Supplementary materials

PFAS in the drinking water source: analysis of the contamination levels, origin and emission rates

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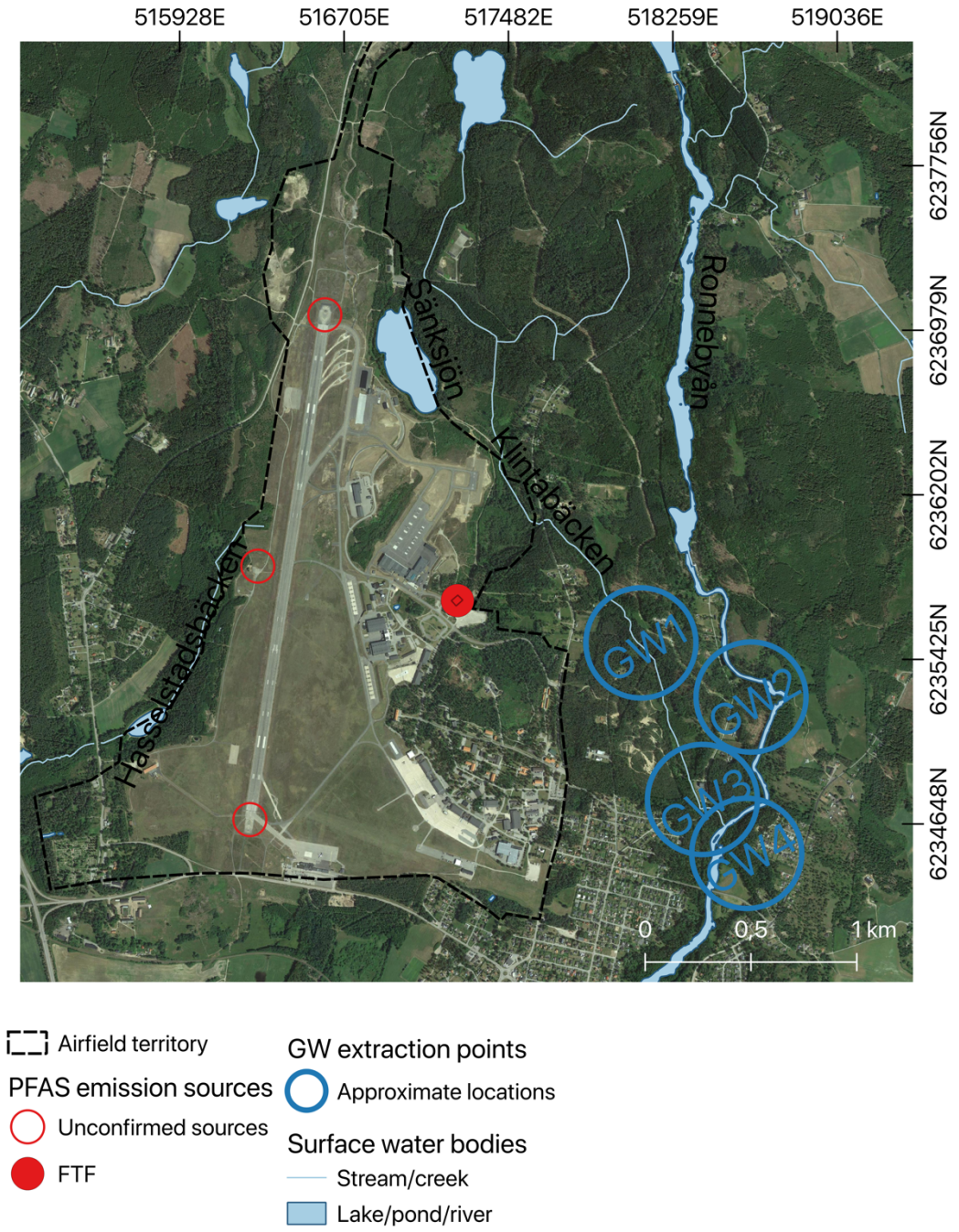

Figure S1. Study area description, including: airfield territory, PFAS emission sources, surface water bodies and groundwater extraction locations (exact locations were approximated for security reasons); basemap sources: Google Satellite data and GSD Lantmäteriet; CRS: SWEREF99 TM.

