Appendix C
Well Development Logs

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WELL DEVELOPMENT LOG

WELL ID: NSE-B2114-MW01

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	16.09	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0 (ppm)	Start Water Level:	5.26	Ft btoc
Event Date:	August 1, 2022 12:26 PM		Water Column:	10.83	Ft
Development Team:	Caitlin Dronfield		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.77	Gal
Equipment	Submersible Pump, Bailer Whale pump YSI, Turbidity Meter, YSI 650 MDS C-102748 MultiRAE,	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Start Time:	10:50	
			End Time:	11:55	
			Total Volume Purged:	30	Gal
Tubing Materials:	HDPE 3/8" OD x 1/4" ID		Screened Interval:	9-19	Ft bgs
			Pumping/Tube Intake:	15	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
10:55	0.5	0	6.76	6.98	1.15	19.72	38	6.01	1,000	Gray
11:00	0.5	2.5	6.52	6.95	0.924	18.25	-40	5.54	1,000	Gray
11:05	0.5	2.5	6.48	6.95	0.875	18.12	-47	6.27	1,000	Cloudy
11:10	0.5	2.5	6.46	6.98	0.847	18.37	-43	6.58	1,000	Cloudy
11:15	0.5	2.5	6.45	6.99	0.827	18.92	-62	2.62	243	Cloudy
11:20	0.5	2.5	6.45	7.05	0.819	18.69	-39	5.32	227	Cloudy
11:25	0.5	2.5	6.45	7.04	0.575	18.06	-52	6.97	208	Cloudy
11:30	0.5	2.5	6.43	7.06	0.814	18.54	-34	7.57	55.1	Clear
11:35	0.5	2.5	6.43	7.04	0.804	18.57	-44	6.58	37.9	Clear
11:40	0.5	2.5	6.43	7.06	0.789	18.62	-42	2.89	28.4	Clear
11:45	0.5	2.5	6.43	7.07	0.789	18.94	-47	2.8	23.6	Clear
11:50	0.5	2.5	6.31	7.15	0.798	19.61	-41	4.13	12.8	Clear
11:55	0.5	2.5	6.3	7.1	0.793	19.09	-54	2.82	7.63	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NSE-B2114-MW02

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	28.75	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0 (ppm)	Start Water Level:	7.31	Ft btoc
Event Date:	August 1, 2022 2:13 PM		Water Column:	21.44	Ft
Development Team:	Caitlin Dronfield		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	3.5	Gal
Equipment	Submersible Pump, Bailer Whale pump YSI, Turbidity Meter, YSI 600 MDS C-102748 MultiRAE, C-102715	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Start Time:	12:50	
			End Time:	14:40	
			Total Volume Purged:	105	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	19-20	Ft bgs
			Pumping/Tube Intake:	27	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
12:55	1	0	27	6.46	6.03	17.32	-76	1.11	1,000	Gray
13:00	1	5	27	6.51	6.14	15.18	-79	3.93	1,000	Cloudy
13:05	1	5	27	6.51	6.44	14.83	-87	1.82	184	Cloudy
13:10	1	.5	27	6.52	6.3	14.87	-84	2.17	235	Cloudy
13:15	1	5	27	6.53	6.76	14.74	-80	2.1	178	Cloudy
13:20	1	5	27	6.52	6.34	14.96	-82	1.97	119	Cloudy
13:25	1	5	27	6.52	7.03	15.48	-86	2.67	175	Cloudy
13:30	1	5	27	6.62	4.86	15.17	-66	NM	1,000	Gray
13:35	1	5	27	6.54	7.14	15.37	-65	4.23	488	Cloudy
13:40	1	5	27	6.57	6.44	15.1	-66	8.44	147	Cloudy
13:45	0.5	5	27	6.54	6.87	15.26	-61	4.37	76.5	Clear
13:50	0.5	5	27	6.49	4.94	15.26	-62	3.74	96.7	Clear
13:55	0.5	5	27	6.42	3.95	15.62	-54	4.36	145	Cloudy
14:00	0.5	5	27	6.39	3.15	15.49	-57	3.54	150	Cloudy
14:05	0.5	5	27	6.36	4.89	15.82	-55	3.42	115	Clear
14:10	0.5	5	27	6.39	5.18	15.5	-49	3.5	99.9	Clear
14:15	0.25	1.25	27	6.38	6.15	16.81	-46	3.48	95.1	Clear
14:20	0.25	1.25	27	6.37	5.3	16.87	-47	3.55	102	Clear
14:25	0.25	1.25	27	6.37	4.78	16.92	-47	2.94	84.9	Clear
14:30	0.25	1.25	27	6.38	4.88	16.99	-48	2.92	82.6	Clear
14:35	0.25	1.25	27	6.35	4.88	17.04	-46	2.99	76.8	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NSE-B2114-MW03

Project Name:	NAVSTA Everett PFAS SI			Well Depth:	24.16	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	**VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 %	Start Water Level:	6.51	Ft btoc
Event Date:	August 1, 2022 5:25 PM			Water Column:	17.65	Ft
Development Team:	Caitlin Dronfield			Well Diameter:	2	In
		Notes:		Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units		Well Volume:	2.88	Gal
Equipment	Submersible Pump Whale pump YSI, Turbidity Meter, YSI 650 MDS MultiRAE,	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface		Start Time:	15:30	
				End Time:	16:45	
				Total Volume Purged:	160	Gal
Tubing Materials:	HDPE 3/8" OD x 1/4" ID			Screened Interval:	15-25	Ft bgs
				Pumping/Tube Intake:	22	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
15:35	2	10	15.3	7.97	0.873	15.75	-115	4.48	1,000	Gray
15:40	2	10	18.42	7.84	1.046	14.49	-89	4.58	1,000	Gray
15:45	2	10	21	7.58	1.34	14.48	-58	5.2	376	Cloudy
15:50	2	10	22	7.44	1.47	14.5	-42	3.45	197	Cloudy
15:55	2	10	22	7.43	1.47	14.99	-45	3.96	156	Cloudy
16:00	2	10	22	7.48	1.49	14.22	-34	4.12	269	Cloudy
16:05	2	10	22	7.45	1.47	14.26	-30	5.46	116	Clear
16:10	2	10	22	7.38	1.6	14.12	-30	2.17	166	Cloudy
16:15	2	10	22	7.4	1.56	13.99	-28	5.14	139	Clear
16:20	2	10	22	7.36	1.6	13.79	-27		111	Clear
17:25	2	10	22	7.35	1.59	13.98	-25	1.97	98.7	Clear
16:25	2	10	22	7.34	1.45	13.66	-27	1.45	88.8	Clear
16:30	2	10	22	7.34	1.46	13.71	-25	1.17	80.4	Clear
16:35	2	10	22	7.35	1.35	13.59	-24	1.11	77.2	Clear
16:40	2	10	22	7.35	1.3	13.55	-24	0.99	75.5	Clear
16:45	2	10	22	7.35	1.33	13.61	-23	1.14	71.2	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

WELL DEVELOPMENT LOG

WELL ID: NRSJC-B6-MW03

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	38.63	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: NA	Start Water Level:	31.02	Ft btoc
Event Date:	June 29, 2022 1:34 PM		Water Column:	7.61	Ft
Development Team:	C. Torgerson		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.24	Gal
Equipment	Submersible Pump, Bailer, Surge Block	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts	Start Time:	13:30	
		(mg/L) = Milligrams per liter	End Time:	15:15	
	YSI, Turbidity Meter, 650 MDS C102748 MultiRAE, 46730	(NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Total Volume Purged:	52	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	10	Ft bgs
			Pumping/Tube Intake:	37.5	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
13:36	0.5	0	34.95	6.14	5	13.26	139	9.8	152	Cloudy
13:43	0.5	3.5	35.5	6.1	170	12.88	137	9.48	67.5	Clear
13:48	0.5	2.5	35.67	6.07	168	12.75	135	9.56	41.5	Clear
13:53	0.5	2.5	35.78	6.08	96	12.7	134	9.41	39.7	Clear
13:59	0.5	3.0	35.85	6.13	167	12.75	135	9.73	43.2	Clear
14:04	0.5	2.5	35.95	6.11	163	12.7	137	9.46	51.4	Clear
14:09	0.5	2.5	36	6.17	166	12.7	141	9.41	78.5	Cloudy
14:17	0.5	4.0	36.12	6.12	165	12.68	143	9.49	71.6	Cloudy
14:22	0.5	2.5	36.15	6.07	88	12.65	144	8.78	42.4	Clear
14:30	0.5	4.0	36.2	6.08	165	12.67	147	8.78	20.6	Clear
14:37	0.5	3.0	36.28	6.06	148	12.65	147	9.27	84.1	Cloudy
14:43	0.5	3.0	36.5	6.06	165	12.64	149	8.67	199	Cloudy
14:54	0.5	5.5	33.55	6.14	86	12.77	162	9.26	159	Brown
15:04	0.5	5.0	34.7	6.11	161	12.95	165	8.72	26.5	Clear
15:09	0.5	2.5	34.52	6.12	160	13.01	168	8.8	12	Clear
15:14	0.5	2.5	34.45	6.15	162	12.96	171	9.03	7.66	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-B6-MW04

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	40.25	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: NA	Start Water Level:	27.55	Ft btoc
Event Date:	June 29, 2022 6:43 PM		Water Column:	12.7	Ft
Development Team:	C.Torgerson		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	2.07	Gal
Equipment	Submersible Pump, Bailer, Surge Block	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts	Start Time:	09:43	
		(mg/L) = Milligrams per liter	End Time:	11:00	
	YSI, Turbidity Meter, MultiRAE,	(NTU) = Nephelometric Turbidity Unit NM = Not measured	Total Volume Purged:	74	Gal
		Ft bgs = Feet below ground surface			
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	10	Ft bgs
			Pumping/Tube Intake:		Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
09:50	1.5	0	40	6.38	5	12.85	23	9.87	1,000	Brown
10:01	1	15	36.9	6.15	72	12.3	27	8.13	1,000	Brown
10:09	0.75	8	36.21	5.98	98	12.59	70	8.83	22.9	Clear
10:16	0.75	5.25	35.01	5.99	99	13.33	59	7.83	835	Brown
10:21	0.75	3.75	35.5	5.97	95	13.29	62	8.11	483	Brown
10:31	0.75	7.5	35.85	5.78	104	12.41	75	7.29	111	Cloudy
10:37	0.75	4.5	35.99	5.63	103	12.57	84	7.41	70	Cloudy
10:42	0.75	3.75	36.04	5.67	102	12.64	93	7.48	61.6	Cloudy
10:47	0.75	3.75	35.7	5.63	98	12.41	107	7.34	15.7	Clear
10:52	0.75	3.75	35.9	5.62	101	12.43	108	7.55	30.4	Clear
10:57	0.75	3.75	36.08	5.67	102	12.41	105	7.4	26.8	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S1-MW05

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	14.55	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: NA	Start Water Level:	5.45	Ft btoc
Event Date:	July 6, 2022 10:31 AM		Water Column:	9.1	Ft
Development Team:	T. Chalmers, Ilka Dinkelman		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.5	Gal
Equipment	Submersible Pump, Bailer, Surge Block	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts	Start Time:	09:37	
		(mg/L) = Milligrams per liter	End Time:	10:30	
	YSI, 650 MultiRAE,	(NTU) = Nephelometric Turbidity Unit NM = Not measured	Total Volume Purged:	168	Gal
		Ft bgs = Feet below ground surface			
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	4.0 – 14.0	Ft bgs
			Pumping/Tube Intake:	NA	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
09:45	3.5	28	5.45	5.49	0.097	11.7	138	1.44	52.2	Cloudy
09:55	3.5	35	5.45	5.32	0.094	11.8	157	1.27	13.5	Clear
10:04	3.5	31.5	5.45	5.32	0.092	11.79	162	1.06	12.5	Clear
10:10	3.5	21	5.45	5.31	0.091	11.86	160	1.01	7.57	Clear
10:15	3.5	17.5	5.45	5.32	0.09	11.91	160	0.94	4.49	Clear
10:20	3.5	17.5	5.45	5.32	0.09	11.9	163	0.89	3.74	Clear
10:25	3.5	17.5	5.45	5.34	0.091	11.9	163	0.93	3.06	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S1-MW06

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	42	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: NA	Start Water Level:	29.65	Ft btoc
Event Date:	June 30, 2022 3:26 PM		Water Column:	12.35	Ft
Development Team:	C.Torgerson		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	2.02	Gal
Equipment	Submersible Pump, Bailer, Surge Block	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts	Start Time:	16:32	
	YSI, Turbidity Meter, MultiRAE,	(mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured	End Time:	09:09	
		Ft bgs = Feet below ground surface	Total Volume Purged:	1490	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	10	Ft bgs
			Pumping/Tube Intake:	41	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
16:37	1.5	0	30.51	6.29	109	11.99	106	7.26	976	Brown
16:43	1.5	9	30.7	5.9	63	11.24	126	7.63	138	Cloudy
16:48	1.5	7.5	30.74	5.75	103	10.92	138	7.72	42.4	Clear
16:53	2	10	30.75	5.58	56	10.9	149	8.01	23.1	Clear
16:58	1.75	8.75	30.75	5.61	101	10.88	152	7.65	11.4	Clear
08:53	1.5	1,432.5	30.53	6.42	76	11.13	200	9.34	194	Cloudy
08:58	1.5	7.5	30.55	5.87	56	10.74	199	8.27	10.8	Clear
09:03	1.5	7.5	30.55	5.74	103	10.67	197	8.11	5.79	Clear
09:08	1.5	7.5	30.55	5.7	104	10.75	193	7.7	3.98	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S4-MW14

Project Name:	NAVSTA Everett PFAS SI			Well Depth:	27.4	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	**VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 %	Start Water Level:	18.25	Ft btoc
Event Date:	July 12, 2022 11:59 AM			Water Column:	9.15	Ft
Development Team:	Greg Warren, K.Smith			Well Diameter:	2	In
		Notes:		Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units		Well Volume:	1.49	Gal
Equipment	Submersible Pump, Bailer, Surge Block Mini Monsoon YSI, Turbidity Meter, C102748 MultiRAE, C102715	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface		Start Time:	10:22	
				End Time:	11:51	
				Total Volume Purged:	20	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID			Screened Interval:	17-27	Ft bgs
				Pumping/Tube Intake:	26	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
11:30	1.5	0	18.95	6.91	0.456	10.69	77.6	0.32	58.5	Cloudy
11:35	1	5	18.9	6.91	0.458	11.13	74	0.28	43.8	Clear
11:40	1	5	18.9	6.9	0.457	11.17	70	0.25	13	Clear
11:45	1	5	18.9	6.9	0.457	11.16	68	0.24	4.94	Clear
11:50	1	5	18.9	6.9	0.457	11.16	67	0.24	3.46	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

JACOBS

WELL DEVELOPMENT LOG

WELL ID: NRSJC-S4-MW15

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	26.15	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0 (ppm)	Start Water Level:	17.69	Ft btoc
Event Date:	July 11, 2022 3:28 PM		Water Column:	8.46	Ft
Development Team:	Ilka Dinkelman		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.38	Gal
Equipment	Submersible Pump, Bailer, Surge Block MiniMonsoon YSI, YSI 650 C102748 MultiRAE, MultiRae	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Start Time:	13:55	
			End Time:	15:04	
			Total Volume Purged:	88.4	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	16-26	Ft bgs
			Pumping/Tube Intake:	25	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
14:23	1.5	42	18.85	6.9	0.413	11.3	36	0.52	44	Clear
14:35	1.5	18	18.86	6.8	0.416	11.3	42	0.33	23	Clear
14:40	1.3	6.5	18.86	6.85	0.416	11.3	44	0.32	10.9	NA
14:45	1.3	6.5	18.86	6.75	0.416	11.38	51	0.3	8.7	Clear
14:50	1	5	18.86	6.8	0.413	11.9	58	0.39	10.6	Clear
14:56	1	6	18.85	6.7	0.411	13.7	79	0.44	3	Clear
15:00	1.1	4.4	18.85	6.8	13.8	13.8	76	0.6	2.5	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S5-MW16

Project Name:	NAVSTA Everett PFAS SI			Well Depth:	28	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	NA	Start Water Level:	22.05	Ft btoc
Event Date:	July 8, 2022 1:16 PM			Water Column:	5.95	Ft
Development Team:	Greg Warren, Ilka Dinkelman			Well Diameter:	2	In
		Notes:		Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units		Well Volume:	0.97	Gal
Equipment	Submersible Pump, Bailer, Surge Block Mini monsoon YSI, YSI 560 MultiRAE,	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface		Start Time:	10:34	
				End Time:	10:58	
				Total Volume Purged:	24	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID			Screened Interval:	18-28	Ft bgs
				Pumping/Tube Intake:	26	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
10:34	1	0	22.88	6.3	0.198	9.2	112	0.35	55.4	Clear
10:45	1	11	22.88	6.22	0.197	9.17	107	0.3	12.9	Clear
10:54	1	9	22.87	6.16	0.196	9.15	108	0.32	7.45	Clear
10:58	1	4	NM	6.03	0.195	9.17	113	0.34	4.51	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S5-MW18

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	26.9	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0.11417117 (ppm	Start Water Level:	18.23	Ft btoc
Event Date:	July 7, 2022 5:07 PM		Water Column:	8.67	Ft
Development Team:	Greg Warren, Ilka Dinkelman		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute	Well Volume:	1.41	Gal
Equipment	Submersible Pump Mini monsoon YSI, YSI 650 MDS C102748 MultiRAE, MultiRAE C102715	(SU) = Standard Units (mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Start Time:	15:44	
			End Time:	16:45	
			Total Volume Purged:	80	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	17-27	Ft bgs
			Pumping/Tube Intake:	24	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
16:20	1	55	18.33	6.5	0.11	10	34	1.5	65	Clear
16:25	1	5	18.31	6.5	0.116	9.97	27	1.3	20	Clear
16:30	1	5	18.32	6.6	0.115	9.9	27	1	12	Clear
16:40	1	10	18.31	6.3	0.114	9.8	43	0.9	7.7	Clear
16:45	1	5	18.3	6.3	0.114	9.8	45	0.7	5.5	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S5-MW19

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	23.2	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: NA	Start Water Level:	14.7	Ft btoc
Event Date:	July 8, 2022 11:20 AM		Water Column:	8.5	Ft
Development Team:	Greg Warren, Ilka Dinkelman		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.39	Gal
Equipment	Submersible Pump, Bailer, Surge Block Mini monsoon YSI, YSI 650 C102748 MultiRAE, MultiRae	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Start Time:	09:40	
			End Time:	10:25	
			Total Volume Purged:	5	Gal
Tubing Materials:	HDPE 3/8" OD x 1/4" ID		Screened Interval:	13.2-23.2	Ft bgs
			Pumping/Tube Intake:	21	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
10:15	1	0	14.73	6.3	0.117	9.8	56	1.1	15	Cloudy
10:20	0.5	2.5	14.73	6.3	0.116	9.8	54	1	6.6	NM
10:25	0.5	2.5	14.72	6.3	0.114	9.9	56	1.2	4.3	NM

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S6-MW08

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	17.5	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0.2 (ppm)	Start Water Level:	9.4	Ft btoc
Event Date:	July 7, 2022 12:20 PM		Water Column:	8.1	Ft
Development Team:	Greg Warren, Ilka Dinkelman		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.32	Gal
Equipment	Submersible Pump, Bailer, Surge Block Hand develop YSI, 650MDS #C102748 MultiRAE,	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Start Time:	10:29	
			End Time:	11:45	
			Total Volume Purged:	31	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	4-14	Ft bgs
			Pumping/Tube Intake:	16	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
10:40	0.5	5.5	11.75	6.39	0.131	10.77	129	1.3	999	Brown
10:45	0.5	2.5	11.75	6.36	0.129	10.74	99	1.14	389	Cloudy
10:50	0.5	2.5	11.75	6.3	0.126	10.64	87	1.04	202	Cloudy
11:00	0.5	5	11.75	6.17	0.122	10.76	91	0.82	27.1	Clear
11:10	0.5	5	11.75	6.1	0.121	10.78	92	0.69	9.28	Clear
11:20	0.5	5	11.75	6.08	0.12	10.62	91	0.59	3.18	Clear
11:30	0.5	5	11.75	6.1	0.119	10.57	92	0.52	2.39	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S6-MW09

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	17.59	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: NA	Start Water Level:	8.67	Ft btoc
Event Date:	July 6, 2022 3:18 PM		Water Column:	8.92	Ft
Development Team:	T.Chalmers		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.45	Gal
Equipment	Submersible Pump, Bailer, Surge Block	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts	Start Time:	13:58	
		(mg/L) = Milligrams per liter	End Time:	14:50	
	YSI, C103124 MultiRAE, C102715	(NTU) = Nephelometric Turbidity Unit NM = Not measured	Total Volume Purged:	140	Gal
		Ft bgs = Feet below ground surface			
Tubing Materials:	HDPE 3/8" OD x 1/4" ID		Screened Interval:	4.0 – 14.0	Ft bgs
			Pumping/Tube Intake:	0	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
14:10	3.5	0	9.55	6.13	0.099	11	108	1.93	293	Cloudy
14:15	3.5	17.5	9.55	5.9	0.097	11	118	1.66	139	Cloudy
14:20	3.5	17.5	9.55	5.78	0.096	10.99	141	1.61	79.5	Clear
14:25	3.5	17.5	9.55	5.68	0.096	11.01	139	1.43	66.7	Clear
14:30	3.5	17.5	9.55	5.65	0.095	10.98	142	1.39	54.3	Clear
14:35	3.5	17.5	9.55	5.65	0.094	10.95	145	1.34	39.3	Clear
14:40	3.5	17.5	9.55	5.66	0.093	11	146	1.31	30.8	Clear
14:40	3.5	17.5	9.55	5.66	0.092	10.98	151	1.27	32	Clear
14:45	3.5	17.5	9.55	5.66	0.092	11	151	1.26	37.5	Clear
14:50	3.5	17.5	9.55	5.67	0.092	10.98	150	1.26	36.2	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S6-MW10

Project Name:	NAVSTA Everett PFAS SI			Well Depth:	27.45	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	**VOC:** 0.1 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 %	Start Water Level:	19	Ft btoc
Event Date:	July 7, 2022 1:58 PM			Water Column:	8.45	Ft
Development Team:	Greg Warren, Ilka Dinkelman			Well Diameter:	2	In
			Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability		(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.38	Gal
Equipment	Submersible Pump Hand Develop, monsoon pump YSI, 650 MultiRAE,		(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Start Time: End Time: Total Volume Purged:	11:58 60	 Gal
Tubing Materials:	Poly Tubing 1/4”			Screened Interval: Pumping/Tube Intake:	17.5 - 27.5	Ft bgs Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
13:16	NA	30	22.2	5.3	0.073	8.7	33	1.6	999	Cloudy
13:25	1	9	19.8	5.3	0.072	10.2	42	1.43	269	Cloudy
13:35	0.5	5	19.8	5.2	0.073	10.1	82	1.2	49	Clear
13:40	0.5	2.5	19.8	5.25	0.073	10.15	80	1.1	12	Clear
13:45	0.5	2.5	19.8	NM	NM	NM	NM	NM	NM	NM
13:50	0.5	2.5	19.8	5.14	0.072	10.04	65.1	0.97	1.67	Clear
14:00	0.5	5	19.8	5.19	0.071	10.02	65.6	0.87	1.4	Clear
14:07	0.5	3.5	19.8	5.2	0.07	10.1	67.1	0.8	1.9	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S7-MW11

