<0.3	-	<0.005	-	-	-	-	-
Perfluorodecanoic acid (PFDA)	-	<0.3	-	<0.3	-	<0.3	-	<0.3	-	<0.005	-	-	-	-	-
Perfluoroundecanoic acid (PFUnDA)	-	<0.3	-	<0.3	-	<0.3	-	<0.3	-	<0.005	-	-	-	-	-
Perfluorododecanoic acid (PFDoDA)	-	<0.3	-	<0.3	-	<0.3	-	<0.3	-	<0.005	-	-	-	-	-
Perfluorotridecanoic acid (PFTrDA)	-	<0.3	-	<0.3	-	<0.3	-	<0.3	-	<0.005	-	-	-	-	-
Perfluorotetradecanoic acid (PFTeDA)	-	<0.3	-	<0.3	-	<0.3	-	<0.3	-	<0.005	-	-	-	-	-
Perfluorooctanesulfonamides (FOSAs)															
Perfluorooctanesulfonamide (FOSA)	-	<1.5	-	<1.5	-	<1.5	-	<1.5	-	<0.01	-	-	-	-	-
N-ethylperfluoro-1-octanesulfonamide (NEtFOSA-M)	-	<1.5	-	<1.5	-	<1.5	-	<1.5	-	<0.01	-	-	-	-	-
N-methylperfluoro-1-octanesulfonamide (NMeFOSA-M)	-	<1.5	-	<1.5	-	<1.5	-	<1.5	-	<0.01	-	-	-	-	-
Perfluorooctanesulfonamidoacetic acids (FOSAAs)															
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	-	<1.5	-	<1.5	-	<1.5	-	<1.5	-	<0.01	-	-	-	-	-
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	-	<1.5	-	<1.5	-	<1.5	-	<1.5	-	<0.01	-	-	-	-	-
Perfluorooctanesulfonamidoethanols (FOSEs)															
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol (NEtFOSE-M)	-	<1.5	-	<1.5	-	<1.5	-	<1.5	-	<0.01	-	-	-	-	-
2-(N-methylperfluoro-1-octanesulfonamido)-ethanol (NMeFOSE-M)	-	<1.5	-	<1.5	-	<1.5	-	<1.5	-	0.44	-	-	-	-	-
Telomer Sulfonic acids (FTSs)															
1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTS)	<0.010	<0.3	<0.010	<0.3	<0.010	<0.3	<0.010	<0.3	<0.010	<0.005	-	-	-	-	-
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTS)	7.16	20	15.50	20	4.77	15	10.7	38	1.97	1.7	-	-	-	-	-
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2 FTS)	0.431	1.3	1.51	1.3	0.595	2.5	0.771	3.7	0.343	0.55	-	-	-	-	-
1H,1H,2H,2H-perfluorodecanesulfonic acid (10:2 FTS)	<0.010	<0.3	<0.010	<0.3	<0.010	<0.3	<0.010	<0.3	<0.010	<0.005	-	-	-	-	-

Notes:

1. Results in ug/L
2. Guideline values for PFDS and PFBA (derived 2011) PFOS, PFOA (derived 2017) have been obtained from Minnesota Department of Health (MDH) (see http://www.health.state.mn.us/divs/eh/risk/guidance/hrltype.html).
3. US EPA PFOA and PFOS Drinking Water Health Advisories (see https://www.epa.gov/sites/production/files/2016-05/documents/2016-12361.pdf).
4. Australian Government Department of Health - Health Based Guidance Values for PFAS accessed 01/06/2017 (https://www.health.gov.au/internet/main/publishing.nsf/Content/2200FE0860460353CA2580C900B17CDC/$File/fs-Health-Based-Guidance-Values.pdf).
5. WA Department of Environment Regulation (2017). (https://www.der.wa.gov.au/images/documents/your-environment/contaminated-sites/guidelines/Guideline-on-Assessment-and-Management-of-PFAS-.pdf).
6. Summations are made by adding compounds together, where one compound is below detection limit it is not included in the summation.

<LOR = Result is Less than Limit of Reporting
NR = Result Not Reportable
- Denotes No Guideline Value Available

0.48	Concentration exceeds provisional non-potable water guidelines
0.48	Concentration exceeds provisional drinking water guidelines
0.48	Concentration exceeds 95% ecological guidelines

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