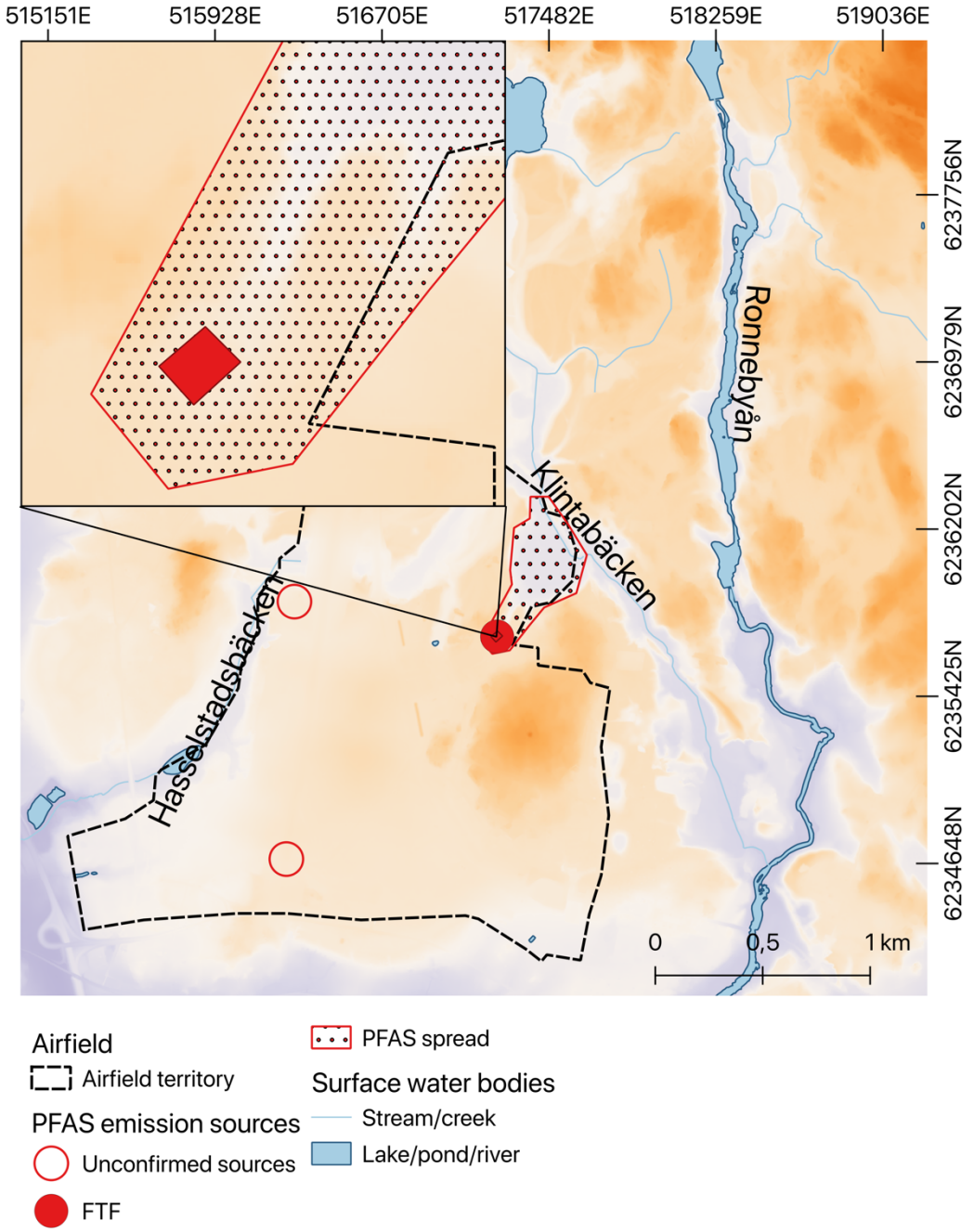

Figure S2. Topography of the studied area, including: airfield territory, surface water bodies, PFAS emission sources and spread area; basemap sources: GSD Lantmäteriet and Geodata Lantmäteriet; CRS: SWEREF99 TM.