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	254.6	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0 (ppm)	Start Water Level:	236.03	Ft btoc
Event Date:	November 7, 2022 1:15 PM		Water Column:	18.57	Ft
Development Team:	Jordan Couture, David Lubell		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute	Well Volume:	3.03	Gal
Equipment	Bailer	(SU) = Standard Units	Start Time:	13:05	
	HDPE tubing with waters check valve and surge block	(mS/cm) = milliSiemens per centimeter	End Time:		
	Horiba, Horiba U-22 #22200	(mV) = Millivolts			
	,	(mg/L) = Milligrams per liter	Total Volume Purged:	75.5	Gal
		(NTU) = Nephelometric Turbidity Unit			
Tubing Materials:		NM = Not measured	Screened Interval:	234-254	Ft bgs
	1/2" x 3/8"	Ft bgs = Feet below ground surface	Pumping/Tube Intake:		Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
13:05		0		5.94	0.28	7.03	214	7.66	1,000	Brown
14:05				7.11	0.189	8.47	112	8.79	1,000	Brown
14:30				7.76	0.188	9.1	127	9.49	1,000	Brown
15:14		20		7.67	0.193	9.63	147	9.65	1,000	Brown
15:46		25		7.66	0.183	8.95	153	9.23	1,000	Brown
16:18		30.5		7.51	0.174	8.53	152	9.16	1,000	Brown
16:55										

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRSJC-S7-MW12

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	245.9	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0 (ppm)	Start Water Level:	237.67	Ft btoc
Event Date:	November 1, 2022 11:50 AM		Water Column:	8.23	Ft
Development Team:	Jordan Couture		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.34	Gal
Equipment	Bailer, Waterra Tubing and Foot Valve	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts	Start Time:	15:08	
		(mg/L) = Milligrams per liter	End Time:	15:17	
	Horiba, MultiRAE	(NTU) = Nephelometric Turbidity Unit NM = Not measured	Total Volume Purged:	0	Gal
Tubing Materials:	HDPE 3/8" OD x 1/4" ID	Ft bgs = Feet below ground surface	Screened Interval:	233 - 243	Ft bgs
			Pumping/Tube Intake:	237.75	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
17:55	NM	0	237.7	6.45	0.195	10.34	223	10.47	1,000	Brown
18:27	NM	NM	237.8	7.88	0.126	10.11	192	8.93	1,000	Brown
19:04	NM	NM	237.74	8.41	0.121	9.66	159	8.82	1,000	Brown
12:10	NM	NM	237.75	8.36	0.258	8.23	244	7.91	1,000	Brown
12:22	NM	NM	237.8	6.21	0.163	8.25	215	8.64	987	Brown
12:50	NM	NM	237.75	6.43	0.152	9.05	204	7.79	1,000	Brown
12:54	NM	NM	237.76	6.53	0.163	8.73	191	8.33	1,000	Brown
13:12	NM	NM	237.75	6.57	0.157	8.79	213	7.98	1,000	Brown

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

JACOBS

WELL DEVELOPMENT LOG

WELL ID: NRSJC-S7-MW13

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	240.21	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0 (ppm)	Start Water Level:	239.6	Ft btoc
Event Date:	November 3, 2022 3:17 PM		Water Column:	0.61	Ft
Development Team:	Jordan Couture		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	NA	(mL/min) = milliliters per minute	Well Volume:	0.1	Gal
Equipment	Bailer	(SU) = Standard Units (mS/cm) = milliSiemens per centimeter	Start Time:	15:17	
	YSI, Horiba, MultiRAE	(mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	End Time:		
			Total Volume Purged:	0	Gal
Tubing Materials:	HDPE 3/8" OD x 1/4" ID		Screened Interval:	217 - 2327	Ft bgs
			Pumping/Tube Intake:		Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
15:17		0								Brown; well dry

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRCPB-B106-MW01

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	20.86	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: NA	Start Water Level:	12.01	Ft btoc
Event Date:	August 5, 2022 10:01 AM		Water Column:	8.85	Ft
Development Team:	Caitlin Dronfield		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute (SU) = Standard Units	Well Volume:	1.44	Gal
Equipment	Submersible Pump Whale pump Horiba, Horiba U52 44010 Pine MultiRAE, Multirae PID 46730	(mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Start Time:	08:20	
			End Time:	09:30	
			Total Volume Purged:	133.5	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	11-21	Ft bgs
			Pumping/Tube Intake:	19.5	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
08:25	2	0	15.04	5.48	0.378	14.17	166	2.49	1,000	Brown
08:30	2	7.5	15.64	6.29	0.224	14.24	94	1.89	875	Cloudy
08:35	2	10	15.88	6.29	0.195	14.76	93	8.84	498	Cloudy
08:40	2	10	16.1	6.3	0.19	14.6	86	10.57	252	Cloudy
08:45	2	10	16.17	6.36	0.185	14.4	90	5.04	436	Cloudy
08:50	2	10	16.32	6.29	0.184	14.66	95	5.58	193	Cloudy
08:55	2	16	16.38	6.23	0.179	14.7	101	5.02	169	Clear
09:00	2	10	16.41	6.21	0.177	14.59	106	4.64	68.9	Clear
09:05	2	10	16.48	6.22	0.177	14.35	106	8.85	73.3	Clear
09:10	2	10	16.48	6.17	0.175	14.65	111	9.58	65.4	Clear
09:15	2	10	16.61	6.19	0.174	14.75	109	5.02	47.3	Clear
09:20	2	10	16.61	6.16	0.175	14.76	113	5.35	13.3	Clear
09:25	2	10	16.69	6.16	0.174	15	111	5.47	14.5	Clear
09:30	2	10	16.69	6.17	0.175	14.62	112	6.06	9.54	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRCPB-B106-MW02

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	19.67	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0 (ppm)	Start Water Level:	12.77	Ft btoc
Event Date:	August 8, 2022 11:51 AM		Water Column:	5.9	Ft
Development Team:	Caitlin Dronfield, Carlin Coleman		Well Diameter:	2	In
		Notes:	Volume per Foot:	0.163	Gal/ft
Purge Method:	Stability	(mL/min) = milliliters per minute	Well Volume:	0.96	Gal
Equipment	Submersible Pump, Bailer	(SU) = Standard Units	Start Time:	09:50	
	Whale pump	(mS/cm) = milliSiemens per centimeter	End Time:	11:30	
	Horiba, Horiba u52 44010	(mV) = Millivolts			
	MultiRAE, Multirae PID 46730	(mg/L) = Milligrams per liter	Total Volume Purged:	170	Gal
		(NTU) = Nephelometric Turbidity Unit			
		NM = Not measured			
		Ft bgs = Feet below ground surface			
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	10-20	Ft bgs
			Pumping/Tube Intake:	15.5	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
09:50	2	0	13	5.14	0.334	14.99	173	5.94	1,000	Brown
09:55	2	10	13.03	5.58	0.149	14.5	136	9.12	1,000	Cloudy
10:00	2	10	13.07	5.6	0.141	14.33	132	9.34	467	Cloudy
10:10	2	10	13.12	5.56	0.134	14.15	130	8.62	243	Cloudy
10:15	2	10	13.14	5.53	0.138	14.16	132	6.49	73.5	Cloudy
10:20	2	10	13.16	5.54	0.108	14.28	123	9.01	54.3	Clear
10:25	2	10	13.22	5.57	0.096	14.25	125	9.02	39.2	Clear
10:30	2	10	13.17	5.58	0.134	14.18	127	8.48	32.3	Clear
10:35	2	10	13.21	5.56	0.106	14.38	136	9.02	26.1	Clear
10:40	2	10	13.19	5.55	0.132	14.24	142	7.16	24.1	Clear
10:45	2	10	13.21	5.62	0.132	14.36	131	8.31	22.8	Clear
10:50	2	10	13.26	5.61	0.104	14.53	134	8.92	19.8	Clear
10:55	2	10	13.28	5.61	0.104	14.61	129	8.94	18.6	Clear
11:00	2	10	13.27	5.57	0.13	14.4	143	7.92	17.8	Clear
11:05	2	10	13.24	5.61	0.113	14.54	147	8.91	18.3	Clear
11:10	2	10	13.29	5.53	0.089	14.62	158	9.11	19.8	Clear
11:15	2	10	13.29	5.56	0.129	14.36	159	8.82	19.2	Clear
11:20	2	10	13.34	5.49	0.129	14.45	165	8.99	23.9	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

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WELL DEVELOPMENT LOG

WELL ID: NRCPB-B106-MW03

Project Name:	NAVSTA Everett PFAS SI		Well Depth:	15.2	Ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading: **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 %	Start Water Level:	12.13	Ft btoc
Event Date:	August 8, 2022 5:12 PM		Water Column:	3.07	Ft
Development Team:	Caitlin Dronfield, Carlin Coleman		Well Diameter:	2	In
Purge Method:	Stability	Notes: (mL/min) = milliliters per minute (SU) = Standard Units (mS/cm) = milliSiemens per centimeter (mV) = Millivolts (mg/L) = Milligrams per liter (NTU) = Nephelometric Turbidity Unit NM = Not measured Ft bgs = Feet below ground surface	Volume per Foot:	0.163	Gal/ft
Equipment	Submersible Pump, Bailer Whale pump Horiba, Turbidity Meter, Horiba u52 44010 MultiRAE, MultiRae PID 046730		Well Volume:	0.5	Gal
			Start Time:	15:50	
			End Time:	16:30	
			Total Volume Purged:	7.5	Gal
Tubing Materials:	HDPE 3/8" OD x ¼" ID		Screened Interval:	6-16	Ft bgs
			Pumping/Tube Intake:	13	Ft bgs

WELL STABILIZATION DATA

Time	Pumping rate (gal/min)	Volume Removed (gal)	Water level (ft bgs)	pH (SU)	SP. COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Clarity/Color
15:55	0.25	0	13	6.37	0.609	19.09	36	3.74	1,000	Brown
16:00	0.25	1.25	13	6.5	0.344	18.1	53	5.08	NM	Cloudy
16:05	0.25	1.25	13	6.35	0.329	18.11	54	3.21	195	Cloudy
16:10	0.25	1.25	13	6.27	0.289	17.9	61	3.09	81.1	Clear
16:15	0.25	1.25	13	6.22	0.268	17.81	68	3.2	25.3	Clear
16:21	0.25	1.50	13	6.24	0.251	17.94	70	3.82	19.7	Clear
16:25	0.25	1.00	13	6.25	0.099	18.27	46	3.95	8.96	Clear

Legend: gal/min= gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU**= Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches

Appendix D
Groundwater Sampling Sheets

GROUNDWATER SAMPLING DATA SHEET

WELL ID: NSE-B2114-MW01

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	18.88	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	5.81	ft btoc
Start Date:	August 11, 2022	Weather:	Sunny, 75 °F	Water Column:	13.07	ft
Sampling Team:	Caitlin Dronfield, Carlin Coleman			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	2.13	gal
Equipment	Peristaltic Pump, Horiba, MultiRAE			Start Time:	15:55	
				End Time:	17:35	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE ¼ in.			Screened Interval:	9.0 - 19	ft btoc
				Pumping/Tube Intake:	16	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
16:00	250	6.15	6.09	0.941	19.81	13.00	1.14	184.00	Cloudy
16:05	250	6.08	6.31	0.920	17.35	-47.00	0.08	228.00	Cloudy
16:10	250	NA	6.38	0.917	17.23	-64.00	0.05	245.00	Cloudy
16:15	250	NA	6.42	0.915	17.11	-71.00	0.00	223.00	Cloudy
16:20	250	NA	6.50	0.911	17.15	-82.00	0.00	211.00	Cloudy
16:25	250	NA	6.58	0.906	17.26	-91.00	0.00	184.00	Cloudy
16:30	250	6.03	6.58	0.910	17.22	-91.00	0.00	120.00	Clear
16:35	250	6.09	6.61	0.909	17.24	-94.00	0.00	74.90	Clear
16:40	250	6.05	6.67	0.905	17.33	-104.00	0.00	56.50	Clear
16:45	250	6.09	6.70	0.903	17.27	-108.00	0.00	57.00	Clear
16:50	250	6.05	6.64	0.908	17.27	-104.00	0.00	47.60	Clear
16:55	250	6.06	6.68	0.906	17.33	-108.00	0.00	29.10	Clear
17:00	250	6.05	6.73	0.900	17.30	-115.00	0.00	22.50	Clear
17:05	250	6.08	6.73	0.901	17.30	-115.00	0.00	29.70	Clear
17:10	250	6.08	6.68	0.901	17.40	-112.00	0.00	22.80	Clear
17:15	250	6.08	6.72	0.898	17.52	-115.00	0.00	12.90	Clear
17:20	250	6.09	6.75	0.893	17.58	-120.00	0.00	11.40	Clear
17:25	250	6.06	6.76	0.893	17.56	-121.00	0.00	7.72	Clear
17:30	250	6.04	6.77	0.893	17.58	-122.00	0.00	6.40	Clear
17:35	250	6.07	6.77	0.894	17.53	-123.00	0.00	6.67	Clear

SAMPLE INFORMATION

Sample ID:	NSE-B2114-GW01-0822	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	08/11/22 17:40	QC Sample:	Field Duplicate
Sample Comments:	NA	QC Sample ID:	NSE-B2114-GW01P-0822 17:45

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

WELL ID: NSE-B2114-MW02

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	28.29	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	7.82	ft btoc
Start Date:	August 11, 2022	Weather:	Sunny, 75 °F	Water Column:	20.47	ft
Sampling Team:	Caitlin Dronfield, Carlin Coleman			Well Diameter:		in.
				Volume per Foot:	0	gal/ft
Purge Method:	Low Flow			Well Volume:	0	gal
Equipment	Peristaltic Pump, Horiba, Turbidity Meter, MultiRAE			Start Time:	18:14	
				End Time:	19:30	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE Flex Tubing			Screened Interval:	19 - 29	ft btoc
				Pumping/Tube Intake:	2.5	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
18:15	300	7.87	6.55	2.830	18.58	-97.00	0.81	965.00	Cloudy
18:20	300	7.89	5.87	6.650	18.01	-68.00	0.00		Cloudy
18:25	300	7.87	5.87	6.600	17.97	-69.00	0.00	973.00	Cloudy
18:30	300	7.86	5.68	6.280	17.77	-75.00	0.00	849.00	Cloudy
18:35	300	7.91	5.85	6.130	17.81	-76.00	0.00	791.00	Cloudy
18:40	300	7.87	5.85	6.070	17.76	-77.00	0.00	666.00	Cloudy
18:45	300	7.88	5.85	5.870	17.73	-79.00	0.00	676.00	Cloudy
18:50	300	7.87	5.85	5.680	17.67	-82.00	0.00	588.00	Cloudy
18:55	300	7.87	5.85	5.580	17.66	-84.00	0.00	552.00	Cloudy
19:05	150	7.89	5.87	5.430	18.81	-87.00	0.00	484.00	Cloudy
19:10	150	7.59	5.86	5.430	19.38	-88.00	0.00	509.00	Cloudy
19:15	150	7.49	5.86	5.410	19.67	-88.00	0.00	422.00	Cloudy
19:20	150	7.56	5.86	5.310	20.47	-87.00	0.00	392.00	Cloudy
19:25	150	7.48	5.86	5.190	20.77	-86.00	0.00	391.00	Cloudy

SAMPLE INFORMATION

Sample ID:	NSE-B2114-GW02-0822	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	08/11/22 19:30	QC Sample:	NA
Sample Comments:	NA	QC Sample ID:	NA

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NSE-B2114-MW03

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	24.05	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	6.6	ft btoc
Start Date:	August 11, 2022	Weather:	Sunny, 70 °F	Water Column:	17.45	ft
Sampling Team:	Caitlin Dronfield, Carlin Coleman			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	2.85	gal
Equipment	Peristaltic Pump, YSI, Turbidity Meter, MultiRAE,			Start Time:	17:55	
				End Time:	18:40	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE ¼ in.			Screened Interval:	15 - 25	ft btoc
				Pumping/Tube Intake:	21.5	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
18:00	150	6.67	6.71	0.687	16.07	132.10	3.37	22.30	Clear
18:05	150	6.70	7.26	0.635	16.08	71.90	3.31	11.70	Clear
18:10	150	6.72	7.38	0.634	15.95	45.80	3.11	13.20	Clear
18:15	150	6.73	7.40	0.636	15.79	26.80	2.87	10.00	Clear
18:20	150	6.73	7.40	0.635	15.71	13.20	2.62	8.65	Clear
18:25	200	6.74	7.40	0.636	15.55	3.40	2.39	7.13	Clear
18:30	200	6.76	7.40	0.636	15.46	-6.80	2.15	4.09	Clear
18:35	200	6.78	7.40	0.635	15.46	-8.20	2.05	5.78	Clear
18:40	200	6.79	7.40	0.636	15.43	-6.30	1.99	7.77	Clear

SAMPLE INFORMATION

Sample ID:	NSE-B2114-GW03-0822	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	08/11/22 18:45	QC Sample:	MS/MSD
Sample Comments:	NA	QC Sample ID:	NSE-B2114-GW03-0822-MS NSE-B2114-GW03-0822-MSD

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-B6-MW01

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	50	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	31.27	ft btoc
Start Date:	June 30, 2022	Weather:	NA	Water Column:	8.73	ft
Sampling Team:	Jordan Couture, Jordan Peery-Lemon			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.443	gal
Equipment	Bladder Pump, 042840 Water level meter, 042840			Start Time:	9:25	
				End Time:	10:20	
				Total Volume Purged:	4.5	gal
Tubing Materials:	HDPE, Flex Tubing			Screened Interval:	30-40	ft btoc
				Pumping/Tube Intake:	35	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
9:25	200	31.25	6.08	0.079	11.3	216.5	11.05	229	Cloudy/no odor
9:30	200	31.20	6.02	0.079	11.4	213.0	10.78	237	Cloudy/no odor
9:35	200	31.20	6.01	0.079	11.3	211.0	10.91	260	Cloudy/no odor
9:40	200	31.20	6.03	0.079	11.4	207.2	11.18	281	Cloudy/no odor
9:45	200	31.20	6.03	0.078	11.4	203.3	11.11	268	Cloudy/no odor
9:50	200	31.20	6.08	0.078	11.5	198.5	11.42	268	Cloudy/no odor
9:55	200	31.20	6.09	0.077	11.6	194.0	11.50	253	Cloudy/no odor
10:00	200	31.20	6.13	0.077	11.5	192.3	11.53	237	Cloudy/no odor
10:05	200	31.20	6.13	0.076	11.5	191.3	11.60	213	Cloudy/no odor
10:10	200	31.20	6.14	0.076	11.5	189.9	11.46	200	Cloudy/no odor
10:15	200	31.20	6.18	0.076	11.9	185.2	11.51	202	Cloudy/no odor

SAMPLE INFORMATION

Sample ID:	NRSJC-B6-GW01-0622	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	06/30/22 10:20	QC Sample:	NA
Sample Comments:	NA	QC Sample ID:	NA

Notes: °C = Degrees Centigrade, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

WELL ID: NRSJC-B6-MW02

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	35	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	25.55	ft btoc
Start Date:	June 30, 2022	Weather:	NA	Water Column:	9.45	ft
Sampling Team:	Jordan Couture, Jordan Peery-Lemon			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.54	gal
Equipment	Bladder Pump, 10307			Start Time:	11:30	
	Water level meter, 042840			End Time:	12:55	
				Total Volume Purged:	4.5	gal
Tubing Materials:	HDPE, Flex Tubing			Screened Interval:	25-35	ft btoc
				Pumping/Tube Intake:	30	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
11:30	200	25.58	6.19	0.131	10.7	190.2	8.93	149	Cloudy/no odor
11:35	200	25.58	6.30	0.130	10.7	183.4	8.00	173	Cloudy/no odor
11:40	200	25.58	6.33	0.130	10.6	182.0	7.85	146	Cloudy/no odor
11:45	200	25.58	6.35	0.125	10.5	179.9	8.11	132	Cloudy/no odor
11:50	200	25.58	6.35	0.121	10.5	179.1	8.13	104	Cloudy/no odor
11:55	200	25.58	6.38	0.115	10.7	175.5	8.26	92.7	Cloudy/no odor
12:00	200	25.58	6.39	0.111	10.6	173.4	8.14	74.3	Cloudy/no odor
12:05	200	25.58	6.34	0.108	10.6	174.1	8.25	57.3	Cloudy/no odor
12:10	200	25.58	6.34	0.106	10.4	174.3	8.23	50.7	Clear/no odor
12:15	200	25.58	6.33	0.104	10.5	174.0	8.25	48.1	Clear/no odor
12:20	200	25.58	6.34	0.103	10.6	174.2	8.33	42.3	Clear/no odor
12:25	200	25.58	6.33	0.102	10.6	174.6	8.39	40.3	Clear/no odor
12:30	200	25.58	6.31	0.100	10.5	174.1	8.57	35.2	Clear/no odor
12:35	200	25.58	6.29	0.099	10.5	177.0	8.62	30.6	Clear/no odor
12:40	200	25.58	6.30	0.097	10.5	177.1	8.82	27.6	Clear/no odor
12:45	200	25.58	6.29	0.096	10.5	177.9	8.89	25.7	Clear/no odor
12:50	200	25.58	6.29	0.096	10.5	178.1	8.93	25.9	Clear/no odor

SAMPLE INFORMATION

Sample ID:	NRSJC-B6-GW02-0622	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	06/30/22 12:55	QC Sample:	NA
Sample Comments:	NA	QC Sample ID:	NA

Notes: °C = Degrees Centigrade, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

JACOBS

GROUNDWATER SAMPLING DATA SHEET

WELL ID: NRSJC-B6-MW03

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	40	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	31.09	ft btoc
Start Date:	June 30, 2022	Weather:	NA	Water Column:	8.91	ft
Sampling Team:	Jordan Couture, Jordan Peery-Lemon			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.45	gal
Equipment	Bladder Pump, 10307			Start Time:	13:50	
	Water level meter, 042840			End Time:	14:55	
				Total Volume Purged:	4.5	gal
Tubing Materials:	HDPE, Flex Tubing			Screened Interval:	28.5-38.5	ft btoc
				Pumping/Tube Intake:	35	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
13:50	200	31.19	5.66	0.151	12.8	207.2	9.18	193	Cloudy/no odor
13:55	200	31.20	5.63	0.155	12.7	208.5	9.24	241	Cloudy/no odor
14:00	200	31.20	5.60	0.158	12.5	210.5	9.34	219	Cloudy/no odor
14:05	200	31.20	5.70	0.162	12.5	211.5	9.34	182	Cloudy/no odor
14:10	200	31.20	5.74	0.162	12.3	210.3	9.16	115	Cloudy/no odor
14:15	200	31.20	5.79	0.163	12.3	208.0	8.93	67.3	Clear/no odor
14:20	200	31.20	5.84	0.162	12.2	205.7	8.87	42.5	Clear/no odor
14:25	200	31.20	5.86	0.161	12.1	205.2	8.84	27.0	Clear/no odor
14:30	200	31.20	5.87	0.160	12.2	205.1	8.74	22.3	Clear/no odor
14:35	200	31.20	5.89	0.161	12.2	204.5	8.67	15.6	Clear/no odor
14:40	200	31.20	5.90	0.161	12.0	204.5	8.62	9.26	Clear/no odor
14:45	200	31.20	5.92	0.161	12.0	204.1	8.60	8.44	Clear/no odor
14:50	200	31.20	5.93	0.161	12.2	203.6	8.56	9.64	Clear/no odor

SAMPLE INFORMATION

Sample ID:	NRSJC-B6-GW03-0622	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	06/30/22 14:55	QC Sample:	NA
Sample Comments:	NA	QC Sample ID:	NA

Notes: °C = Degrees Centigrade, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

JACOBS

GROUNDWATER SAMPLING DATA SHEET

WELL ID: NRSJC-B6-MW04

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	40	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	26.46	ft btoc
Start Date:	July 07, 2022	Weather:	NA	Water Column:	13.54	ft
Sampling Team:	Jordan Couture, Jordan Peery-Lemon			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	2.2	gal
Equipment	Bladder Pump, 10307			Start Time:	8:35	
	Water level meter, 042840			End Time:	9:45	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE, Flex Tubing			Screened Interval:	30-40	ft btoc
				Pumping/Tube Intake:	35	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
8:35	250	28.06	5.44	0.112	11.5	207.1	7.50	747	Cloudy/none
8:40	250	28.06	5.66	0.105	11.5	197.2	7.63	691	Cloudy/none
8:45	250	28.06	5.11	0.098	11.4	172.3	7.78	603	Cloudy/none
8:50	250	28.06	5.13	0.097	11.4	170.0	7.88	397	Cloudy/none
8:55	250	28.06	5.18	0.094	11.6	165.9	7.88	338	Cloudy/none
9:00	250	28.06	5.26	0.090	11.6	160.0	7.74	311	Cloudy/none
9:05	250	28.16	5.31	0.090	11.5	157.8	7.96	325	Cloudy/none
9:10	250	28.16	5.33	0.090	11.5	156.8	7.95	303	Cloudy/none
9:15	250	28.16	5.36	0.089	11.5	156.2	7.97	248	Cloudy/none
9:20	250	28.16	5.38	0.088	11.5	155.9	7.96	210	Cloudy/none
9:25	250	28.16	5.30	0.088	11.5	157.4	7.96	179	Cloudy/none
9:30	250	28.26	5.45	0.088	11.6	154.4	7.94	162	Cloudy/none
9:35	250	28.36	5.46	0.088	11.6	154.6	7.96	163	Cloudy/none
9:40	250	28.46	5.47	0.088	11.6	154.3	7.84	163	Cloudy/none

SAMPLE INFORMATION

Sample ID:	NRSJC-B6-GW04-0622	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/01/22 9:45	QC Sample:	NA
Sample Comments:	NA	QC Sample ID:	NA

Notes: °C = Degrees Centigrade, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S1-MW05

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	14.55	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	5.65	ft btoc
Start Date:	July 11, 2022	Weather:	Sunny, 85 °F	Water Column:	8.9	ft
Sampling Team:	Charles Royko			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.45	gal
Equipment	Peristaltic Pump, C-103265			Start Time:	15:49	
	YSI, Turbidity Meter, C-103308			End Time:	16:52	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE, Flex Tubing			Screened Interval:	4.0 - 14	ft btoc
				Pumping/Tube Intake:	NA	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
15:56	300	5.59	4.97	0.206	12.20	184.30	3.81	370.00	Cloudy/Brownish cloudy
16:01	300	5.59	5.19	0.205	12.10	174.60	3.13	287.00	Cloudy
16:06	300	5.59	5.31	0.201	12.10	169.60	2.69	180.00	Cloudy
16:18	300	5.59	5.39	0.205	12.20	168.10	2.76	234.00	Cloudy
16:23	300	5.59	5.27	0.200	12.00	NA	2.76	169.00	Clear
16:28	300	5.59	5.28	0.196	12.10	176.30	2.69	59.50	Clear
16:33	300	5.59	5.27	0.196	12.20	178.30	2.33	36.70	Clear
16:38	300	5.59	5.31	0.194	12.30	176.70	2.17	17.90	Clear
16:43	300	5.59	5.28	0.193	12.00	179.00	2.15	12.30	Clear
16:48	300	5.59	5.35	0.193	12.00	175.80	2.14	9.08	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S1-GW05-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/11/22 17:00	QC Sample:	MS/MSD
Sample Comments:	NA	QC Sample ID:	NRSJC-S1-GW05-0722-MS NRSJC-S1-GW05-0722-MSD

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S1-MW06

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	42.00	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	30.06	ft btoc
Start Date:	July 11, 2022	Weather:	Sunny, 75 °F	Water Column:	11.94	ft
Sampling Team:	Charles Royko			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.95	gal
Equipment	Bladder Pump, YSI, Turbidity Meter			Start Time:	13:45	
				End Time:	14:33	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE			Screened Interval:	28.5 - 38.5	ft btoc
				Pumping/Tube Intake:	37	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
13:56	350	30.10	4.88	181.000	11.40	144.50	6.59	115.00	Brown/Light brownish
14:01	350	30.10	5.01	181.000	11.40	142.50	7.02	57.10	Cloudy
14:06	350	30.10	5.12	180.000	11.20	142.00	6.69	34.90	Cloudy
14:11	350	30.10	5.19	0.182	11.20	146.20	7.07	24.70	Brown/Faint brown
14:19	350	30.10	5.27	0.182	11.20	150.40	6.89	12.80	Clear
14:25	350	30.10	5.24	0.181	11.10	156.20	6.95	7.74	Clear
14:30	350	30.10	5.31	0.181	11.10	157.40	6.84	6.16	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S1-GW06-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/11/22 14:45	QC Sample:	NA
Sample Comments:	NA	QC Sample ID:	NA

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S1-MW07

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	14.41	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	4.89	ft btoc
Start Date:	July 12, 2022	Weather:	Sunny	Water Column:	9.52	ft
Sampling Team:	Charles Royko			Well Diameter:		in.
				Volume per Foot:	0	gal/ft
Purge Method:	Low Flow			Well Volume:	0	gal
Equipment	Peristaltic Pump			Start Time:	10:57	
				End Time:	11:29	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE			Screened Interval:	4.0- 14	ft btoc
				Pumping/Tube Intake:	NA	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
10:58	300	4.41	5.58	0.177	12.70	109.20	3.24	23.00	Clear
11:04	300	4.41	5.50	0.172	12.60	111.30	3.15	6.34	Clear
11:11	300	4.41	5.50	0.147	12.60	111.90	2.90	4.29	Clear
11:16	300	4.41	5.57	0.144	12.50	113.10	3.25	4.49	Clear
11:23	300	4.41	5.63	0.143	12.60	114.50	3.39	4.52	Clear
11:27	300	4.41	5.66	0.144	12.60	115.10	3.42	1.55	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S1-GW07-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/12/22 11:35	QC Sample:	Field Duplicate
Sample Comments:	NA	QC Sample ID:	NRSJC-S1-GW07P-0722 11:37

Notes: °C = Degrees Centigrade, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S4-MW14

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	27.42	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	18.5	ft btoc
Start Date:	July 13, 2022	Weather:	Sunny, 70 °F	Water Column:	8.92	ft
Sampling Team:	NA			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.46	gal
Equipment	Peristaltic Pump, YSI, Turbidity Meter			Start Time:	13:52	
				End Time:	14:16	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE Tubing			Screened Interval:	17 - 27	ft-btoc
				Pumping/Tube Intake:	23	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
13:57	250	18.55	6.41	0.194	11.60	184.40	7.02	29.80	Clear
14:02	250	18.55	6.53	0.194	11.80	177.30	6.48	1.22	Clear
14:07	250	18.55	6.64	0.194	11.80	170.80	6.62	0.47	Clear
14:12	250	18.55	6.71	0.194	11.80	166.20	6.73	0.17	Clear
14:15	250	18.55	6.74	0.194	11.70	164.50	7.07	0.46	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S4-GW14-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/13/22 14:20	QC Sample:	Field Duplicate
Sample Comments:	NA	QC Sample ID:	NRSJC-S4-GW14P-0722 14:22

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S4-MW15

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	27.35	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	18.18	ft btoc
Start Date:	July 13, 2022	Weather:	Sunny, 73 °F	Water Column:	9.17	ft
Sampling Team:	NA			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.5	gal
Equipment	Peristaltic Pump, YSI, Turbidity Meter			Start Time:	14:43	
				End Time:	15:10	
				Total Volume Purged:	2.0	gal
Tubing Materials:	HDPE Tubing			Screened Interval:	17 - 27	ft-btoc
				Pumping/Tube Intake:	23	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
14:48	300	18.22	6.92	0.177	12.00	170.80	9.87	0.92	Clear
14:53	300	18.22	6.48	0.177	12.00	167.30	7.09	0.66	Clear
14:58	300	18.22	6.50	0.177	11.80	166.00	9.51	0.20	Clear
15:03	300	18.22	6.57	0.177	12.00	162.30	9.42	0.05	Clear
15:08	300	18.22	6.63	0.177	12.00	159.00	9.26	0.22	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S4-GW15-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/13/22 15:15	QC Sample:	MS/MSD
Sample Comments:	NA	QC Sample ID:	NRSJC-S4-GW15-0722-MS NRSJC-S4-GW15-0722-MSD

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S5-MW16

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	28.91	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	22.48	ft btoc
Start Date:	July 12, 2022	Weather:	Sunny , 73 °F	Water Column:	6.43	ft
Sampling Team:	NA			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.05	gal
Equipment	Peristaltic Pump, YSI, Turbidity Meter			Start Time:	14:39	
				End Time:	15:30	
				Total Volume Purged:	4.0	gal
Tubing Materials:	HDPE Tubing			Screened Interval:	16.5 – 26.5	ft-btoc
				Pumping/Tube Intake:	25	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	SP. Cond. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
14:44	300	22.52	5.51	0.096	10.10	185.30	10.46	21.10	Clear
14:49	300	22.52	5.61	0.096	10.00	180.60	11.40	17.90	Clear
14:54	300	22.52	5.74	0.097	9.90	174.90	11.58	15.90	Clear
14:59	300	22.52	5.84	0.097	9.80	170.80	11.53	13.50	Clear
15:04	300	22.52	5.87	0.095	9.80	168.70	11.22	10.90	Clear
15:07	300	22.52	5.89	0.095	9.70	167.70	11.14	10.20	Clear
15:10	300	22.52	5.90	0.095	9.60	167.40	11.17	9.10	Clear
15:23	300	22.52	5.93	0.096	10.00	165.40	11.11	NA	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S5-GW16-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/12/22 15:30	QC Sample:	Field Duplicate
Sample Comments:	NA	QC Sample ID:	NRSJC-S5-GW16P-0722 15:32

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

WELL ID: NRSJC-S5-MW18

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	26.95	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	18.42	ft btoc
Start Date:	July 13, 2022	Weather:	Sunny, 70 °F	Water Column:	8.53	ft
Sampling Team:	NA			Well Diameter:	2	In.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.4	gal
Equipment	Peristaltic Pump, C-103265 YSI, Turbidity Meter, C-103308			Start Time:	09:09	
				End Time:	09:37	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE poly Tubing 3/8 in.			Screened Interval:	14 - 24	ft btoc
				Pumping/Tube Intake:	NA	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
09:14	NA	18.42	6.21	0.112	9.50	209.60	8.76	5.07	Clear
09:19	220	18.41	6.01	0.108	9.40	183.90	8.69	2.03	Clear
09:24	220	18.41	6.02	0.108	9.50	167.40	8.31	0.58	Clear
09:29	220	18.41	6.04	0.107	9.40	162.00	8.30	0.37	Clear
09:34	220	18.41	6.09	0.108	9.40	157.60	8.40	0.34	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S5-GW18-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/13/22 09:40	QC Sample:	MS/MSD
Sample Comments:		QC Sample ID:	NRSJC-S5-GW18-0722-MS NRSJC-S5-GW18-0722-MSD

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S5-MW19

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	23.52	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	14.88	ft btoc
Start Date:	July 12, 2022	Weather:	Sunny , 73 °F	Water Column:	8.64	ft
Sampling Team:	NA			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.41	gal
Equipment	Peristaltic Pump, YSI, Turbidity Meter			Start Time:	16:11	
				End Time:	16:37	
				Total Volume Purged:	2.5	gal
Tubing Materials:	HDPE poly Tubing			Screened Interval:	11 - 21	ft btoc
				Pumping/Tube Intake:	19	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
16:15	220	14.89	5.77	0.114	10.20	182.80	11.22	4.33	Clear
16:20	220	14.89	5.97	0.115	10.80	170.00	10.10	1.98	Clear
16:25	220	14.89	6.13	0.116	10.50	163.00	9.78	2.13	Clear
16:30	220	14.89	6.15	0.116	10.80	162.10	9.11	1.14	Clear
16:33	220	14.89	6.17	0.116	10.60	162.40	9.16	1.96	Clear
16:36	220	14.89	6.14	0.115	10.80	166.70	9.17	1.38	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S5-GW19-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/12/22 16:40	QC Sample:	NA
Sample Comments:	NA	QC Sample ID:	NA

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S6-MW08

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	17.54	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	9.55	ft btoc
Start Date:	July 13, 2022	Weather:	Sunny , 70 °F	Water Column:	7.99	ft
Sampling Team:	NA			Well Diameter:		in.
				Volume per Foot:	0	gal/ft
Purge Method:	Low Flow			Well Volume:	0	gal
Equipment	Peristaltic Pump, YSI, Turbidity Meter			Start Time:	12:23	
				End Time:	13:02	
				Total Volume Purged:	3.5	gal
Tubing Materials:	HDPE poly Tubing			Screened Interval:	4.0 - 14	ft btoc
				Pumping/Tube Intake:	13.5	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
12:28	280	9.88	5.77	0.101	11.20	199.10	3.29	29.20	Clear
12:33	280	9.88	5.83	0.103	11.00	191.70	3.22	50.50	Clear
12:38	280	9.88	5.89	0.103	10.90	186.80	3.50	29.70	Clear
12:43	280	9.88	6.02	0.102	10.60	178.80	2.62	17.40	Clear
12:48	280	9.88	5.95	0.103	10.50	181.90	2.64	15.60	Clear
12:53	280	9.88	5.97	0.104	10.50	179.60	2.63	11.20	Clear
12:56	300	9.88	5.99	0.104	10.40	178.20	2.65	9.09	Clear
12:59	300	9.88	6.04	0.104	10.80	174.40	2.59	7.39	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S6-GW08-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/13/22 13:05	QC Sample:	MS/MSD
Sample Comments:	NA	QC Sample ID:	NRSJC-S6-GW08-0722-MS NRSJC-S6-GW08-0722-MSD

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S6-MW09

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	17.59	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	8.95	ft btoc
Start Date:	July 12, 2022	Weather:	Sunny, 70°F	Water Column:	8.64	Ft
Sampling Team:	Charles Royko			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.41	gal
Equipment	Peristaltic Pump, YSI, Turbidity Meter			Start Time:	12:17	
				End Time:	12:49	
				Total Volume Purged:	2.5	gal
Tubing Materials:	HDPE Poly Tubing			Screened Interval:	4.0 - 14	ft btoc
				Pumping/Tube Intake:	13	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
12:22	280	8.95	5.27	0.093	11.50	156.80	3.39	386.00	Brown
12:27	280	8.95	5.34	0.092	11.80	154.80	2.67	196.00	Brown/Light brown
12:32	280	8.95	5.45	0.093	12.10	151.90	2.68	45.10	Clear
12:37	280	8.95	5.54	0.093	12.10	149.40	2.63	14.30	Clear
12:42	280	8.95	5.53	0.092	12.20	150.60	2.51	8.56	Clear
12:45	280	8.95	5.61	0.092	12.20	149.30	2.58	4.68	Clear
12:48	280	8.95	5.62	0.092	12.10	149.60	2.51	3.56	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S6-GW09-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/12/22 12:50	QC Sample:	Field Duplicate
Sample Comments:	NA	QC Sample ID:	NRSJC-S6-GW09P-0722

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S6-MW10

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	27.54	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	19.19	ft btoc
Start Date:	July 13, 2022	Weather:	Sunny, 70 °F	Water Column:	8.35	ft
Sampling Team:	NA			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	1.36	gal
Equipment	Peristaltic Pump, YSI, Turbidity Meter			Start Time:	10:43	
				End Time:	23:57	
				Total Volume Purged:	400	gal
Tubing Materials:	HDPE Poly Tubing			Screened Interval:	14 - 24	ft btoc
				Pumping/Tube Intake:	23	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft)	pH (SU)	SP. Cond. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
10:48	220	19.22	4.43	0.063	10.30	214.20	5.20	129.00	Cloudy Brown tint
10:53	220	19.22	4.54	0.061	10.60	214.80	4.87	121.00	Cloudy Brown tint
10:58	220	19.22	4.61	0.060	10.30	214.60	5.02	98.90	Cloudy Yellow/brown tint
11:03	200	19.22	4.79	0.060	10.70	208.70	4.98	90.70	Cloudy
11:08	200	19.22	4.90	0.059	10.90	206.90	4.89	80.50	Clear
11:13	200	19.22	4.91	0.059	10.90	207.30	4.92	52.60	Cloudy, slight yellow tint
11:18	200	19.22	4.87	0.059	11.00	211.30	4.99	47.10	Cloudy, slight yellow tint
11:23	200	19.22	4.91	0.059	11.10	211.00	4.99	42.40	Cloudy, slight yellow tint
11:28	200	19.22	4.89	0.059	11.00	214.10	5.05	35.00	Cloudy, slight yellow tint
11:33	230	19.22	4.70	0.058	9.40	228.30	5.44	29.30	Clear
11:38	250	19.22	4.64	0.058	9.40	233.00	5.32	32.80	Clear
11:41	250	19.22	4.67	0.057	9.30	232.30	5.35	23.60	Clear
11:44	250	19.22	4.68	0.057	9.30	233.30	5.40	20.30	Clear
11:47	250	19.22	4.73	0.056	9.60	231.90	5.38	15.50	Clear
11:50	250	19.22	4.79	0.056	9.50	229.00	5.43	16.00	Clear
11:53	250	19.22	4.82	0.056	9.60	229.10	5.47	13.00	Clear
11:56	250	19.22	4.85	0.056	9.70	229.70	5.56	12.40	Clear

SAMPLE INFORMATION

Sample ID:	NRSJC-S6-GW10-0722	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	07/13/22 12:00	QC Sample:	NA
Sample Comments:	NA	QC Sample ID:	NA

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S7-MW11

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	254.37	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	238.55	ft btoc
Start Date:	November 9, 2022	Weather:	Sunny	Water Column:	15.82	ft
Sampling Team:	Jordan Couture			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	0	gal
Equipment	Bailer, HDPE bailer			Start Time:	09:35	
				End Time:	NA	
				Total Volume Purged:	NA	gal
Tubing Materials:	NA			Screened Interval:	233 - 243	ft btoc
				Pumping/Tube Intake:	NA	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

SAMPLE INFORMATION

Sample ID:	NRSJC-S7-GW11-1122	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	11/09/22 15:15	QC Sample:	Field Duplicate
Sample Comments:	No parameters collected	QC Sample ID:	NRSJC-S7-GW11P-1122 15:20

Notes: °C = Degrees Centigrade, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRSJC-S7-MW12

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	239.18	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	234.12	ft btoc
Start Date:	November 10, 2022	Weather:	❄ Snowing, 32 °F	Water Column:	5.06	ft
Sampling Team:	Jordan Couture			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	0.83	gal
Equipment	Bailer, HDPE bailer			Start Time:	12:12	
				End Time:	NA	
				Total Volume Purged:	NA	gal
Tubing Materials:	NA			Screened Interval:	233 - 243	ft btoc
				Pumping/Tube Intake:	NA	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

SAMPLE INFORMATION

Sample ID:	NRSJC-S7-GW12-1122	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	11/10/22 13:35	QC Sample:	MS/MSD
Sample Comments:	No parameters collected.	QC Sample ID:	NRSJC-S7-GW12-1122-MS NRSJC-S7-GW12-1122-MSD

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRCPB-B106-MW01

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	20.86	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: Not Measured	Start Water Level:	12.24	ft btoc
Start Date:	August 9, 2022	Weather:	Rainy, 60 °F	Water Column:	8.62	ft
Sampling Team:	Caitlin Dronfield, Carlin Coleman			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Bailer			Well Volume:	1.41	gal
Equipment	Bailer, Horiba, Turbidity Meter, MultiRAE			Start Time:	08:00	
				End Time:	12:00	
				Total Volume Purged:	4.5	gal
Tubing Materials:	HDPE ¼ in.			Screened Interval:	11 - 21	ft btoc
				Pumping/Tube Intake:	NA	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
11:45	NA	12.24	6.05	0.307	15.65	139	7.15	>1000	Light brown

SAMPLE INFORMATION

Sample ID:	NRCPB-B106-GW01-0822	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	08/09/22 11:40	QC Sample:	Field Duplicate
Sample Comments:	Bladder pump control box broken, sampled using bailer	QC Sample ID:	NRCPB-B106-GW01P-0822 11:45

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRCPB-B106-MW02

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	19.52	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: Not Measured	Start Water Level:	11.98	ft btoc
Start Date:	August 9, 2022	Weather:	Rainy, 60 °F	Water Column:	7.54	ft
Sampling Team:	Caitlin Dronfield, Carlin Coleman			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Bailer			Well Volume:	1.23	gal
Equipment	Bailer, Horiba, Turbidity Meter, MultiRAE,			Start Time:	11:15	
				End Time:	12:00	
				Total Volume Purged:	4	gal
Tubing Materials:	HDPE 1/4”			Screened Interval:	10 - 20	ft btoc
				Pumping/Tube Intake:	NA	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
10:30	NA	11.98	6.15	0.159	15.85	123	11.22	>1000	Light brown

SAMPLE INFORMATION

Sample ID:	NRCPB-B106-GW02-0822	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	08/09/22 12:40	QC Sample:	NA
Sample Comments:	Bladder pump control box broken, sampled using bailer	QC Sample ID:	NA

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

GROUNDWATER SAMPLING DATA SHEET

JACOBS

WELL ID: NRCPB-B106-MW03

Project Name:	NAVSTA Everett PFAS SI	Casing Materials:	PVC	Well Depth:	15.82	ft btoc
Project Number:	704758CH.10.08.FI	Well Head PID Reading:	VOC: 0 (ppm)	Start Water Level:	12.52	ft btoc
Start Date:	August 10, 2022	Weather:	Rainy, 60 °F	Water Column:	3.3	ft
Sampling Team:	Caitlin Dronfield, Carlin Coleman			Well Diameter:	2	in.
				Volume per Foot:	0.163	gal/ft
Purge Method:	Low Flow			Well Volume:	0.54	gal
Equipment	Peristaltic Pump, Horiba, Turbidity Meter, MultiRAE			Start Time:	09:30	
				End Time:	10:35	
				Total Volume Purged:	NA	gal
Tubing Materials:	HDPE ¼ in.			Screened Interval:	10 - 20	ft btoc
				Pumping/Tube Intake:	14.82	ft btoc

WELL STABILIZATION DATA

Time	Pumping Rate (mL/min)	Water level (ft btoc)	pH (SU)	Specific Conductivity (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Appearance
09:40	150	12.66	5.27	0.199	16.28	179.00	5.44	504.00	Cloudy
09:45	150	12.68	5.32	0.155	16.20	176.00	5.47	371.00	Cloudy
09:50	150	12.70	5.30	0.133	16.10	182.00	5.56	239.00	Cloudy
09:55	150	12.70	5.32	0.117	16.03	185.00	5.43	166.00	Cloudy
10:00	150	12.71	5.35	0.110	16.11	188.00	5.53	84.00	Clear
10:05	150	12.71	5.33	0.106	16.05	190.00	5.61	39.60	Clear
10:10	150	12.71	5.32	0.104	16.07	195.00	5.58	24.10	Clear
10:15	150	12.71	5.25	0.104	16.02	199.00	5.47	14.10	Clear
10:20	150	12.72	5.24	0.103	15.99	200.00	5.58	9.42	Clear
10:25	150	12.71	5.31	0.102	15.91	198.00	5.68	6.02	Clear
10:30	150	12.70	5.29	0.102	15.88	197.00	5.55	5.25	Clear

SAMPLE INFORMATION

Sample ID:	NRCPB-B106-GW03-0822	Primary Laboratory:	Battelle
Analyses:	PFAS LC-MS/MS Compliant with QSM 5.3b Table B-15	Shipment Method:	FedEx
Collection Date/Time:	08/10/22 10:35	QC Sample:	MS/MSD
Sample Comments:	NA	QC Sample ID:	NRCPB-B106-GW03-0822-MS / NRCPB-B106-GW03-0822-MSD

Notes: °C = Degrees Centigrade, °F = Degrees Fahrenheit, btoc = below top of casing, D.O. = dissolve oxygen, ft = feet, gal = gallon, HDPE = high-density polyethylene, in.= inches, mg/L =milligrams per Liter, mL/min = milliliters per minute, mS/cm = milliSiemens per centimeter, MS/MSD = matrix spike/matrix spike duplicate, mV= millivolts, NA = not applicable, NAVSTA = Naval Station, NTU = Nephelometric Turbidity Unit, PFAS = per- and polyfluoroalkyl substances, PID = photoionization detector, ppm = parts per million, PVC = polyvinyl chloride, SI = Site Inspection, SU = Standard Units, VOC = volatile organic compound

Appendix E
Survey Report

JACOBS Surveying Services for

NAVAL STATION (NAVSTA) EVERETT
Everett, Washington
01/18/2023

Naval Facilities Engineering Command (NAVFAC), Southwest under the Comprehensive Long-term Environmental Action Navy (CLEAN) 9000 Contract, Contract Task Order (CTO) 4117, Contract Number N62470-16-D-9000.