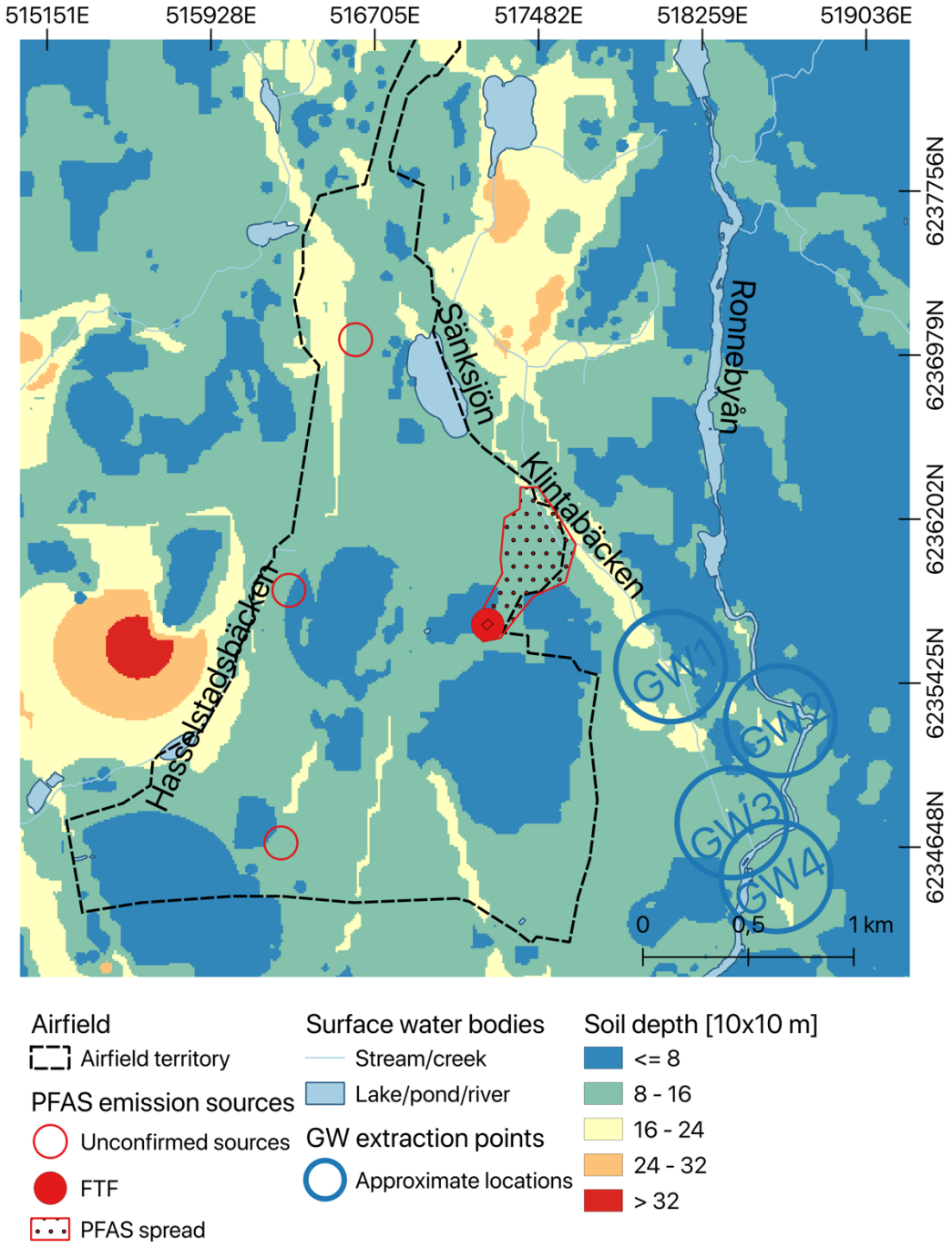

Figure S3. Description of the soil layer depth at the studied area, including: airfield territory, PFAS emission sources and spread area, surface water bodies and groundwater extraction locations (exact locations were approximated for security reasons); basemap sources: GSD Lantmäteriet and Geodata Lantmäteriet; CRS: SWEREF99TM.