JACOBS Project Manager: Dennis Ballam
JACOBS Professional Land Surveyor: Aaron Willis, PLS
JACOBS Project Surveyor: Roland "Duke" Brooks

SITE LOCATION AND DESCRIPTION

NAVSTA Everett occupies approximately 117 acres in western Snohomish County adjacent to Port Gardner Bay, within the city of Everett, Washington. NAVSTA Everett was constructed in the early 1990s under the Navy's Strategic Homeport Initiative and is currently the home port for six Navy destroyers and two United States Coast Guard vessels (Navy, 2018a). The Base includes buildings and facilities that support ship operations and maintenance and provide housing and support to homeported sailors. Surveying is required at the following site:

- Building 2114 (Attachment A) – Fire Station

PROJECT DESCRIPTION:

- Recover NGS horizontal and vertical control monuments per site.
- Establish Primary Control.
- Survey locations of three (3) new monitoring wells.

ATTACHMENT A – Building 2114

HORIZONTAL COORDINATE SYSTEMS DATUM:

The horizontal coordinate systems and datum used are the North American Datum of 1983, NAD83 (2011) Epoch 2010.00, in the Washington State Plane Coordinate System (SPCS), North Zone, U.S. Survey Feet.

VERTICAL DATUM:

The vertical datum is the North American Vertical Datum of 1988 (NAVD88) established using Geoid 18.

ACCURACY SPECIFICATIONS:

a. Horizontal control work complies with Second Order Class II (1:20,000) or better, as outlined in the Federal Geospatial Data Committee (FGDC) *Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C), and Facility Management*.

b. Vertical Control work complies with Second Order Class II (0.0350√m) or better, as outlined in the FGDC *Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C) and Facility Management*.

METHODOLOGY:

Initial reconnaissance efforts were conducted to recover National Geodetic Survey (NGS) Control within the project site vicinity. The following published and established horizontal and vertical control were utilized in the GPS Static CORS Network Adjustment, RTK surveys having 2 occupations with a four-hour minimum satellite constellation difference, and differential leveling; Published and established primary control provided in Table 1 and Published Data Sheet provided (Attachment B). Primary Control locations are shown in Figure 1. Differential level notes (Attachment D)

Table 1 – Primary Control

PID	*EASTING(USFT)*	*NORTHING(USFT)*	*ELEVATION(USFT)*
TIDAL 4 BENCHMARK	1301517.472	360348.388	39.888
69	1301060.699	364382.040	15.775
1	1301127.551	363944.179	15.995

Figure 1 – NAVSTA Everett Project Control Locations

ATTACHEMENT B

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.5.14
Starting Datasheet Retrieval...
1        National Geodetic Survey,   Retrieval Date = JANUARY  9, 2023
 SY0004 ***********************************************************************
 SY0004  TIDAL BM     -  This is a Tidal Bench Mark.
 SY0004  DESIGNATION -  944 7659 TIDAL 4
 SY0004  PID          -  SY0004
 SY0004  STATE/COUNTY-  WA/SNOHOMISH
 SY0004  COUNTRY      -  US
 SY0004  USGS QUAD    -  EVERETT (2017)
 SY0004
 SY0004                        *CURRENT SURVEY CONTROL
 SY0004  ______________________________________________________________________
 SY0004* NAD 83(2011) POSITION- 47 58 46.29614(N) 122 13 01.70344(W)   ADJUSTED
 SY0004* NAD 83(2011) ELLIP HT-   -11.142 (meters)        (06/27/12)   ADJUSTED
 SY0004* NAD 83(2011) EPOCH    -  2010.00
 SY0004* NAVD 88 ORTHO HEIGHT -    12.158 (meters)       39.89  (feet) ADJUSTED
 SY0004  ______________________________________________________________________
 SY0004  GEOID HEIGHT    -        -23.325 (meters)                     GEOID18
 SY0004  NAD 83(2011) X  - -2,280,408.599 (meters)                     COMP
 SY0004  NAD 83(2011) Y  - -3,618,826.148 (meters)                     COMP
 SY0004  NAD 83(2011) Z  -  4,715,344.523 (meters)                     COMP
 SY0004  LAPLACE CORR    -          3.09  (seconds)                    DEFLEC18
 SY0004  DYNAMIC HEIGHT  -         12.160 (meters)       39.89  (feet) COMP
 SY0004  MODELED GRAVITY -    980,774.8   (mgal)                       NAVD 88
 SY0004
 SY0004  VERT ORDER      -  FIRST     CLASS I
 SY0004
 SY0004  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 SY0004  Standards:
 SY0004         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 SY0004            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 SY0004  ----------------------------------------------------------------------
 SY0004  NETWORK    5.00   9.66           1.66   2.30   4.93      0.20080743
 SY0004  ----------------------------------------------------------------------
 SY0004  Click here for local accuracies and other accuracy information.
 SY0004
 SY0004
 SY0004.The horizontal coordinates were established by GPS observations
 SY0004.and adjusted by the National Geodetic Survey in June 2012.
 SY0004
 SY0004.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 SY0004.been affixed to the stable North American tectonic plate. See
 SY0004.NA2011 for more information.
 SY0004
 SY0004.The horizontal coordinates are valid at the epoch date displayed above
 SY0004.which is a decimal equivalence of Year/Month/Day.
 SY0004
 SY0004.The orthometric height was determined by differential leveling and
 SY0004.adjusted by the NATIONAL GEODETIC SURVEY
 SY0004.in June 1991.
 SY0004
 SY0004.Significant digits in the geoid height do not necessarily reflect accuracy.
 SY0004.GEOID18 height accuracy estimate available here.
 SY0004
 SY0004.This Tidal Bench Mark is designated as VM 9202
 SY0004.by the CENTER FOR OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES.
 SY0004
```

SY0004.Click photographs - Photos may exist for this station.
SY0004
SY0004.The X, Y, and Z were computed from the position and the ellipsoidal ht.
SY0004
SY0004.The Laplace correction was computed from DEFLEC18 derived deflections.
SY0004
SY0004.The ellipsoidal height was determined by GPS observations
SY0004.and is referenced to NAD 83.
SY0004
SY0004.The dynamic height is computed by dividing the NAVD 88
SY0004.geopotential number by the normal gravity value computed on the
SY0004.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
SY0004.degrees latitude (g = 980.6199 gals.).
SY0004
SY0004.The modeled gravity was interpolated from observed gravity values.
SY0004
SY0004. The following values were computed from the NAD 83(2011) position.
SY0004
SY0004;   North   East   Units Scale Factor Converg.
SY0004;SPC WA N   -   109,834.421   396,703.331   MT 0.99994516   -1 01 49.0
SY0004;SPC WA N   -   360,348.43 1,301,517.51   sFT 0.99994516   -1 01 49.0
SY0004;UTM 10   - 5,314,321.221   558,420.763   MT 0.99964194   +0 34 53.8
SY0004
SY0004!   - Elev Factor x Scale Factor =   Combined Factor
SY0004!SPC WA N   -   1.00000175 x   0.99994516 =   0.99994691
SY0004!UTM 10   -   1.00000175 x   0.99964194 =   0.99964369
SY0004
SY0004_U.S. NATIONAL GRID SPATIAL ADDRESS: 10TEU5842014321(NAD 83)
SY0004
SY0004   SUPERSEDED SURVEY CONTROL
SY0004
SY0004 NAD 83(2007)- 47 58 46.29571(N)   122 13 01.70440(W) AD(2007.00) 0
SY0004 ELLIP H (02/10/07) -11.132 (m)   GP(2007.00)
SY0004 NAD 83(1998)- 47 58 46.29492(N)   122 13 01.70400(W) AD(   ) 1
SY0004 ELLIP H (07/18/02) -11.175 (m)   GP(   ) 4 1
SY0004 NAD 83(1991)- 47 58 46.29222(N)   122 13 01.70605(W) AD(   ) 1
SY0004 ELLIP H (12/09/91) -10.970 (m)   GP(   ) 4 1
SY0004 NAD 83(1986)- 47 58 46.28625(N)   122 13 01.71304(W) AD(   ) 1
SY0004 NGVD 29   11.04   (m)   36.2   (f) LEVELING   3
SY0004 NGVD 29 (11/26/84)   11.036 (m)   36.21   (f) ADJUSTED   1 1
SY0004
SY0004.Superseded values are not recommended for survey control.
SY0004
SY0004.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SY0004.See file dsdata.pdf to determine how the superseded data were derived.
SY0004
SY0004_MARKER: DB = BENCH MARK DISK
SY0004_SETTING: 36 = SET IN A MASSIVE STRUCTURE
SY0004_SP_SET: ABUTMENT
SY0004_STAMPING: 4 1934
SY0004_MARK LOGO: CGS
SY0004_MAGNETIC: N = NO MAGNETIC MATERIAL
SY0004_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SY0004_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SY0004+SATELLITE: SATELLITE OBSERVATIONS - July 19, 2004
SY0004
SY0004 HISTORY   - Date   Condition   Report By
SY0004 HISTORY   - 1934   MONUMENTED   CGS
SY0004 HISTORY   - 1973   GOOD   NGS
SY0004 HISTORY   - 1987   GOOD   NGS
SY0004 HISTORY   - 1987   GOOD   USPSQD
SY0004 HISTORY   - 1988   GOOD   USPSQD
SY0004 HISTORY   - 19990213 GOOD   USPSQD
SY0004 HISTORY   - 20040719 GOOD   USPSQD
SY0004 HISTORY   - 20051217 GOOD   USPSQD

SY0004 HISTORY   - 20061219 GOOD   USPSQD
SY0004
SY0004   STATION DESCRIPTION
SY0004
SY0004'DESCRIBED BY NATIONAL GEODETIC SURVEY 1973
SY0004'IN EVERETT.
SY0004'AT EVERETT, 0.1 MILE NORTHEAST ALONG THE BURLINGTON-NORTHERN RAILROAD
SY0004'FROM THE STATION, AT THE NORTHEAST END OF THE RAILROAD (UPPER) BRIDGE
SY0004'1783.8 OVER HEWITT AVENUE, IN THE TOP AND 1.4 FEET NORTH OF THE SOUTH
SY0004'EDGE OF THE SOUTH END OF THE EAST CONCRETE ABUTMENT, 5.2 FEET EAST OF
SY0004'THE WEST EDGE OF THE ABUTMENT, 8.7 FEET SOUTHEAST OF THE SOUTHEAST
SY0004'RAIL OF THE UPPER TRACK, ABOUT 7 1/2 FEET HIGHER THAN HEWITT AVENUE
SY0004'AND ABOUT 4 FEET LOWER THAN THE TRACK. 1/4, SEC 19, T 29N, R 5E.
SY0004
SY0004   STATION RECOVERY (1987)
SY0004
SY0004'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987 (MRM)
SY0004'THE STATION WAS RECOVERED AT THIS DATE.
SY0004'
SY0004'THE STATION IS LOCATED IN EVERETT, JUST NORTH OF THE BURLINGTON
SY0004'NORTHERN RAILROAD STATION, AT THE JUNCTION OF THE RAILROAD AND
SY0004'HEWITT AVE.
SY0004'OWNERSHIP--RAILROAD RIGHT-OF-WAY.
SY0004'
SY0004'TO REACH THE STATION FROM THE INTERSECTION OF WALL STREET AND OAKES
SY0004'STREET (NORTHEAST CORNER OF THE COURTHOUSE) IN EVERETT, GO
SY0004'NORTH FOR 0.2 KM (0.1 MI) ON OAKES STREET TO THE INTERSECTION OF
SY0004'HEWITT AVE.
SY0004'TURN LEFT AND GO WEST FOR 1.0 KM (0.6 MI) ON HEWITT AVE TO THE
SY0004'RAILROAD OVERPASS AND THE STATION, AT THE NORTHEAST END OF THE
SY0004'OVERPASS.
SY0004'
SY0004'THE STATION IS A STANDARD CGS BENCH MARK DISK
SY0004'STAMPED---4 1934---,
SY0004'SET INTO A DRILL HOLE IN THE EAST CONCRETE ABUTMENT OF RAILROAD
SY0004'OVERPASS NUMBER 17836. LOCATED
SY0004'2.7 METERS (8.7 FT) SOUTHEAST FROM THE SOUTHEAST RAIL OF RAILROAD,
SY0004'1.6 METERS (5.2 FT) EAST FROM THE WEST EDGE OF THE ABUTMENT,
SY0004'APPROXIMATELY 2.3 METERS (7.5 FT) HIGHER THAN THE ROADWAY AND
SY0004'APPROXIMATELY 1.2 METERS (4 FT) LOWER THAN THE RAILROAD TRACKS.
SY0004'
SY0004'WASHINGTON DOT, FAA, TIDE STATIONS - 1987.
SY0004'
SY0004'THIS STATION SUITABLE FOR GPS SURVEYS.
SY0004'
SY0004'DESCRIBED BY D.A. WEGENAST.
SY0004
SY0004   STATION RECOVERY (1987)
SY0004
SY0004'RECOVERY NOTE BY US POWER SQUADRON 1987 (BT)
SY0004'RECOVERED IN GOOD CONDITION.
SY0004
SY0004   STATION RECOVERY (1988)
SY0004
SY0004'RECOVERY NOTE BY US POWER SQUADRON 1988 (PT)
SY0004'RECOVERED IN GOOD CONDITION.
SY0004
SY0004   STATION RECOVERY (1999)
SY0004
SY0004'RECOVERY NOTE BY US POWER SQUADRON 1999
SY0004'RECOVERED IN GOOD CONDITION.
SY0004
SY0004   STATION RECOVERY (2004)
SY0004
SY0004'RECOVERY NOTE BY US POWER SQUADRON 2004 (SAO)

```
SY0004'RECOVERED IN GOOD CONDITION.
SY0004
SY0004                          STATION RECOVERY (2005)
SY0004
SY0004'RECOVERY NOTE BY US POWER SQUADRON 2005 (DJM)
SY0004'RECOVERED IN GOOD CONDITION.
SY0004
SY0004                          STATION RECOVERY (2006)
SY0004
SY0004'RECOVERY NOTE BY US POWER SQUADRON 2006 (DJM)
SY0004'RECOVERED IN GOOD CONDITION.



*** retrieval complete.
Elapsed Time = 00:00:04
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BUILDING 2114 LOCATION SURVEYS:

Building 2114 consisted of three (3) monitoring wells that were located (Attachment A) with X, Y, & Z values. This data collection for X and Y values was conducted using Real-Time Kinematic (RTK) methods constraining to NGS control points and the primary control network shown in Table 1. The Z value locations are at the top of casing, north notch and was determined by differential leveling. The three (3) monitoring well locations are shown in Table 2.

Table 2- Building 2114 Monitoring Wells

PT ID	*EASTING (USFT)*	*NORTHING (USFT)*	*Elevation (USFT)*	*Description*
NSE-B2114-MW01	1300907.306	364590.939	15.4607	MW01-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1300907.805	364592.085	15.7470	MW01-GROUND NORTH
NSE-B2114-MW02	1300836.689	364524.592	15.9932	MW02-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1300837.137	364525.562	16.3350	MW02-GROUND NORTH
NSE-B2114-MW03	1300857.564	364308.561	15.5715	MW03-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1300857.250	364309.942	15.7930	MW03-GROUND NORTH

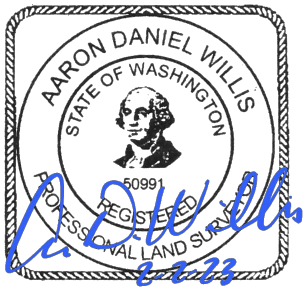
QUALITY ASSURANCE/QUALITY CONTROL (QA/QC):

The procedures, methodology and techniques implemented throughout the field campaign and processing of the survey data, provided high-level precision and accuracy. Using RTK surveys, check shots were collected on established control points (Attachment C) prior to commencing with data collection and post data collection of the monitoring wells to verify values were consistent throughout the time frame of each survey. Differential level loops were utilized to obtain Z values on monitoring wells (Attachment D).

SURVEY'S CERTIFICATION:

I, Aaron Willis, Professional Land Surveyor licensed in the State of Washington, hereby certify that the data acquisition, analysis, computations and other information contained in this document are true, accurate, compliant with the scope of work and were performed under my direct supervision. The accuracy of the control and the features surveyed have met or exceeded (are better than) the accuracy requirements stated within the statement of work for Naval Station (NAVSTA) Everett.

Aaron D. Willis
Professional Land Surveyor
Washington License No. 50991 (expires 1/29/2025)



ATTACHMENT C – RTK CHECKS, CONTROL COMPARISON

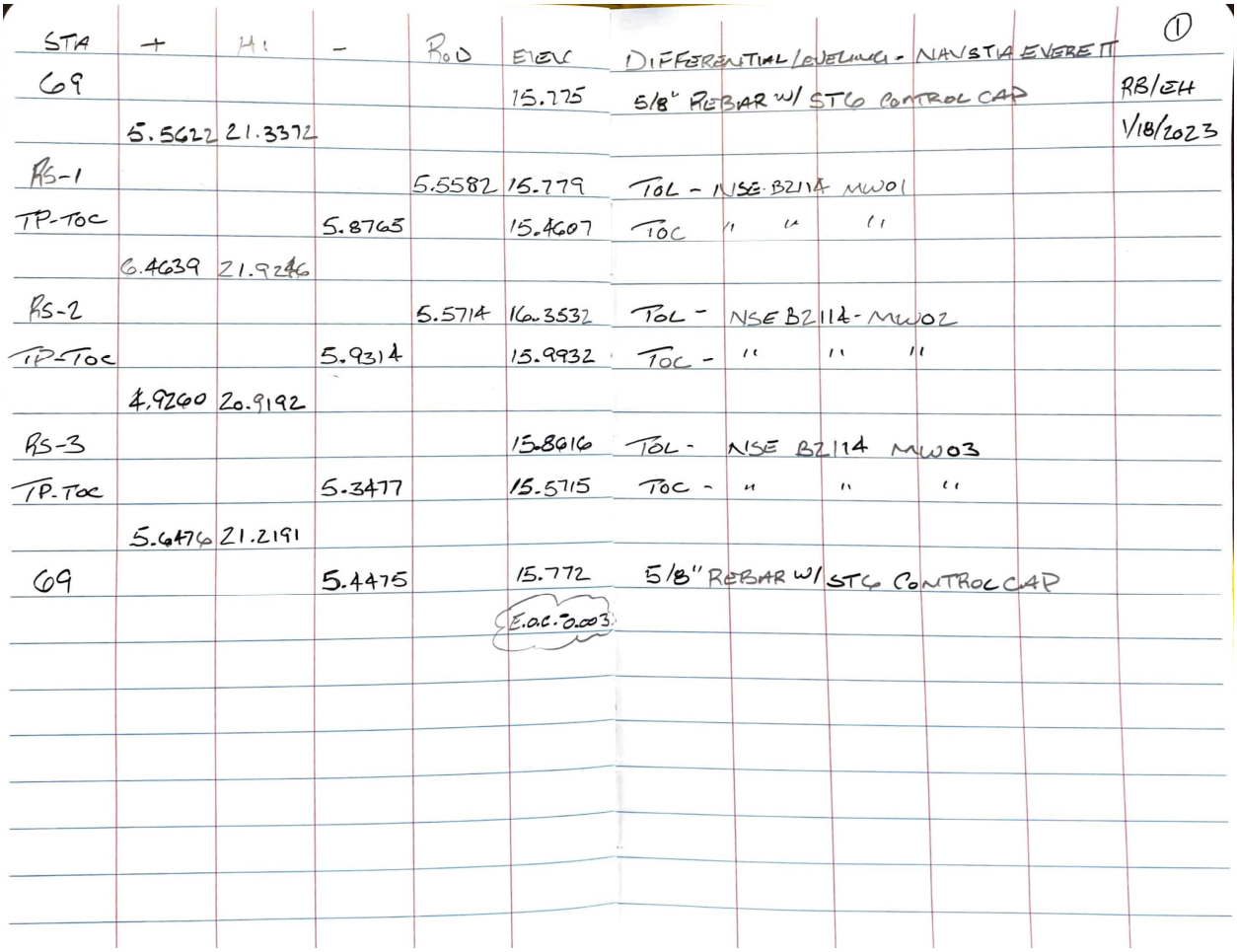
Control Basis: Primary Control Point 69 (Shown in Table 1)

PT ID	Northing	Easting	Elevation
TIDAL 4	360348.388	1301517.472	39.888

Survey Deltas_Primary Control Check_Occupying Control Point 69

PT ID	Northing	Easting	Elevation		Δy	Δx	Δz
TIDAL 4	360348.393	1301517.464	39.890	CK Tidal 4 am	-0.005	0.008	-0.002
TIDAL 4	360348.382	1301517.480	39.904	CK Tidal 4 pm	0.006	-0.008	-0.016

ATTACHMENT D – Differential Level Field Notes



DIFFERENTIAL LEVELING - NAVSTA EVERETT ①

STA	+	HI	−	ROD	ELEV	
69					15.775	5/8" REBAR W/ STG CONTROL CAP
	5.5622	21.3372				
RS-1				5.5582	15.779	TOL - NSE BZ11A MW01
TP-TOC			5.8765		15.4607	TOC " " "
	6.4639	21.9246				
RS-2				5.5714	16.3532	TOL - NSE BZ11A - MW02
TP-TOC			5.9314		15.9932	TOC - " " "
	4.9260	20.9192				
RS-3					15.8616	TOL - NSE BZ11A MW03
TP-TOC			5.3477		15.5715	TOC - " " "
	5.6476	21.2191				
69			5.4475		15.772	5/8" REBAR W/ STG CONTROL CAP
					E.O.C. 0.003	

RB/EH
1/18/2023

JACOBS Surveying Services for

NAVAL RADIO STATION (NRS) JIM CREEK
Arlington, Washington
01/19/2023

Naval Facilities Engineering Command (NAVFAC), Southwest under the Comprehensive Long-term Environmental Action Navy (CLEAN) 9000 Contract, Contract Task Order (CTO) 4117, Contract Number N62470-16-D-9000.