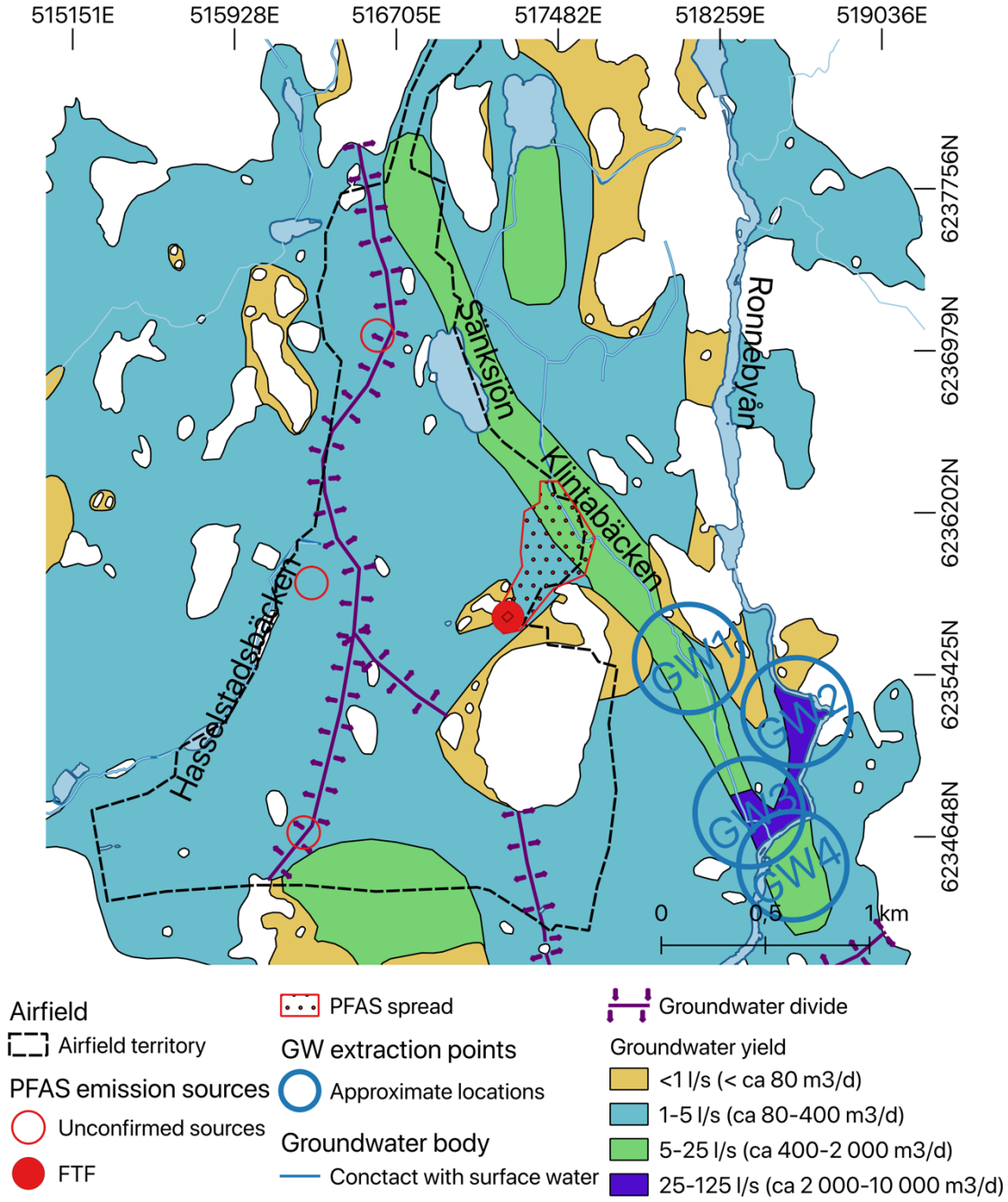

Figure S4. Hydrogeology of the studied area, including: airfield territory, PFAS emission sources and spread area, surface water bodies and groundwater extraction locations (exact locations were approximated for security reasons), groundwater confinement and capacities; basemap sources: GSD Lantmäteriet and Geological Survey of Sweden; CRS: SWEREF99TM.