JACOBS Project Manager: Dennis Ballam
JACOBS Professional Land Surveyor: Aaron Willis, PLS
JACOBS Project Surveyor: Roland "Duke" Brooks

SITE LOCATION AND DESCRIPTION

NRS Jim Creek occupies approximately 3,854 acres in northern Snohomish County approximately 13 miles east of Arlington, Washington. NRS Jim Creek operates and maintains a communication system (Navy, 2018a). The Navy acquired land at NRS Jim Creek in 1949 and constructed the communication system and associated support facilities between 1949 and 1953 (NEESA, 1990). In addition to communication system operations, the Navy currently uses NRS Jim Creek as an outdoor recreational facility for activities such as camping, fishing, boating, hiking, and biking. Current-day buildings include a communication system, outdoor recreational facilities such as cabins and campsites, and supporting facilities. Surveying is required at the following sites:

- Building 6 (Attachment A) – Former Fire Station
- Site 1 (Attachment B) – Building 11 Landfill
- Site 6 (Attachment C) – Blue Campground Landfill
- Site 7 (Attachment C) – Pit Road Landfill
- Site 4 (Attachment D) – Metal Burial Pit
- Site 5 (Attachment D) – Mixed Waste Landfill

PROJECT DESCRIPTION:

- Recover Washington Department of Transportation (WSDOT) horizontal and vertical control monuments per site.
- Establish Primary Control.
- Survey locations of eighteen (18) new monitoring wells.

ATTACHMENT A – BUILDING 6

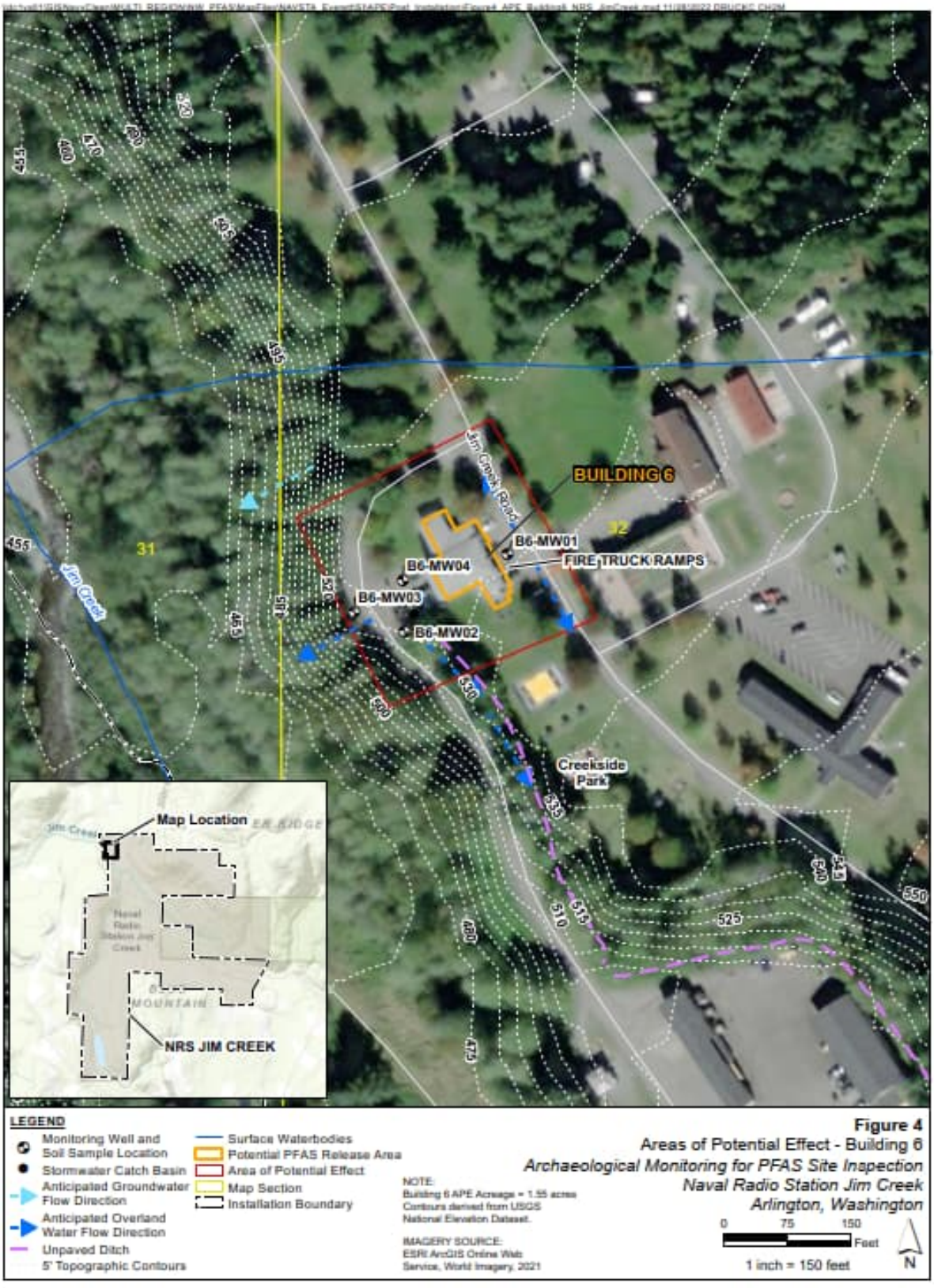


Figure 4
Areas of Potential Effect - Building 6
Archaeological Monitoring for PFAS Site Inspection
Naval Radio Station Jim Creek
Arlington, Washington

ATTACHMENT B – SITE 1

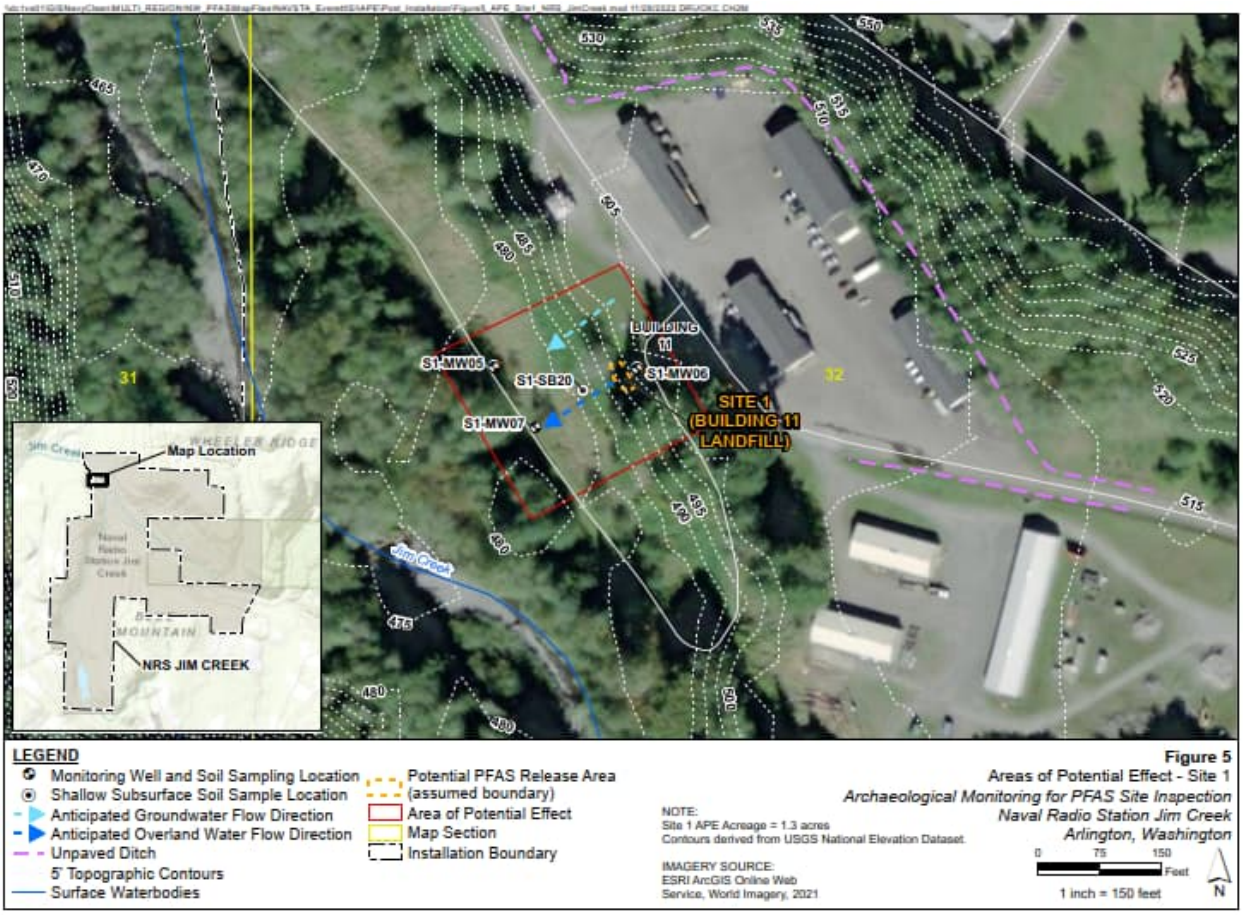


Figure 5
Areas of Potential Effect - Site 1
Archaeological Monitoring for PFAS Site Inspection
Naval Radio Station Jim Creek
Arlington, Washington

ATTACHMENT C – SITE 6 & SITE 7

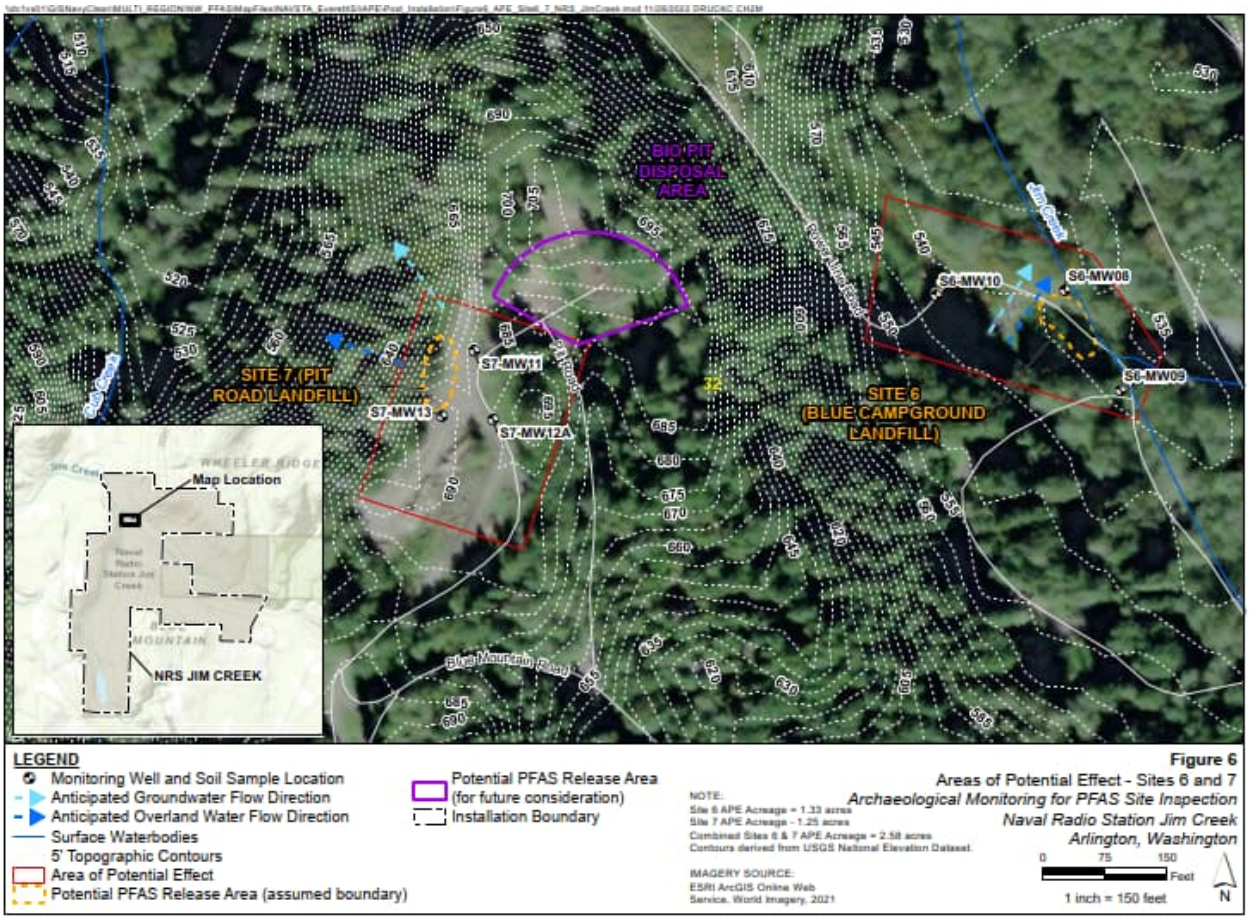


Figure 6
Areas of Potential Effect - Sites 6 and 7
Archaeological Monitoring for PFAS Site Inspection
Naval Radio Station Jim Creek
Arlington, Washington

ATTACHMENT D – SITE 4 & SITE 5

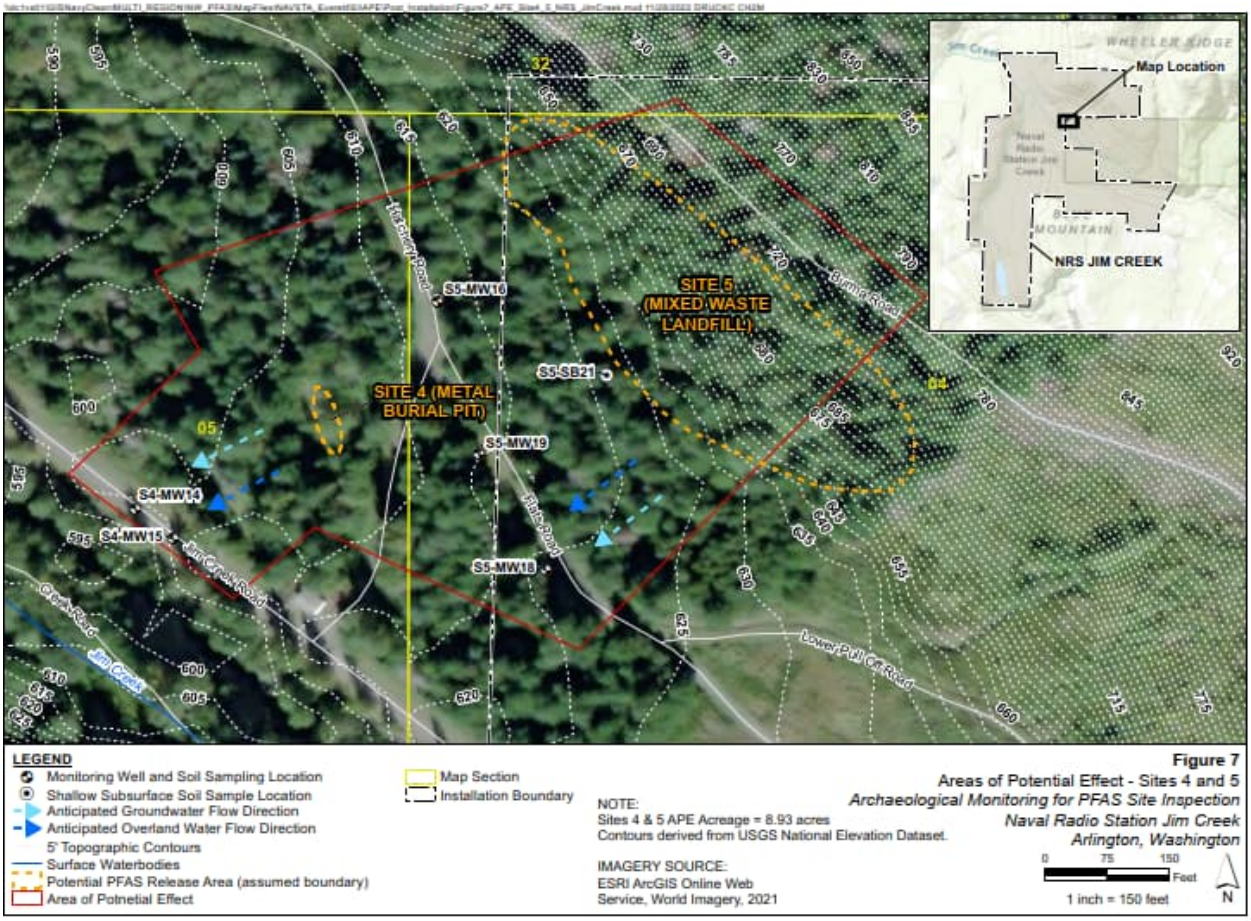


Figure 7
Areas of Potential Effect - Sites 4 and 5
Archaeological Monitoring for PFAS Site Inspection
Naval Radio Station Jim Creek
Arlington, Washington

HORIZONTAL COORDINATE SYSTEMS DATUM:

The horizontal coordinate systems and datum used are the North American Datum of 1983, NAD83 (2011) Epoch 2010.00, in the Washington State Plane Coordinate System (SPCS), North Zone, U.S. Survey Feet.

VERTICAL DATUM:

The vertical datum is the North American Vertical Datum of 1988 (NAVD88) established using Geoid 18.

ACCURACY SPECIFICATIONS:

a. Horizontal control work complies with Second Order Class II (1:20,000) or better, as outlined in the Federal Geospatial Data Committee (FGDC) *Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C), and Facility Management*.

b. Vertical Control work complies with Second Order Class II (0.0350√m) or better, as outlined in the FGDC *Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C) and Facility Management*.