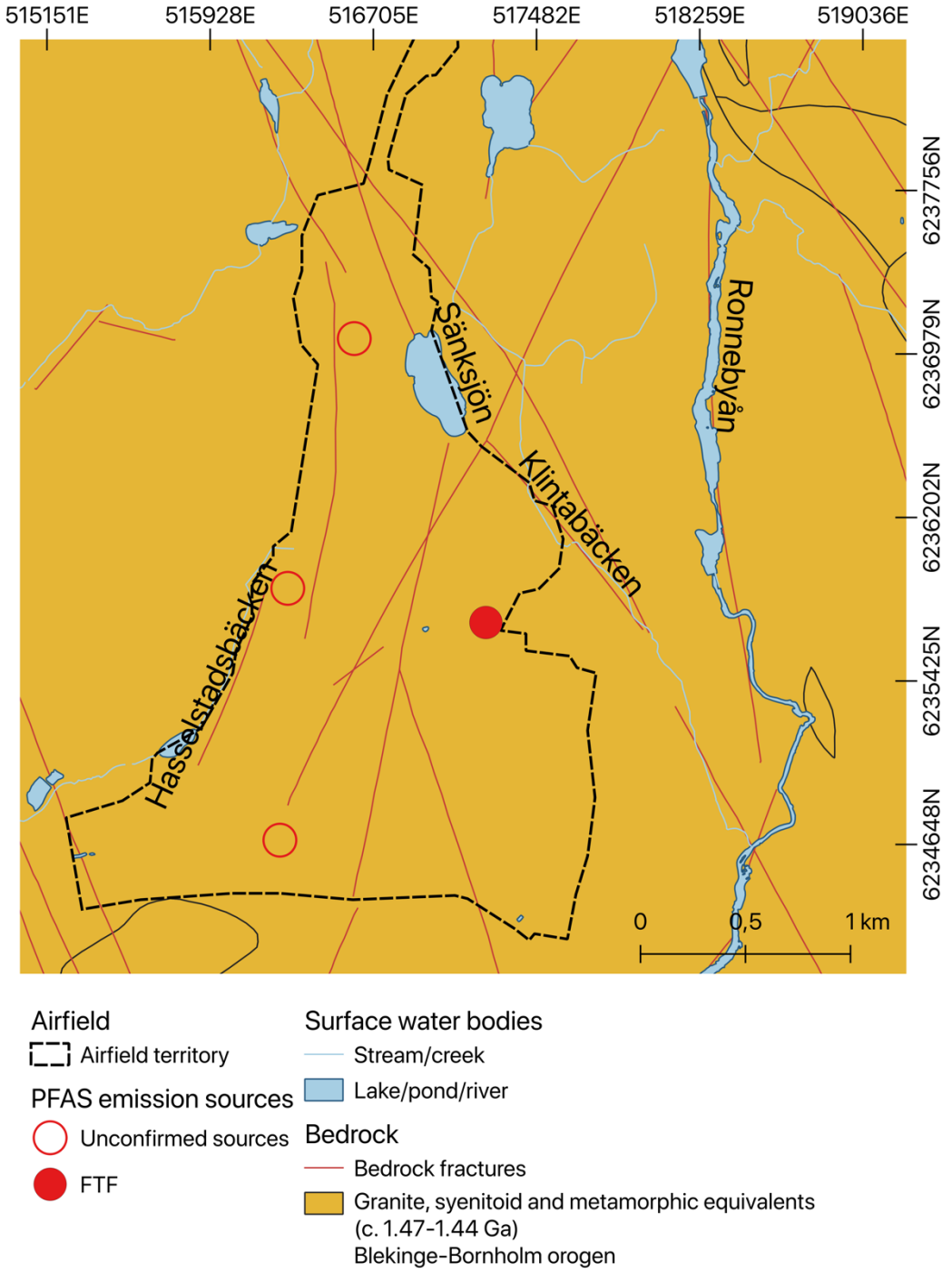

Figure S5. Bedrock lithology at the studied area, including: airfield territory, PFAS emission sources and surface water bodies; basemap sources: GSD Lantmäteriet and Geological Survey of Sweden; CRS: SWEREF99TM.

Figure S6. Photo of the POCIS prior to deployment into the groundwater well.

Table S1. PFAS concentrations measured in triplicate groundwater samples collected from groundwater extraction wells corresponding to GW1, GW3 and GW4 (see Figure S1).

Sample	Individual PFAS concentrations ng L^{-1}*												
	PFBS	PFHxS	PFOS	PFDS	PFHpA	PFHxA	PFOA	PFNA	PFOcDA	6:2 FTSA	8:2 FTSA	FOSA	Σ PFAS
GW4	<1	5.1	5.3	<5	<5	<10	<5	<5	<10	<10	<1	5.3	16
	<1	5.4	6	<5	<5	<10	<5	<5	<10	<10	<1	5.4	17
	<1	5.2	5.8	<5	<5	<10	<5	<5	<10	<10	<1	5.5	17
GW3	190	1400	2000	<5	86	280	260	<5	<10	<10	<1	5.7	4200
	200	1400	2000	<5	82	290	260	<5	<10	<10	<1	5.7	4200
	180	1400	2100	<5	82	280	250	<5	<10	<10	<1	6.7	4300
GW1	340	3600	14000	<5	140	640	350	<5	<10	36	6.1	80	19000
	390	4300	16000	<5	150	720	390	8.8	12	41	5.5	93	22000
	390	3700	13000	9.7	130	690	340	<5	46	36	5.9	82	18000

*) "<x" corresponds to concentrations below the instrumental detection limit (iLOD).

Table S2. PFAS detected in POCIS and corresponding PFAS concentrations estimated for groundwater measured at GW3 and GW1 (see Figure S1).