METHODOLOGY:

Initial reconnaissance efforts were conducted to recover Washington Department of Transportation (WSDOT) Control within the project site vicinity. The following published and established horizontal and vertical control were utilized in the GPS Static Network Adjustment, RTK surveys having two occupations with a three-hour minimum satellite constellation difference, and differential leveling; Published and established primary control provided in Table 1. Published Data Sheet(s) provided (Attachment E). Primary Control locations are shown in Figure 1. Differential level notes (Attachment G)

Table 1 – Primary Control

PID	*EASTING(USFT)*	*NORTHING(USFT)*	*ELEVATION(USFT)*	*PT DESCRIPTION*
BM31530-20	1356472.645	466709.427	137.244	Brass Disc
GP31530-58	1383410.028	465609.453	229.350	Brass Disc in Mon Well
1	1374331.553	442447.403	630.209	5/8" Rebar & ST6 Cap
2	1370100.776	447305.852	540.452	Mag Nail
69	1371045.495	444450.580	690.623	Spike

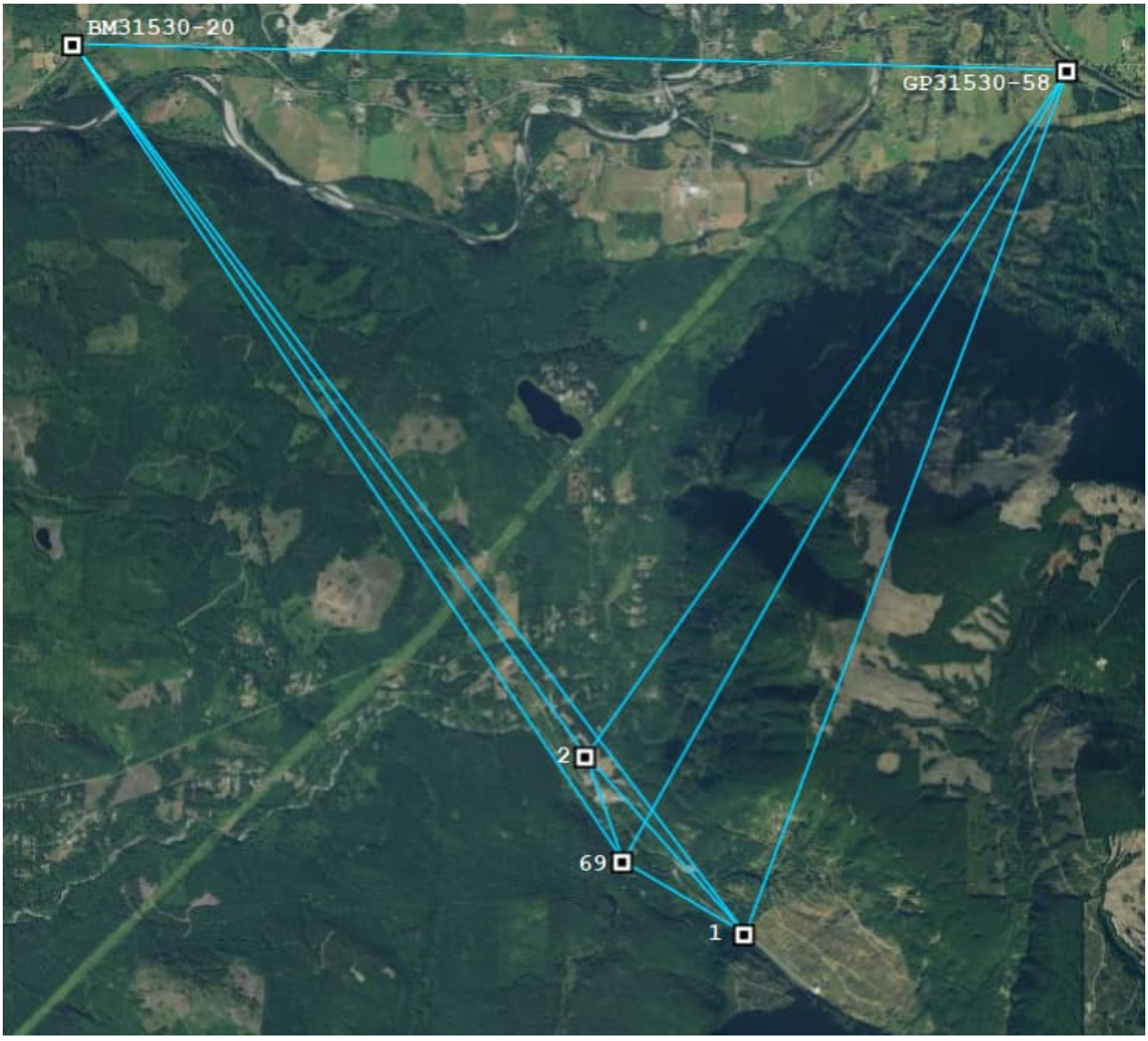


Figure 1 – NRS Jim Creek Project Control Locations

ATTACHMENT E

Washington State Department of Transportation

Geographic Services

SURVEY INFORMATION SYSTEM **Report of Survey Mark**

				ACCOUNTS INFORMATION		
Designation:	BM31530-20	**T.R.S:**	32N, 6E, 11	**BOOK**	**PROJECT**	**INVOICE**
Monument ID:	1621	**Corner Code:**				
NGS Pid:		**State Route:**	530	62	004286	23-94076
State:	WASHINGTON	**Mile Post:**	29.6	284	MS5400	23-05032
County:	SNOHOMISH	**Station:**		NA	MT0319	23-11026
Region:	NW	**Offset:**				
Nearest Town:	ARLINGTON	**Owner:**	GS			
USGS Quad:	OSO	**Bearing:**	M			

TO REACH THE STATION FROM THE JUNCTION OF SR 530 AND SR 009 IN ARLINGTON, GO NORTHEAST 8.71 MILES ALONG SR 530 TO MARK ON LEFT. IT IS LOCATED IN THE NORTHWEST QUADRANT OF THE SR 530/171ST AVE. NE INTERSECTION, 32.1 METERS @ 175 DEGREES FROM A POWER POLE WITH GUY WIRE RM1, 12.4 METERS @ 220 DEGREES FROM THE APPROXIMATE CENTERLINE OF 171ST AVE. NORTHEAST MCGOVERN ROAD, 4.8 METERS @ 250 DEGREES FROM POWER POLE #XD200, 17.3 METERS @ 305 DEGREES FROM THE APPROXIMATE CENTERLINE OF SR 530, 60.6 METERS @ 25 DEGREES FROM POWER POLE #XD199, 3.2 METERS @ 260 DEGREES FROM A WITNESS POST, 4.4 METERS @ 200 DEGREES FROM A WITNESS POST AND 1.0 METER @ 100 DEGREES FROM A WITNESS POST. THE MARK IS A WSDOT BRASS DISK SET INTO THE TOP OF A ROUND CONCRETE MONUMENT RECESSED 16 CM FROM GROUND SURFACE.

Survey Control

Datum: NAD 83/11 **Date:** 11/05/2012

Lat: 48 16 24.797815 N **Long:** 121 59 57.703866 W **Ellips:** 20.476 (M) 67.178 (USFt) **Geoid:** -21.356 (M)

Washington State Plane Zone: North

Northing	**Easting**	**Scale**	**Comb Factor**	**Conv Angle**
142253.318 (M) 466709.427 (USFt)	413453.689 (M) 1356472.645 (USFt)	0.99994594	0.99994273	-0 52 05.3

Ortho:	Date: 07/05/1994	Survey Info	Accuracy	Network	Method
Datum:	NAVD 88	Horizontal	2 CM	PRIMARY	GPS
Elevation:	41.832 (M) 137.244 (USFt)	Ellips	5 CM		GPS
		Ortho	1 CM	PRIMARY	DIFF LEVELS

Datum: NAD 83/07			**Date:** 07/28/2008			
Lat: 48 16 24.797469 N	**Long:** 121 59 57.705045 W		**Ellips:** 20.535 (M) 67.372 (USFt)		**Geoid:** -21.297 (M)	
Washington State Plane Zone: North						
Northing		**Easting**		**Scale**	**Comb Factor**	**Conv Angle**
142253.308 (M) 466709.395 (USFt)		413453.664 (M) 1356472.563 (USFt)		0.99994594	0.99994272	-0 52 05.3

Ortho:	Date: 07/05/1994	Survey Info	Accuracy	Network	Method
Datum:	NAVD 88	Horizontal	2 CM	PRIMARY	GPS
Elevation:	41.832 (M) 137.244 (USFt)	Ellips	5 CM		GPS
		Ortho	1 CM	PRIMARY	DIFF LEVELS

Datum: NAD 83/91			**Date:** 07/05/1994			
Lat: 48 16 24.794103 N	**Long:** 121 59 57.708186 W		**Ellips:** 20.698 (M) 67.907 (USFt)		**Geoid:** -21.134 (M)	
Washington State Plane Zone: North						
Northing		**Easting**		**Scale**	**Comb Factor**	**Conv Angle**
142253.205 (M) 466709.057 (USFt)		413453.598 (M) 1356472.346 (USFt)		0.99994594	0.99994269	-0 52 05.3

Ortho:	Date: 07/05/1994	Survey Info	Accuracy	Network	Method
Datum:	NAVD 88	Horizontal	2 CM	PRIMARY	GPS
Elevation:	41.832 (M) 137.244 (USFt)	Ellips	5 CM		GPS
		Ortho	1 CM	PRIMARY	DIFF LEVELS

History

Recovered On	Recovered By	Action	Condition
6/23/2015	GEOGRAPHIC SERVICES	RECOVERED	GOOD
11/5/2012	GEOGRAPHIC SERVICES	UPDATED	
7/28/2008	GEOGRAPHIC SERVICES	UPDATED	
7/5/1994	GEOGRAPHIC SERVICES	MONUMENTED	

Washington State Department of Transportation

Geographic Services

SURVEY INFORMATION SYSTEM — Report of Survey Mark

				ACCOUNTS INFORMATION		
Designation:	GP31530-58	**T.R.S:**	32N, 7E, 10	**BOOK**	**PROJECT**	**INVOICE**
Monument ID:	1643	**Corner Code:**				
NGS Pid:		**State Route:**	530	47	XL0164	23-94035
State:	WASHINGTON	**Mile Post:**	35.0	284	MS5400	23-05032
County:	SNOHOMISH	**Station:**		291	JK6179	23-06006
Region:	NW	**Offset:**		NA	MT0319	23-11026
Nearest Town:	OSO	**Owner:**	GS			
USGS Quad:	OSO	**Bearing:**	M			

TO REACH THE STATION FROM THE FIRE HALL IN OSO, GO NORTHEAST 2.23 MILES ALONG SR 530 TO MARK ON LEFT. IT IS LOCATED IN THE NORTHWEST QUADRANT OF THE SR 530/WHITMAN ROAD INTERSECTION, 1.0 METER SOUTH OF A WITNESS POST, 42.1 METERS SOUTHWEST OF THE WESTSIDE OF THE SOUTHWEST END OF THE CONCRETE BARRIER FOR COUNTY BRIDGE NO. 111, 18.6 METERS NORTHWEST OF A UTILITY BOX IN THE APPROXIMATE CENTERLINE OF WHITMAN ROAD, 10.0 METERS NORTH OF THE APPROXIMATE CENTERLINE OF SR 530, 5.9 METERS NORTHEAST OF POWER POLE #XDL325, 1.3 METERS SOUTHEAST OF A WITNESS POST AND 10.3 METERS SOUTH OF THE APPROXIMATE CENTERLINE OF RAILROAD GRADE. THE MARK IS A WSDOT BRASS DISK SET INTO THE TOP OF A ROUND CONCRETE MONUMENT AND UNDER A MONUMENT CASE AND COVER LEVEL WITH SHOULDER SURFACE. MONUMENT CASE HAS BEEN STAMPED.

Survey Control

Datum: NAD 83/11 **Date:** 10/26/2012

Lat: 48 16 17.780323 N **Long:** 121 53 19.302946 W **Ellips:** 48.997 (M) 160.751 (USFt) **Geoid:** -20.909 (M)

Washington State Plane Zone: North

Northing	Easting	Scale	Comb Factor	Conv Angle
141918.045 (M) 465609.453 (USFt)	421664.220 (M) 1383410.028 (USFt)	0.99994584	0.99993815	-0 47 08.7

Ortho: Date: 07/05/1994

Datum: NAVD 88

Elevation: 69.906 (M) 229.350 (USFt)

Survey Info	Accuracy	Network	Method
Horizontal	2 CM	PRIMARY	GPS
Ellips	5 CM		GPS
Ortho	1 CM	PRIMARY	DIFF LEVELS

Datum: NAD 83/07			**Date:** 10/24/2008				
Lat: 48 16 17.780099 N	**Long:** 121 53 19.304452 W		**Ellips:** 49.060 (M) 160.958 (USFt)			**Geoid:** -20.846 (M)	
Washington State Plane Zone: North							
Northing		**Easting**		**Scale**	**Comb Factor**	**Conv Angle**	
141918.038 (M) 465609.430 (USFt)		421664.189 (M) 1383409.927 (USFt)		0.99994584	0.99993814	-0 47 08.7	
Ortho:	Date: 07/05/1994	Survey Info	Accuracy	Network	Method		
Datum:	NAVD 88	Horizontal	2 CM	PRIMARY	GPS		
Elevation:	69.906 (M) 229.350 (USFt)	Ellips	5 CM		GPS		
		Ortho	1 CM	PRIMARY	DIFF LEVELS		

Datum: NAD 83/91			**Date:** 07/05/1994				
Lat: 48 16 17.776916 N	**Long:** 121 53 19.307191 W		**Ellips:** 49.217 (M) 161.473 (USFt)			**Geoid:** -20.689 (M)	
Washington State Plane Zone: North							
Northing		**Easting**		**Scale**	**Comb Factor**	**Conv Angle**	
141917.941 (M) 465609.111 (USFt)		421664.131 (M) 1383409.736 (USFt)		0.99994584	0.99993812	-0 47 08.7	
Ortho:	Date: 07/05/1994	Survey Info	Accuracy	Network	Method		
Datum:	NAVD 88	Horizontal	2 CM	PRIMARY	GPS		
Elevation:	69.906 (M) 229.350 (USFt)	Ellips	5 CM		GPS		
		Ortho	1 CM	PRIMARY	DIFF LEVELS		

History

Recovered On	Recovered By	Action	Condition
6/23/2015	GEOGRAPHIC SERVICES	RECOVERED	GOOD
10/26/2012	GEOGRAPHIC SERVICES	UPDATED	
10/24/2008	GEOGRAPHIC SERVICES	UPDATED	
7/5/1994	GEOGRAPHIC SERVICES	MONUMENTED	

BUILDING 6 LOCATION SURVEYS:

Building 6 consisted of four (4) monitoring wells that were located **(Attachment A)** with X, Y, & Z values**.** This data collection for X and Y values was conducted using Real-Time Kinematic (RTK) methods constraining to the primary control network shown in **Table 1**. The Z value locations are at the top of casing, north notch and was determined by differential leveling. The four (4) monitoring well locations are shown in **Table 3**.

Table 3- Building 6 Monitoring Wells

PT ID	*EASTING (USFT)*	*NORTHING (USFT)*	*Elevation (USFT)*	*Description*
B6-MW01 (BNV 430)	1369819.243	447300.355	534.812	MW01-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1369819.445	447301.267	535.220	MW01-ASPHALT NORTH
B6-MW02 (BNV 431)	1369701.005	447221.815	532.584	MW02-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1369701.674	447223.138	532.900	MW02-ASPHALT NORTH
B6-MW03 (BNV 432)	1369622.513	447259.23	533.714	MW03-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1369622.298	447260.138	534.040	MW03-GROUND NORTH
B6-MW04 (BNV 433)	1369690.572	447284.043	533.810	MW04-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1369690.684	447284.861	534.127	MW04-GROUND NORTH

SITE 1 LOCATION SURVEYS:

Site 1 consisted of three (3) monitoring wells that were located **(Attachment B)** with X, Y, & Z values**.** This data collection for X and Y values was conducted using Real-Time Kinematic (RTK) methods constraining to the primary control network shown in **Table 1**. The Z value locations are at the top of casing, north notch and was determined by differential leveling. The three (3) monitoring well locations are shown in **Table 4**.

Table 4- Site 1 Monitoring Wells

PT ID	*EASTING (USFT)*	*NORTHING (USFT)*	*ELEVATION (USFT)*	*DESCRIPTION*
S1-MW05 (BNV 437)	1369835.454	446488.540	476.264	MW05-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1369835.674	446490.623	476.150	MW05-GROUND NORTH
S1-MW06 (BNV 439)	1370007.098	446483.129	507.313	MW06-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1370006.871	446484.567	504.527	MW06-GROUND NORTH
S1-MW07 (BNV 438)	1369883.150	446413.209	476.968	MW07-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1369883.127	446414.798	477.163	MW07-GROUND NORTH

SITE 6 LOCATION SURVEYS:

Site 6 consisted of three (3) monitoring wells that were located **(Attachment C)** with X, Y, & Z values**.** This data collection for X and Y values was conducted using Real-Time Kinematic (RTK) methods constraining to the primary control network shown in **Table 1**. The Z value locations are at the top of casing, north notch and was determined by differential leveling. The three (3) monitoring well locations are shown in **Table 5**.

Table 5- Site 6 Monitoring Wells

PT ID	*EASTING (USFT)*	*NORTHING (USFT)*	*ELEVATION (USFT)*	*DESCRIPTION*
S6-MW08 (BNV 435)	1371835.731	444709.236	538.823	MW08-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1371835.683	444710.914	536.163	MW08-GROUND NORTH
S6-MW09 (BNV 436)	1371903.999	444603.13	541.336	MW09-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1371904.124	444605.267	538.581	MW09-GROUND NORTH
S6-MW10 (BNV 434)	1371653.415	444703.876	546.279	MW10-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1371652.728	444705.058	543.730	MW10-GROUND NORTH

SITE 7 LOCATION SURVEYS:

Site 7 consisted of three (3) monitoring wells that were located **(Attachment C)** with X, Y, & Z values**.** This data collection for X and Y values was conducted using Real-Time Kinematic (RTK) methods constraining to the primary control network shown in **Table 1**. The Z value locations are at the top of casing, north notch and was determined by differential leveling. The three (3) monitoring well locations are shown in **Table 6**.

Table 6- Site 7 Monitoring Wells

PT ID	*EASTING (USFT)*	*NORTHING (USFT)*	*ELEVATION (USFT)*	*DESCRIPTION*
S7-MW11 (BNV 478)	1371117.401	444645.168	688.515	MW11-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1371116.936	444646.516	686.104	MW11-GROUND NORTH
S7-MW12A (BNV476)	1371147.544	444562.414	689.198	MW12A-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1371147.704	444563.900	686.545	MW12A-GROUND NORTH
S7-MW13 (BNV 477)	1371078.670	444574.390	692.366	MW13-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1371077.419	444575.417	689.626	MW13-GROUND NORTH

SITE 4 LOCATION SURVEYS:

Site 4 consisted of two (2) monitoring wells that were located (Attachment D) with X, Y, & Z values. This data collection for X and Y values was conducted using Real-Time Kinematic (RTK) methods constraining to the primary control network shown in Table 1. The Z value locations are at the top of casing, north notch and was determined by differential leveling. The two (2) monitoring well locations are shown in Table 7.

Table 7- Site 4 Monitoring Wells

PT ID	*EASTING (USFT)*	*NORTHING (USFT)*	*ELEVATION (USFT)*	*DESCRIPTION*
S4-MW14 (BNV 443)	1373735.053	442870.918	609.554	MW14-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1373734.724	442871.735	609.901	MW14-ASPHALT NORTH
S4-MW15 (BNV 444)	1373780.135	442835.107	611.105	MW15-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	1373779.99	442835.832	611.416	MW15-ASPHALT NORTH

SITE 5 LOCATION SURVEYS:

Site 5 consisted of three (3) monitoring wells that were located (Attachment D) with X, Y, & Z values. This data collection for X and Y values was conducted using Real-Time Kinematic (RTK) methods constraining to the primary control network shown in Table 1. The Z value locations are at the top of casing, north notch and was determined by differential leveling. The three (3) monitoring well locations are shown in Table 8.

Table 8- Site 5 Monitoring Wells

PT ID	*EASTING (USFT)*	*NORTHING (USFT)*	*ELEVATION (USFT)*	*DESCRIPTION*
S5-MW16 (BNV 442)	1374102.525	443119.831	615.318	MW16-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1374100.856	443120.969	612.522	MW16-GROUND NORTH
S5-MW18 (BNV 440)	1374234.342	442803.592	621.097	MW18-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1374234.689	442805.497	618.266	MW18-GROUND NORTH
S5-MW19 (BNV 441)	1374158.172	442943.500	615.451	MW19-TOP LID_Horz. & TOP CASING_vert. (Stand Up)
GROUND	1374158.016	442944.635	612.587	MW19-GROUND NORTH

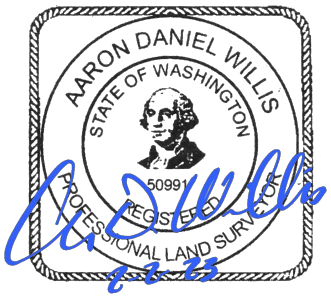
QUALITY ASSURANCE/QUALITY CONTROL (QA/QC):

The procedures, methodology and techniques implemented throughout the field campaign and processing of the survey data, provided high-level precision and accuracy. Using RTK surveys, check shots were collected on established control points (Attachment F) prior to commencing with data collection and post data collection of the monitoring wells to verify values were consistent throughout the time frame of each survey. Differential level loops were utilized to obtain Z values on monitoring wells (Attachment G).

SURVEY'S CERTIFICATION:

I, Aaron Willis, Professional Land Surveyor licensed in the State of Washington, hereby certify that the data acquisition, analysis, computations, and other information contained in this document are true, accurate, compliant with the scope of work and were performed under my direct supervision. The accuracy of the control and the features surveyed have met or exceeded (are better than) the accuracy requirements stated within the statement of work for Naval Radio Station (NRS) Jim Creek.

Aaron D. Willis
Professional Land Surveyor
Washington License No. 50991 (expires 1/29/2025)



ATTACHMENT F – RTK CHECKS, CONTROL COMPARISON

Control Basis: Primary Control Point 69 (Shown in Table 1)

PT ID	Easting	Northing	Elevation
CP 69	1371045.495	444450.58	690.623

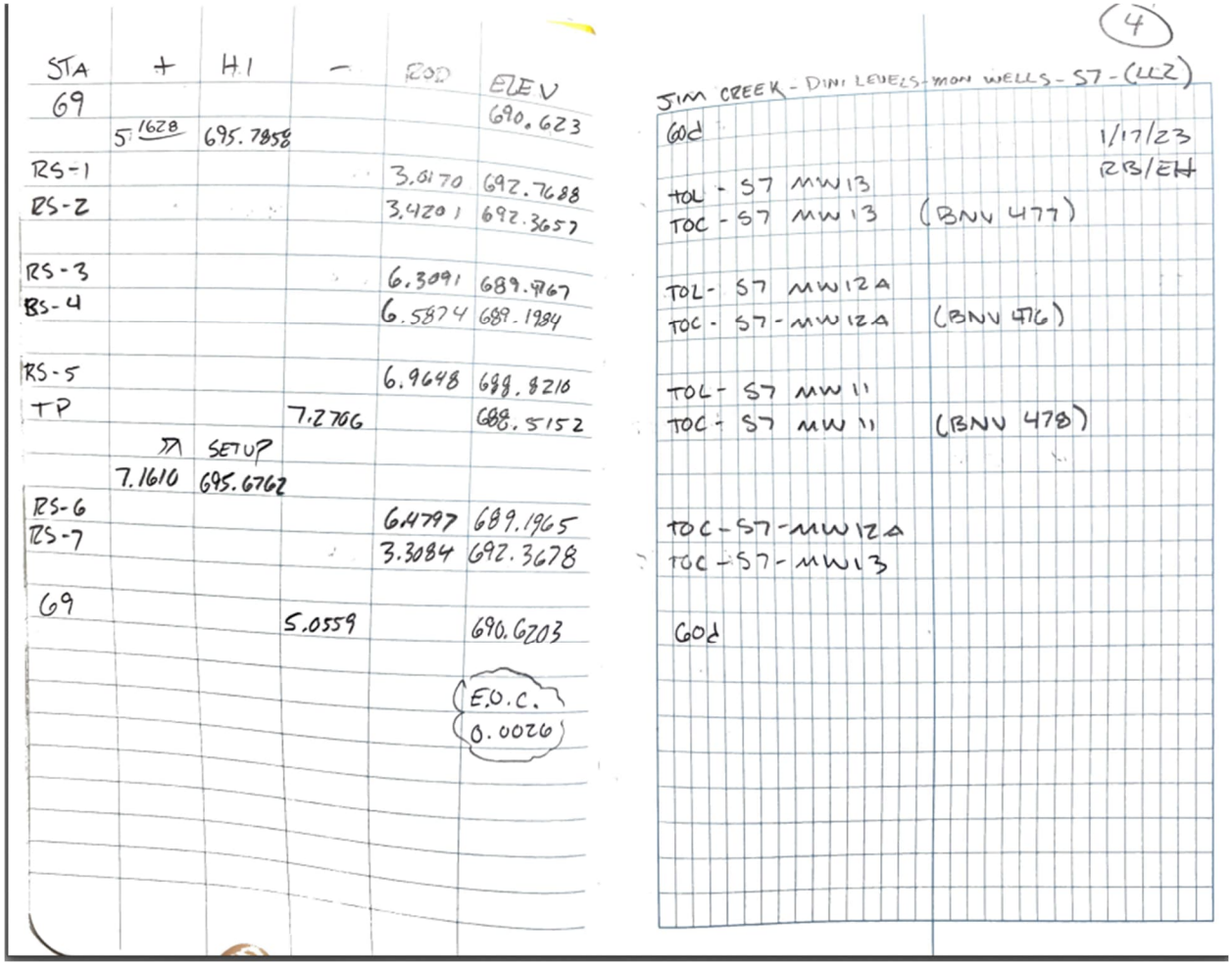
Survey Deltas_Primary Control Check_Occupying Control Point 69

PT ID	Easting	Northing	Elevation	AM/PM CHECK			
CP 1 (Record)	1374331.553	442447.403	630.209		Δy	Δx	Δz
CP 1 (Measured)	1374331.573	442447.429	630.208	AM	-0.020	-0.026	0.001
CP 1 (Measured)	1374331.572	442447.425	630.18	PM	-0.019	-0.022	0.029

Survey Deltas_Primary Static Control Check_Occupying Control 1 and 2

Published WSDOT GP31530-20	1356472.645	466709.427	137.244		Δy	Δx	Δz
Measured WSDOT GP31530-20	1356472.646	466709.429	137.259		-0.001	-0.002	-0.015
Published WSDOT GP31530-58	1383410.028	465609.453	229.35		Δy	Δx	Δz
Measured WSDOT GP31530-58	1383410.030	465609.453	229.34		-0.002	0.000	0.010

ATTACHMENT G – Differential Level Field Notes



STA	+	HI	−	ROD	ELEV
69					690.623
	5.1628	695.7858			
RS-1				3.0170	692.7688
RS-2				3.4201	692.3657
RS-3				6.3091	689.9767
BS-4				6.5874	689.1984
RS-5				6.9648	688.8216
TP			7.2706		688.5152
	↗	SETUP			
	7.1610	695.6762			
RS-6				6.4797	689.1965
RS-7				3.3084	692.3678
69			5.0559		690.6203
				E.O.C.	
				0.0026	

(4)

JIM CREEK - DINI LEVELS - MON WELLS - S7 - (LLZ)

GOd 1/17/23 RB/EH

TOL - S7 MW13
TOC - S7 MW13 (BNV 477)

TOL - S7 MW12A
TOC - S7 - MW12A (BNV 476)

TOL - S7 MW11
TOC - S7 MW11 (BNV 478)

TOC - S7 - MW12A
TOC - S7 - MW13

GOd

STA	+	HI	−	ROD	ELEV
CP#2					540.452
	2.6168	543.0688			
TP			7.7625		535.3063
	⅄	SETUP			
	7.6123	542.9186			
CP#2			2.4652		540.4534
–	–	–	–	–	–
CP #1					630.209
	2.1848	632.3938			
TP			7.8605		
	2.4880	627.0213			
CP#4			9.1438		617.8775
	⅄	SETUP			
	9.0857	626.9632			
TP			2.4298		624 5334
	7.8237	632.3571			
CP#1			2.1490		630.2081

8

JIM CREEK LEVELS SITE B (LL3)

1/19/23

RB/EH

MAG NAIL

TOL BG-MW 09 (SITE B)

5/8" RBR & CAP

SITE (4 ROAD) & SITE 5 (LL4)

TURN PLATE

TURN PLATE

(9)

JIM CREEK LEVELS - SITE 4 (LLS)

1/19/23
RB/EH

STA	+	HI	−	ROD	ELEV
CP#4					617.8775
	1.3723	619.2498			
RS-1				8.1445	611.1053
TP			9.6955		609.5543
	⚒	SETUP			
	9.6056	619.1599			
RS-2				9.2284	609.9315
RS-3				8.0513	611.1086
RS-4				7.7262	611.4337
CP#4			1.2817		617.8782

TOC S4-MW05
TOC S4-MW14 (BNV 443)

TOL-S4-MW14
TOC-S4-MW15 (BNV 444)
TOL-S4-MW15

STA	+	HI	−	ROD	ELEV
CP#4					617.8775
	2.5170	620.3945			
TP			8.7565		611.6380
	4.7001	616.3381			
RS-1				0.7678	615.5703
TP			1.0204		615.3177
	3.0116	618.3293			
RS-2			2.5553 →		615.7740
TP			2.8781		615.4512
	6.3378	621.7890			
RS-3				0.4484	621.3403
TP			0.6919		621.0971
	↑	SETUP			
	0.5831	621.6802			
TP			6.2279		615.4523
	2.8241	618.2764			
TP			2.8639		615.3125
	1.0941	616.4066			
TP			4.7778		611.6288
	8.4731	620.1019			
4			2.2224		617.8795

JIM CREEK LEVELS - SITE 5 LCG
1/19/23
RB / EH

T-PLATE

TOL-S5-MW16
TOC-S5-MW16 (BNV 442)

TOL-S5-MW19 (BNV 441)
TOC-S5-MW19

TOL-S5-MW18
TOC-S5-MW18 (BNV 440)

TOC-S5-MW19

TOC-S5-MW16

T-PLATE

STA	+	HI	−	RSD	ELEV
B6 MW01					535.3063
	4.6886	539.9949			
RS-1				5.1825	534.8124
RS-2				7.0318	532.9631
TP			7.4107		532.5842
	5.8377	538.4219			
RS-3				4.6122	533.8097
RS-4				4.2631	534.1588
RS-5				4.3457	534.0762
TP			4.7081		533.7138
	⊼	SETUP			
	4.6595	538.3733			
RS-6				4.5634	533.8099
TP			5.7889		532.5844
	7.7252	540.3096			
RS-7				5.4975	534.8121
B6 MW01			5.0037		535.3059

(11)

JIM CREEK - LEVELS - SB-6 (BUILDING) (LL7)

TOL - B6 - MW01 - (BNV 430)

TOC - B6 - MW01
TOL - B6 - MW02
TOC - B6 - MW02 (BNV 431)

TOC - B6 - MW04 (BNV 433)
TOL - B6 - MW04
TOL - B6 - MW03
TOC - B6 - MW03 (BNV 432)

TOC - B6 - MW04
TOC - B6 - MW02

B6 - MW01 TOC

TOL - (RIM) BM

STA	+	HI	−	ROD	ELEV	
TOC - BG MW03					533.7138	
	5.5487	539.2625				
TP			8.1456		531.1169	T- PLATE
	1.4551	532.5720				
TP			8.9055		523.6665	T- PLATE
	0.3210	523.9875				
TP			9.4946		514.4929	T-PLATE
	0.5806	515.0735				
TP			9.1990		505.8745	T-PLATE
	5.0367	510.9112				
RS-1				3.7049	507.7063	TOL - S1 - MW06
RS-2				6.3845	504.5267	GND - N - S1 MW06
TP			3.5985		507.3127	TOC - S2 - ~~MW05~~ MW06 (BNV 439)
	5.2624	512.5751				
TP			6.4612		506.1139	T- PLATE
	~~0.0~~ 0.5490	506.6629				
TP			9.5792		497.0837	T- PLATE
	0.7457	497.8294				
TP			9.4613		488.3681	T- PLATE
	0.4739	488.8420				
TP			7.2224		481.6196	T- PLATE
	3.4432	485.0628				

JIM CREEK - LEVELS SITE B (LLB)

STA	+	HI	−	ROD	ELEV
RS-3				7.9000	477.1628
RS-4				7.4452	477.6176
RS-5				8.0950	476.9678
RS-6				8.3895	476.6733
RS-7				8.9127	476.1501
TP			8.7989		476.2639
	ΔX	SETUP			
	8.7220	484.9859			
RS-8				8.0179	476.9680
TP			3.3788		481.6071
	7.1745	488.7816			
TP			1.2799		487.5017
	9.1572	496.6589			
TP			0.7495		495.9094
	8.7292	504.5386			
TP			0.4890		504.1496
	8.6254	512.7750			
TP			5.4625		507.3125
	3.5780	510.8905			
			1.3164		509.5741
	9.5199	519.0940			

(13)

JIM CREEK LEVELS - SITE 1 (LLB) 1/19/2023 RB/EH

GND-N-S1-MW07
TOL-S1-MW07
TOC-S1-MW07 (BNV 438)

TOL-S1-MW05
GND-N-S1-MW05
TOC-S1-MW05 (BNV 437)

TOC-S1-MW07
T-PLATE

T-PLATE

T-PLATE

T-PLATE

TOC-S1-MW06

T-PLATE

JIM CREEK - LEVELS - SITE 1 & BUILDING

T-PLATE

T-PLATE

STA	+	HI	−	ROD	ELEV
TP			0.4855		518.6085
	8599	527.4684			
TP			1.2589		526.2095
	9.1554	535.3649			
TEC-BG-MW03			1.6594		533.7055

(3)

JIM CREEK LEVELS - SITE - SG (LLA)

STA	+	HI	-	ROD	ELEV	
3					538.486	SPIKE 1/17/2023 BB/EH
	4.8394	543.3274				
RS-1				1.7887	541.5387	TOL SG-MW09 (BNM 436)
RS-2				4.744	538.584	GND-NORTH-SG-MW09
RS-3				1.9890	541.3364	TOC SG-MW09
TP-1			3.9981		539.3273	TOL - SG-MW08
RS-4				4.5025	538.8229	TOC - SG-MW08 (BNM 435)
	3.3546	542.6819				
RS-5				6.5189	536.163	NORTH-GND - SG-MW08
TP3			2.8427		539.8392	T-PLATE
	7.6369	547.4761				
RS-6				3.7459	543.7302	GND-NORTH - SG MW10
RS-7				0.5974	546.8787	TOL - SG MW10
TP-TOC			1.1970		546.2791	TOC - SG MW10 (BNM 434)
	TA SETUP					
	1.1054	547.3845				
TP-2					539.8392	T-PLATE
	2.6011	542.5003				

JIM CREEK - LEVELS - SITE SG - (LL) CONT.

STA	+	Hi	-	Rod	ELEV	
TP-TOC			3.6795		538.8708	TOC - SG-MW08
	4.7530	543.5738				
RS-8				2.2394	541.3344	TOC - SG-MW09
#3			5.0908		538.483	SPIKE
					E.O.C. -0.003	

1/17/2023
RB/EH

JACOBS Surveying Services for

NAVAL RECREATION COMPLEX (NRC) PACIFIC BEACH
Pacific Beach, Washington
01/20/2023

Naval Facilities Engineering Command (NAVFAC), Southwest under the Comprehensive Long-term Environmental Action Navy (CLEAN) 9000 Contract, Contract Task Order (CTO) 4117, Contract Number N62470-16-D-9000.

JACOBS Project Manager: Dennis Ballam
JACOBS Professional Land Surveyor: Aaron Willis, PLS
JACOBS Project Surveyor: Roland "Duke" Brooks

SITE LOCATION AND DESCRIPTION

NRC Pacific Beach occupies approximately 53 acres in western Grays Harbor County adjacent to the Pacific Ocean approximately 36 miles northwest of Aberdeen, Washington. The installation was initially developed by the Navy at the start of World War II as a communications center and range for training purposes (NEESA, 1991). By 1956, the Navy moved training operations closer to Puget Sound and Seattle. Defense equipment and associated infrastructure such as gun mounts, ammunition magazines, and related buildings were demolished and replaced with more conventional structures (NEESA, 1991). By the late 1970s, military housing was no longer required, and the installation was converted into a recreational facility with single-family homes and dormitory-type buildings. In 1984, a 1-acre recreational vehicle and motor home park was built along the northern boundary of the installation and exists to this day. There are currently no active military operations at NRC Pacific Beach. Surveying is required at the following site:

- Building 106 (Attachment A) – Former Fire Station

PROJECT DESCRIPTION:

- Recover NGS horizontal and vertical control monuments per site.
- Establish Primary Control.
- Survey locations of three (3) new monitoring wells.

ATTACHMENT A – Building 106

Figure 2-10
Site Layout and Sampling Locations: NRC Pacific Beach, Building 106
Site Inspection for PFAS
NRC Pacific Beach
Pacific Beach, Washington

HORIZONTAL COORDINATE SYSTEMS DATUM:

The horizontal coordinate systems and datum used are the North American Datum of 1983, NAD83 (2011) Epoch 2010.00, in the Washington State Plane Coordinate System (SPCS), South Zone, U.S. Survey Feet.

VERTICAL DATUM:

The vertical datum is the North American Vertical Datum of 1988 (NAVD88) established using Geoid 18.

ACCURACY SPECIFICATIONS:

a. Horizontal control work complies with Second Order Class II (1:20,000) or better, as outlined in the Federal Geospatial Data Committee (FGDC) *Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C), and Facility Management*.

b. Vertical Control work complies with Second Order Class II (0.0350√m) or better, as outlined in the FGDC *Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C) and Facility Management*.

METHODOLOGY:

Initial reconnaissance efforts were conducted to recover National Geodetic Survey (NGS) Control within the project site vicinity. The following published and established horizontal and vertical control were utilized in the GPS Static CORS Network Adjustment, RTK surveys having 2 occupations with a four-hour minimum satellite constellation difference, and differential leveling; Published and established primary control provided in Table 1 and Published Data Sheet(s) provided (Attachment B). Primary Control locations are shown in Figure 1. Differential level notes (Attachment D)

Table 1 – Primary Control (Yellow is Jacobs Adjusted Value)

PID	*EASTING(USFT)*	*NORTHING(USFT)*	*ELEVATION(USFT)*
PACBCH 1 BENCHMARK	720234.731	707019.731	115.885
PABH A	720030.48	705504.82	46.68
PABH B	719548.31	708831.47	120.93

Figure 1 – NAVSTA Everett Project Control Locations

ATTACHMENT B

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.5.14
Starting Datasheet Retrieval...
1        National Geodetic Survey,   Retrieval Date = JANUARY  9, 2023
 DQ3217 ***********************************************************************
 DQ3217  DESIGNATION -  PACBCH1
 DQ3217  PID         -  DQ3217
 DQ3217  STATE/COUNTY-  WA/GRAYS HARBOR
 DQ3217  COUNTRY     -  US
 DQ3217  USGS QUAD   -  MOCLIPS (2017)
 DQ3217
 DQ3217                        *CURRENT SURVEY CONTROL
 DQ3217  ______________________________________________________________________
 DQ3217* NAD 83(1986) POSITION- 47 12 46.19   (N) 124 12 14.09   (W)   HD_HELD1
 DQ3217* NAVD 88 ORTHO HEIGHT -    35.322 (meters)      115.89  (feet) ADJUSTED
 DQ3217  ______________________________________________________________________
 DQ3217  GEOID HEIGHT    -        -24.459 (meters)                     GEOID18
 DQ3217  DYNAMIC HEIGHT  -         35.327 (meters)      115.90  (feet) COMP
 DQ3217  MODELED GRAVITY -    980,757.6   (mgal)                       NAVD 88
 DQ3217
 DQ3217  VERT ORDER      -  SECOND    CLASS I
 DQ3217
 DQ3217.The horizontal coordinates were determined by differentially corrected
 DQ3217.hand held GPS observations or other comparable positioning techniques
 DQ3217.and have an estimated accuracy of +/- 3 meters.
 DQ3217.
 DQ3217.The orthometric height was determined by differential leveling and
 DQ3217.adjusted by the NATIONAL GEODETIC SURVEY
 DQ3217.in October 2016.
 DQ3217
 DQ3217.Significant digits in the geoid height do not necessarily reflect accuracy.
 DQ3217.GEOID18 height accuracy estimate available here.
 DQ3217
 DQ3217.Click photographs - Photos may exist for this station.
 DQ3217
 DQ3217.The dynamic height is computed by dividing the NAVD 88
 DQ3217.geopotential number by the normal gravity value computed on the
 DQ3217.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 DQ3217.degrees latitude (g = 980.6199 gals.).
 DQ3217
 DQ3217.The modeled gravity was interpolated from observed gravity values.
 DQ3217
 DQ3217;                  North         East     Units  Estimated Accuracy
 DQ3217;SPC WA S     -   215,499.6     219,525.9     MT  (+/- 3 meters HH1 GPS)
 DQ3217
 DQ3217_U.S. NATIONAL GRID SPATIAL ADDRESS: 10TDT0883629518(NAD 83)
 DQ3217
 DQ3217                           SUPERSEDED SURVEY CONTROL
 DQ3217
 DQ3217.No superseded survey control is available for this station.
 DQ3217
 DQ3217_MARKER: DD = SURVEY DISK
 DQ3217_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 DQ3217_STAMPING: PACBCH1 1979
 DQ3217_MARK LOGO: USN
 DQ3217_PROJECTION: RECESSED 22 CENTIMETERS
 DQ3217_MAGNETIC: O = OTHER; SEE DESCRIPTION
 DQ3217_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 DQ3217+STABILITY: SURFACE MOTION
```

DQ3217_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
DQ3217+SATELLITE: SATELLITE OBSERVATIONS - August 28, 2016
DQ3217
DQ3217 HISTORY   - Date   Condition   Report By
DQ3217 HISTORY   - 1979   MONUMENTED   USN
DQ3217 HISTORY   - 20160828 GOOD   WADT
DQ3217
DQ3217   STATION DESCRIPTION
DQ3217
DQ3217'DESCRIBED BY WA DEPT OF TRANSP 2016 (KW)
DQ3217'THE STATION IS LOCATED ABOUT 7.1 MI (11.4 KM) NORTH-NORTHWEST OF
DQ3217'COPALIS BEACH, 6.4 MI (10.3 KM) NORTHWEST OF CARLISLE AND 1.7 MI (2.7
DQ3217'KM) SOUTH-SOUTHEAST OF MOCLIPS.
DQ3217'
DQ3217'TO REACH THE STATION FROM THE JUNCTION OF SR 109 (MILEPOST 29.41) AND
DQ3217'OCEAN BEACH ROAD, AT PACIFIC BEACH. GO WEST 0.30 MI (0.48 KM) ALONG
DQ3217'MAIN ST. THEN GO NORTH 0.30 MI (0.48 KM) ALONG FIRST ST. TO ENTRANCE
DQ3217'TO PACIFIC BEACH RECREATION AND CONFERENCE CENTER. TURN LEFT, THEN
DQ3217'LEFT AGAIN FOLLOWING FRONTAGE ROAD SOUTH FOR 0.05 MI (0.08 KM) TO
DQ3217'MARK, IN ASPHALT PAVEMENT, A U.S. NAVY BRASS DISK SET INTO A CONCRETE
DQ3217'MONUMENT RECESSED 20 CM (8 INCHES) BELOW ASPHALT UNDER A CASE AND
DQ3217'COVER.
DQ3217'
DQ3217'IT IS LOCATED NEAR FENCE LINE BETWEEN BUILDINGS 102 AND 51.
DQ3217'
DQ3217'IT IS 12.9 M (42.3 FT) SOUTHEAST FROM, A FIRE HYDRANT, 7.9 M (25.9 FT)
DQ3217'SOUTHWEST FROM A LUMINAIRE AND 4.0 M (13.1 FT) SOUTHWEST FROM A FENCE.

*** retrieval complete.
Elapsed Time = 00:00:04

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

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PROGRAM = datasheet95, VERSION = 8.12.5.14
Starting Datasheet Retrieval...
1        National Geodetic Survey,   Retrieval Date = JANUARY 22, 2023
 AF8805 ***********************************************************************
 AF8805  DESIGNATION -  PABH B
 AF8805  PID         -  AF8805
 AF8805  STATE/COUNTY-  WA/GRAYS HARBOR
 AF8805  COUNTRY     -  US
 AF8805  USGS QUAD   -  MOCLIPS (2017)
 AF8805
 AF8805                        *CURRENT SURVEY CONTROL
 AF8805  ______________________________________________________________________
 AF8805* NAD 83(2011) POSITION- 47 13 03.75077(N) 124 12 25.15890(W)   ADJUSTED
 AF8805* NAD 83(2011) ELLIP HT-    12.426 (meters)        (06/27/12)   ADJUSTED
 AF8805* NAD 83(2011) EPOCH   -  2010.00
 AF8805* NAVD 88 ORTHO HEIGHT -    36.859 (meters)      120.93  (feet) ADJUSTED
 AF8805  ______________________________________________________________________
 AF8805  GEOID HEIGHT    -        -24.455 (meters)                     GEOID18
 AF8805  NAD 83(2011) X  - -2,439,859.238 (meters)                     COMP
 AF8805  NAD 83(2011) Y  - -3,589,202.060 (meters)                     COMP
 AF8805  NAD 83(2011) Z  -  4,658,246.853 (meters)                     COMP
 AF8805  LAPLACE CORR    -          9.19  (seconds)                    DEFLEC18
 AF8805  DYNAMIC HEIGHT  -         36.865 (meters)      120.95  (feet) COMP
 AF8805  MODELED GRAVITY -    980,758.2   (mgal)                       NAVD 88
 AF8805
 AF8805  VERT ORDER      -  SECOND    CLASS I
 AF8805
 AF8805  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 AF8805  Standards:
 AF8805         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 AF8805            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 AF8805  ------------------------------------------------------------------
 AF8805  NETWORK    0.77   1.65           0.36   0.24   0.84     -0.06703633
 AF8805  ------------------------------------------------------------------
 AF8805  Click here for local accuracies and other accuracy information.
 AF8805
 AF8805
 AF8805.The horizontal coordinates were established by GPS observations
 AF8805.and adjusted by the National Geodetic Survey in June 2012.
 AF8805
 AF8805.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 AF8805.been affixed to the stable North American tectonic plate. See
 AF8805.NA2011 for more information.
 AF8805
 AF8805.The horizontal coordinates are valid at the epoch date displayed above
 AF8805.which is a decimal equivalence of Year/Month/Day.
 AF8805
 AF8805.The orthometric height was determined by differential leveling and
 AF8805.adjusted by the NATIONAL GEODETIC SURVEY
 AF8805.in October 2016.
 AF8805
 AF8805.Significant digits in the geoid height do not necessarily reflect accuracy.
 AF8805.GEOID18 height accuracy estimate available here.
 AF8805
 AF8805.Click photographs - Photos may exist for this station.
 AF8805
 AF8805.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AF8805
```