Deployment		Individual PFAS detected in POCIS															
		PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFBS	L-PFHxS	B-PFHxS	L-PFOS	B-PFOS	L-FOSA	B-FOSA	MeFOSA	6:2 FTSA	8:2 FTSA
Location	Period [days]	Rs [L day^{-1}] *															
		0.0046	0.029	0.035	0.061	0.077	0.04	0.028	0.046	0.046	0.088	0.088	0.1	0.1	0.1	0.046	0.088
		PFAS concentrations in water corresponding to accumulated in POCIS sorbent [ng L^{-1}]															
GW3	28	67	64	12	27	0.066	0.063	65	150	48	39	44	-	-	-	-	-
	28	110	76	15	34	0.074	0.075	75	180	63	62	78	-	-	-	-	-
	28	98	48	8.3	20	0.054	0.074	45	120	43	29	30	-	-	-	-	-
	MEAN	92	63	12	27	0.065	0.071	62	150	51	43	51	-	-	-	-	-
	SD	22	14	3.4	7	0.01	0.0067	15	30	10	17	25	-	-	-	-	-
GW1	7	150	200	32	54	0.35	0.3	150	620	170	140	150	1.7	0.72	-	13	0.33
	7	88	170	30	51	0.35	0.2	110	500	140	150	160	2	0.74	-	12	0.19
	14	150	190	34	63	0.35	0.19	170	740	230	330	420	3.5	1.3	-	17	0.31
	14	210	190	25	57	0.37	0.16	150	680	230	360	430	3.3	1.4	-	15	0.31
	21	88	150	27	49	0.34	0.16	120	550	180	390	550	4.4	1.4	-	15	0.31
	21	140	160	25	48	0.32	0.27	120	560	210	360	470	3.7	1.3	-	14	0.32
	28	99	170	31	54	0.35	0.25	120	640	230	530	800	5	1.6	0.02	16	0.35
	28	140	160	21	44	0.31	0.18	110	480	170	440	610	5.2	1.4	0.026	14	0.31
	MEAN	130	170	28	53	0.34	0.21	130	600	200	340	450	3.6	1.2	-	15	0.3
	SD	41	18	4.4	5.9	0.019	0.053	22	90	35	130	220	1.3	0.32	-	1.6	0.048

$Rs=C_{sorbent} * m_{sorbent} (C_{water}*time)^{-1}$ (product of concentration of compound in adsorbent [ng g^{-1}] and mass of adsorbent [g] divided by product of water concentration [ng L^{-1}] and time [days] (Gobelius et al., 2019)).

Table S3. Example of analysed PFAS compositions corresponding to PFAS-AFFF reported for US market (grey) and measured PFAS concentrations and relative composition in PFAS-AFFF reported for on Swedish market*

AFFF product	Individual PFAS														Period in use
	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFDA	PFBS	PFHxS	PFHpS	PFOS	10:2 FTSA	8:2 FTSA	6:2 FTSA	4:2 FTSA	
3M	?	?	?	?	?	?	PFBS*	PFHxS	PFHpS	PFOS					1980s - 2008
National Foam											10:2 FTSA**	8:2 FTSA**	6:2 FTSA**	4:2 FTSA**	
Ansul												8:2 FTSA**	6:2 FTSA**		
Angus											10:2 FTSA**	8:2 FTSA**	6:2 FTSA**		1980s - Present
Chemguard											10:2 FTSA**	8:2 FTSA**	6:2 FTSA**		
Fire Service Plus											10:2 FTSA**	8:2 FTSA**	6:2 FTSA**	4:2 FTSA**	
OneSeven B-AR	1500	1100	500	100							?	?	2400	?	??? - Present
	27%	**20%**	**9%**	**2%**									**43%**		
ARC Miljö	600	100	1100								?	?	4400	?	
	10%	**2%**	**18%**										**71%**		
Towalex AFFF-AR 3x3	1000	600	9800	100	200	100					?	?	8100	?	
	5%	**3%**	**49%**	**1%**	**1%**	**1%**							**41%**		
Towalex AFFF 3% Master	1100	600	10400	200	300	100					?	?	4100	?	
	7%	**4%**	**62%**	**1%**	**2%**	**1%**							**24%**		
Sthamex AFFF-P 3%	100		100								?	?	9500	?	
	1%		**1%**										**98%**		

*) reported PFAS compositions and concentrations might not fully represent the actual PFAS composition in PFAS-AFFF; **) corresponds to individual PFAS with functional group other than stated (Rupert et al., 2005; Place and Field, 2012; KEMI, 2015; Kärrman et al., 2016).

References:

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Rupert, W.; Verdonik, D.; Hanauska, C. Environmental Impacts of Fire Fighting Foams; Hughes Associates, Inc., Baltimore, MD USA, 2005.