AF8805.The Laplace correction was computed from DEFLEC18 derived deflections.
AF8805
AF8805.The ellipsoidal height was determined by GPS observations
AF8805.and is referenced to NAD 83.
AF8805
AF8805.The dynamic height is computed by dividing the NAVD 88
AF8805.geopotential number by the normal gravity value computed on the
AF8805.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AF8805.degrees latitude (g = 980.6199 gals.).
AF8805
AF8805.The modeled gravity was interpolated from observed gravity values.
AF8805
AF8805. The following values were computed from the NAD 83(2011) position.
AF8805
AF8805;   North   East   Units Scale Factor Converg.
AF8805;SPC WA S   -   216,052.263   219,318.763   MT 0.99997560   -2 41 33.9
AF8805;SPC WA S   -   708,831.47   719,548.31   sFT 0.99997560   -2 41 33.9
AF8805;UTM 10   - 5,230,064.265   408,611.913   MT 0.99970264   -0 53 09.3
AF8805
AF8805!   - Elev Factor x Scale Factor =   Combined Factor
AF8805!SPC WA S   -   0.99999805 x   0.99997560 =   0.99997365
AF8805!UTM 10   -   0.99999805 x   0.99970264 =   0.99970069
AF8805
AF8805:   Primary Azimuth Mark   Grid Az
AF8805:SPC WA S   - PACIFIC BEACH CORS ARP   164 06 24.7
AF8805:UTM 10   - PACIFIC BEACH CORS ARP   162 18 00.1
AF8805
AF8805_U.S. NATIONAL GRID SPATIAL ADDRESS: 10TDT0861130064(NAD 83)
AF8805
AF8805|---|
AF8805| PID   Reference Object   Distance   Geod. Az |
AF8805| dddmmss.s |
AF8805| AF9668 PACIFIC BEACH CORS ARP   APPROX. 0.6 KM 1612450.8 |
AF8805| AF8806 PABH A   APPROX. 1.0 KM 1690336.5 |
AF8805|---|
AF8805
AF8805   SUPERSEDED SURVEY CONTROL
AF8805
AF8805 NAD 83(2007)- 47 13 03.74928(N)   124 12 25.16278(W) AD(2007.00) 0
AF8805 ELLIP H (02/10/07)   12.436 (m)   GP(2007.00)
AF8805 NAD 83(1998)- 47 13 03.74565(N)   124 12 25.16752(W) AD(   ) B
AF8805 ELLIP H (03/21/00)   12.431 (m)   GP(   ) 3 2
AF8805 NAD 83(1991)- 47 13 03.74247(N)   124 12 25.17280(W) AD(   ) B
AF8805 ELLIP H (11/01/99)   12.607 (m)   GP(   ) 4 1
AF8805 NAVD 88 (07/26/02)   36.904 (m)   121.08   (f) SUPERSEDED 2 1
AF8805 NAVD 88   36.90   (m)   121.1   (f) LEVELING   3
AF8805
AF8805.Superseded values are not recommended for survey control.
AF8805
AF8805.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AF8805.See file dsdata.pdf to determine how the superseded data were derived.
AF8805
AF8805_MARKER: F = FLANGE-ENCASED ROD
AF8805_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
AF8805_STAMPING: PABH B
AF8805_MARK LOGO: NGS
AF8805_PROJECTION: RECESSED 10 CENTIMETERS
AF8805_MAGNETIC: N = NO MAGNETIC MATERIAL
AF8805_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AF8805+STABILITY: POSITION/ELEVATION WELL
AF8805_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AF8805+SATELLITE: SATELLITE OBSERVATIONS - August 28, 2016
AF8805_ROD/PIPE-DEPTH: 8   meters
AF8805_SLEEVE-DEPTH : 0.9 meters
AF8805

```
AF8805  HISTORY     - Date     Condition        Report By
AF8805  HISTORY     - 1998     MONUMENTED       NGS
AF8805  HISTORY     - 19981010 GOOD             NGS
AF8805  HISTORY     - 20050830 GOOD             USPSQD
AF8805  HISTORY     - 20160828 GOOD             WADT
AF8805
AF8805                          STATION DESCRIPTION
AF8805
AF8805'DESCRIBED BY NATIONAL GEODETIC SURVEY 1998 (GAS)
AF8805'0.4 KM (0.25 MI) WESTERLY ALONG MAIN STREET FROM THE POST OFFICE IN
AF8805'PACIFIC BEACH, THENCE 0.6 KM (0.35 MI) NORTHERLY ALONG FIRST STREET,
AF8805'THENCE 0.5 KM (0.30 MI) NORTHERLY ALONG A DRIVEWAY THROUGH THE PACIFIC
AF8805'BEACH RECREATION AND CONFERENCE CENTER, 28.9 M (94.8 FT) SOUTHWEST OF
AF8805'THE DRIVEWAY CENTER, 25.6 M (84.0 FT) SOUTH OF THE NORTHWEST CORNER OF
AF8805'A CHAIN-LINK FENCE ENCLOSING A MOBILE HOME PARK, 15.8 M (51.8 FT) WEST
AF8805'OF ELECTRIC JUNCTION BOX NUMBER 32, 11.6 M (38.1 FT) WEST OF THE
AF8805'SOUTHWEST CORNER OF A PAVED PARKING AREA, AND 5.8 M (19.0 FT) EAST OF
AF8805'A WITNESS POST AND FENCE.  NOTE--ACCESS TO THE DATUM POINT IS THROUGH
AF8805'A 5-INCH LOGO CAP.  THE MONUMENT IS ON PROPERTY OWNED BY U.S.  NAVY
AF8805'PACIFIC BEACH RECREATION AND CONFERENCE CENTER, TELEPHONE NUMBER (360)
AF8805'276-4414, EXTENSION 221.
AF8805
AF8805                          STATION RECOVERY (1998)
AF8805
AF8805'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (CSM)
AF8805'RECOVERED AS DESCRIBED.
AF8805
AF8805                          STATION RECOVERY (2005)
AF8805
AF8805'RECOVERY NOTE BY US POWER SQUADRON 2005 (SAH)
AF8805'ALTERNATE LOCATION DESCRIPTION. ON THE U.S.NAVY PACIFIC BEACH
AF8805'RECREATION AND CONFERENCE CENTER RV PARK, FIND SPACE 33, A STRAIGHT
AF8805'LINE THROUGH THE LENGTH OF THE SITE EXTENDED TO THE BARRIER FENCE TO
AF8805'WITNESS POST. POST PARTIALLY HIDDEN BY PLANT GROWTH ON OTHER SIDE OF
AF8805'CHAIN LINK FENCE.
AF8805
AF8805                          STATION RECOVERY (2016)
AF8805
AF8805'RECOVERY NOTE BY WA DEPT OF TRANSP 2016 (KW)
AF8805'RECOVERED AS DESCRIBED.



*** retrieval complete.
Elapsed Time = 00:00:03
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The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

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PROGRAM = datasheet95, VERSION = 8.12.5.14
Starting Datasheet Retrieval...
1        National Geodetic Survey,   Retrieval Date = JANUARY  9, 2023
 AF8806 ***********************************************************************
 AF8806  DESIGNATION -  PABH A
 AF8806  PID         -  AF8806
 AF8806  STATE/COUNTY-  WA/GRAYS HARBOR
 AF8806  COUNTRY     -  US
 AF8806  USGS QUAD   -  MOCLIPS (2017)
 AF8806
 AF8806                        *CURRENT SURVEY CONTROL
 AF8806  ______________________________________________________________________
 AF8806* NAD 83(2011) POSITION- 47 12 31.17612(N) 124 12 15.91914(W)   ADJUSTED
 AF8806* NAD 83(2011) ELLIP HT-   -10.221 (meters)        (06/27/12)   ADJUSTED
 AF8806* NAD 83(2011) EPOCH   -  2010.00
 AF8806* NAVD 88 ORTHO HEIGHT -    14.228 (meters)       46.68  (feet) ADJUSTED
 AF8806  ______________________________________________________________________
 AF8806  GEOID HEIGHT    -        -24.472 (meters)                     GEOID18
 AF8806  NAD 83(2011) X  - -2,440,104.821 (meters)                     COMP
 AF8806  NAD 83(2011) Y  - -3,589,909.202 (meters)                     COMP
 AF8806  NAD 83(2011) Z  -  4,657,546.906 (meters)                     COMP
 AF8806  LAPLACE CORR    -          9.08  (seconds)                    DEFLEC18
 AF8806  DYNAMIC HEIGHT  -         14.230 (meters)       46.69  (feet) COMP
 AF8806  MODELED GRAVITY -    980,757.6   (mgal)                       NAVD 88
 AF8806
 AF8806  VERT ORDER      -  SECOND    CLASS I
 AF8806
 AF8806  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 AF8806  Standards:
 AF8806         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 AF8806            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 AF8806  ------------------------------------------------------------------
 AF8806  NETWORK    0.77   1.65           0.36   0.24   0.84     -0.06901278
 AF8806  ------------------------------------------------------------------
 AF8806  Click here for local accuracies and other accuracy information.
 AF8806
 AF8806
 AF8806.The horizontal coordinates were established by GPS observations
 AF8806.and adjusted by the National Geodetic Survey in June 2012.
 AF8806
 AF8806.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 AF8806.been affixed to the stable North American tectonic plate. See
 AF8806.NA2011 for more information.
 AF8806
 AF8806.The horizontal coordinates are valid at the epoch date displayed above
 AF8806.which is a decimal equivalence of Year/Month/Day.
 AF8806
 AF8806.The orthometric height was determined by differential leveling and
 AF8806.adjusted by the NATIONAL GEODETIC SURVEY
 AF8806.in October 2016.
 AF8806
 AF8806.Significant digits in the geoid height do not necessarily reflect accuracy.
 AF8806.GEOID18 height accuracy estimate available here.
 AF8806
 AF8806.Click photographs - Photos may exist for this station.
 AF8806
 AF8806.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AF8806
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AF8806.The Laplace correction was computed from DEFLEC18 derived deflections.
AF8806
AF8806.The ellipsoidal height was determined by GPS observations
AF8806.and is referenced to NAD 83.
AF8806
AF8806.The dynamic height is computed by dividing the NAVD 88
AF8806.geopotential number by the normal gravity value computed on the
AF8806.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AF8806.degrees latitude (g = 980.6199 gals.).
AF8806
AF8806.The modeled gravity was interpolated from observed gravity values.
AF8806
AF8806. The following values were computed from the NAD 83(2011) position.
AF8806
AF8806;                    North         East     Units Scale Factor Converg.
AF8806;SPC WA S     -   215,038.299   219,465.729   MT  0.99997386   -2 41 27.2
AF8806;SPC WA S     -   705,504.82    720,030.48    sFT  0.99997386   -2 41 27.2
AF8806;UTM  10      - 5,229,055.714   408,790.728   MT  0.99970224   -0 53 02.1
AF8806
AF8806!             -  Elev Factor  x  Scale Factor =   Combined Factor
AF8806!SPC WA S     -   1.00000160  x   0.99997386  =   0.99997546
AF8806!UTM  10      -   1.00000160  x   0.99970224  =   0.99970384
AF8806
AF8806:                Primary Azimuth Mark                    Grid Az
AF8806:SPC WA S     -  PABH B                                  351 45 10.5
AF8806:UTM  10      -  PABH B                                  349 56 45.4
AF8806
AF8806_U.S. NATIONAL GRID SPATIAL ADDRESS: 10TDT0879029055(NAD 83)
AF8806
AF8806|-----------------------------------------------------------------------|
AF8806| PID    Reference Object                    Distance      Geod. Az  |
AF8806|                                                          dddmmss.s |
AF8806| AF8805 PABH B                            APPROX. 1.0 KM 3490343.3 |
AF8806|-----------------------------------------------------------------------|
AF8806
AF8806                          SUPERSEDED SURVEY CONTROL
AF8806
AF8806  NAD 83(2007)-  47 12 31.17463(N)    124 12 15.92301(W) AD(2007.00) 0
AF8806  ELLIP H (02/10/07)  -10.212  (m)                       GP(2007.00)
AF8806  NAD 83(1998)-  47 12 31.17101(N)    124 12 15.92775(W) AD(       ) B
AF8806  ELLIP H (03/21/00)  -10.217  (m)                       GP(       ) 3 2
AF8806  NAD 83(1991)-  47 12 31.16783(N)    124 12 15.93301(W) AD(       ) B
AF8806  ELLIP H (11/01/99)  -10.042  (m)                       GP(       ) 4 1
AF8806  NAVD 88 (07/26/02)   14.279  (m)          46.85   (f) SUPERSEDED  2 1
AF8806  NAVD 88              14.28   (m)          46.9    (f) LEVELING    3
AF8806
AF8806.Superseded values are not recommended for survey control.
AF8806
AF8806.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AF8806.See file dsdata.pdf to determine how the superseded data were derived.
AF8806
AF8806_MARKER: F = FLANGE-ENCASED ROD
AF8806_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
AF8806_STAMPING: PABH A 1998
AF8806_MARK LOGO: NGS
AF8806_PROJECTION: RECESSED 7 CENTIMETERS
AF8806_MAGNETIC: N = NO MAGNETIC MATERIAL
AF8806_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AF8806_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AF8806+SATELLITE: SATELLITE OBSERVATIONS - August 28, 2016
AF8806
AF8806  HISTORY     - Date     Condition        Report By
AF8806  HISTORY     - 1998     MONUMENTED       NGS
AF8806  HISTORY     - 19981010 GOOD             NGS
AF8806  HISTORY     - 20050830 GOOD             USPSQD
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AF8806 HISTORY   - 20160828 GOOD   WADT
AF8806
AF8806   STATION DESCRIPTION
AF8806
AF8806'DESCRIBED BY NATIONAL GEODETIC SURVEY 1998 (GAS)
AF8806'0.4 KM (0.25 MI) WESTERLY ALONG MAIN STREET FROM THE POST OFFICE IN
AF8806'PACIFIC BEACH, THENCE 0.05 KM (0.05 MI) NORTHERLY ALONG FIRST STREET,
AF8806'THENCE 0.08 KM (0.05 MI) SOUTHERLY ALONG SPRAGUE PLACE, 28.0 M (91.9
AF8806'FT) WEST OF THE PLACE CENTER, 20.5 M (67.3 FT) NORTH OF THE NORTHWEST
AF8806'CORNER OF A PORCH AT HOUSE NUMBER 303, 19.8 M (65.0 FT) SOUTH OF A
AF8806'FENCE CORNER, 8.1 M (26.6 FT) NORTH OF A FENCE CORNER, 1.9 M (6.2 FT)
AF8806'EAST OF A WITNESS POST AND FENCE, AND 0.4 M (1.3 FT) BELOW THE LEVEL
AF8806'OF THE PLACE. NOTE--ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH
AF8806'LOGO CAP. THE MONUMENT IS ON PROPERTY OWNED BY U.S. NAVY PACIFIC
AF8806'BEACH RECREATION AND CONFERENCE CENTER, TELEPHONE NUMBER (360)
AF8806'276-4414, EXTENSION 221. THE ROD WAS DRIVEN TO REFUSAL AT 1.0 METER
AF8806'(3.3 FT) AND ANCHORD, WITH A 0.9 METER SLEEVE, AND MARK FLUSH WITH THE
AF8806'GROUND.
AF8806
AF8806   STATION RECOVERY (1998)
AF8806
AF8806'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (CSM)
AF8806'RECOVERED AS DESCRIBED.
AF8806
AF8806   STATION RECOVERY (2005)
AF8806
AF8806'RECOVERY NOTE BY US POWER SQUADRON 2005 (SAH)
AF8806'ALTERNATE LOCATION DESCRIPTION. WITNESS POST IS ON THE BARRIER FENCE
AF8806'LINE ABOUT HALF WAY BETWEEN HOUSES NUMBERED 303 AND 304.
AF8806
AF8806   STATION RECOVERY (2016)
AF8806
AF8806'RECOVERY NOTE BY WA DEPT OF TRANSP 2016 (KW)
AF8806'RECOVERED AS DESCRIBED.

*** retrieval complete.
Elapsed Time = 00:00:04

BUILDING 106 LOCATION SURVEYS:

Building 106 consisted of three (3) monitoring wells that were located (Attachment A) with X, Y, & Z values. This data collection for X and Y values was conducted using Real-Time Kinematic (RTK) methods constraining to NGS control points and the primary control network shown in Table 1. The Z value locations are at the top of casing, north notch and was determined by differential leveling. The three (3) monitoring well locations are shown in Table 2.

Table 2- Building 106 Monitoring Wells

PT ID	*EASTING (USFT)*	*NORTHING (USFT)*	*Elevation (USFT)*	*Description*
NRCPB-B106-MW01 (BNV-455)	720211.2489	707361.0091	119.4122	MW01-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	720211.3966	707361.9169	119.7947	MW01-ASPHALT NORTH
NRCPB-B106-MW02 (BNV-446)	720105.4833	707320.9529	118.1027	MW02-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	720105.5774	707321.7583	118.5179	MW02-ASPHALT NORTH
NRCPB-B106-MW03 (BNV-447)	720036.0245	707311.1815	116.8947	MW03-TOP LID_Horz. & TOP CASING_vert. (Flush Mount)
GROUND	720035.9404	707312.0887	117.1624	MW03-ASPHALT NORTH

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC):

The procedures, methodology and techniques implemented throughout the field campaign and processing of the survey data, provided high-level precision and accuracy. Using RTK surveys, check shots were collected on published control points (Attachment C) prior to commencing with data collection and post data collection of the monitoring wells to verify values were consistent throughout the time frame of each survey. Differential level loops were utilized to obtain Z values on monitoring wells (Attachment E).

SURVEY'S CERTIFICATION:

I, Aaron Willis, Professional Land Surveyor licensed in the State of Washington, hereby certify that the data acquisition, analysis, computations and other information contained in this document are true, accurate, compliant with the scope of work and were performed under my direct supervision. The accuracy of the control and the features surveyed have met or exceeded (are better than) the accuracy requirements stated within the statement of work for Naval Recreation Complex (NRC) Pacific Beach.

Aaron D. Willis
Professional Land Surveyor
Washington License No. 50991 (expires 1/29/2025)

ATTACHMENT C – RTK CHECKS, CONTROL COMPARISON

Control Basis: Primary Control Point PACBCH 1 (Shown in Table 1)

PT ID	Northing	Easting	Elevation
PACBCH 1	707019.7312	720234.731	115.885

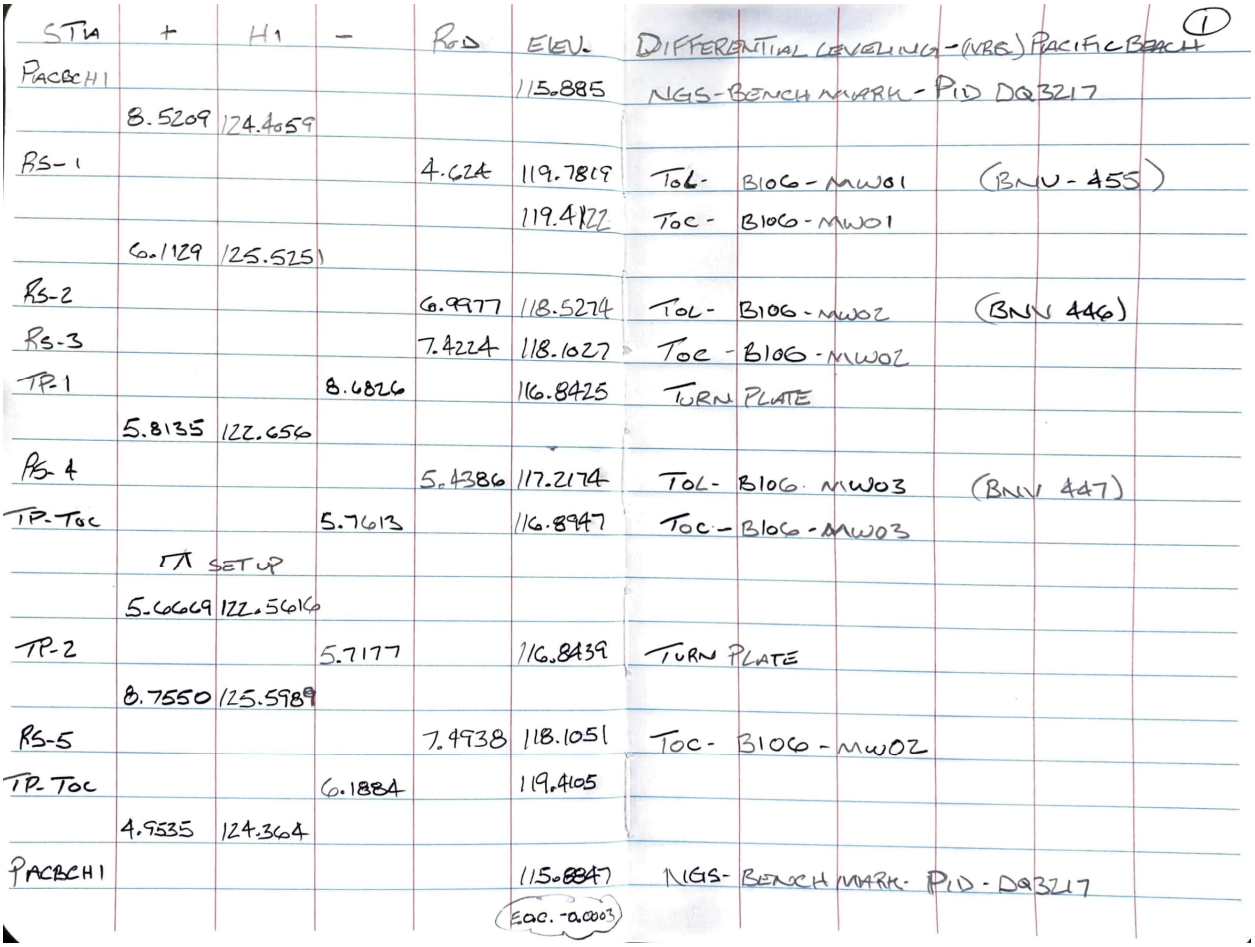
Survey Deltas_Primary Control Check_Occupying Control Point PACBCH 1

PT ID	Northing	Easting	Elevation	Δy	Δx	Δz
PABH A AM	705504.77	720030.438	46.701	0.014	0.010	0.024
PABH A PM	705504.778	720030.44	46.706	0.006	0.008	0.019
PABH B AM	708831.412	719548.295	120.989	0.018	0.009	-0.030
PABH B PM	708831.441	719548.285	120.955	-0.011	0.019	0.004

Survey Deltas_Primary Control Check_Record (R) vs Measured (M)

PABH B (R)	708831.47	719548.31	120.93	Δy	Δx	Δz
PABH B AM (M)	708831.412	719548.295	120.989	0.058	0.015	-0.059
PABH B PM (M)	708831.441	719548.285	120.955	0.029	0.025	-0.025
PABH A (R)	705504.82	720030.48	46.68	Δy	Δx	Δz
PABH A AM (M)	705504.77	720030.438	46.701	0.050	0.042	-0.021
PABH A PM (M)	705504.778	720030.44	46.706	0.042	0.040	-0.026

ATTACHMENT D – Differential Level Field Notes



STA	+	HI	−	ROD	ELEV.	DIFFERENTIAL LEVELING - (NRS) PACIFIC BRANCH ①	
PACBCH1					115.885	NGS-BENCH MARK - PID DQ3217	
	8.5209	124.4059					
RS-1				4.624	119.7819	TOL - B106 - MW01	(BNV-455)
					119.4122	TOC - B106 - MW01	
	6.1129	125.5251					
RS-2				6.9977	118.5274	TOL - B106 - MW02	(BNV 446)
RS-3				7.4224	118.1027	TOC - B106 - MW02	
TP-1			8.6826		116.8425	TURN PLATE	
	5.8135	122.656					
RS 4				5.4386	117.2174	TOL - B106 - MW03	(BNV 447)
TP-TOC			5.7613		116.8947	TOC - B106 - MW03	
	IT SETUP						
	5.6669	122.5616					
TP-2			5.7177		116.8439	TURN PLATE	
	8.7550	125.5989					
RS-5				7.4938	118.1051	TOC - B106 - MW02	
TP-TOC			6.1884		119.4105		
	4.9535	124.364					
PACBCH1					115.8947	NGS - BENCH MARK - PID - DQ3217	
					(ERR. -0.0003)		