Field Report

Project:	City of Wasilla WWTP Pilot Study	Field Crew:	Jake Alward, John Marshall, Riley Bronga
File:	204700415	Date(s):	August 29, 2017 to August 31, 2017

Subsurface☒ Surface☒ Vegetation ☒

Reference: August Water Sampling Event

1.1 BACKGROUND

August was the first month for a full sampling event with 18 surface and 7 sub-surface samples taken. The weather was cloudy with slight precipitation. The terrain was difficult to navigate, even more so than July, as the ground was very wet (Photo 3 & 4). Depending on where you stepped, you could sink up to your waist.

Detectable results summary, data quality summary tables, and photo log are attached.

1.2 SAMPLING EVENT HIGHLIGHTS

SUBSURFACE SAMPLING

As this was the first subsurface sampling event, the sampling process is discussed below.

The shallow borings (B1, B3, B4, and B11) were sampled using a peristaltic pump as they are only about 21-feet deep. The peristaltic pump was able to pump at a rate of about 0.61 quarts per minute. To get reading with the YSI, it worked best to place the sensor in a stainless-steel cup and run water into the cup.

The larger diameter monitoring wells (MW6 and MW8) were purged using a bailer. There was water visible at the top of both large diameter wells. MW8 has water flowing out of the casing. The monitoring wells would fill to the top before the bailer was even emptied. The bailers were used to purge three times the volume of the well before water samples were taken. The YSI sensor was placed directly in the well at these two locations.

The deep monitoring well, MW14, consists of two wells. One is 100-feet below ground surface (bgs) and the other is 150-feet bgs. The shallower well was not sampled as there was not enough water for the micro-bailer to collect a sample. The deeper casing yielded enough water to sample although it was rather difficult using the 1" bailer. Half the water would leak out by the time it was pulled up the 150 feet.

SURFACE SAMPLING

Surface sampling took two full days as there were 18 samples to be collected. Other than being slightly time consuming, sampling of the surface water locations went as planned.

Reference: August Water Sampling Event

VEGTATION MONITORING

Vegetation data was collected at VM3, the final site to be established. Other sites were established in July 2017.

IMPROVEMENTS FOR FUTURE SAMPLING

- 200-foot water sensor is required to measure the water level at MW14.
- Quality micro-bailers are need. They need to be heavy enough to drop 150-feet and provide a better seal so not to leak
- Use a flow-thru cup for YSI data collection at small diameter casing subsurface locations

1.3 STREAM GAGING

Two stream gaging stations were set up south of the percolation beds (Photo 1 & 2). The gaging stations were constructed using two 1.5'x4' HDPE sheets to channel flow into a measured area. The measured weir data is below:

WEIR 1 (SW17)

Width: 2.21'
Water depth(s): Right stream – 0.49' Left stream – 0.52' Middle stream – 0.61'
Velocity: 0.31 ft/sec
Calculated flow: 0.37 CF/sec

WEIR 2 (SW18)

Width: 3.22'
Water depth(s): Right stream – 0.73' Left stream – 0.56' Middle stream – 0.70'
Velocity: 0.28 ft/sec
Calculated flow: 0.60 F/sec

1.4 SAMPLE RESULTS

The attached table summarizes detected analytes. All others were below detectable limits. Note the maximum detectable limit for total coliform is 2420 col/100mL. Complete results can be found in SGS reports.

1.5 DATA QUALITY

One subsurface and two surface samples were duplicated to ensure lab results quality. The relative percent difference between the fecal coliform (FC) and E. Coli results for SW12 and its duplicate are of concern. Being that this data is for background purposes only, we will continue to monitor future FC and E. Coli results closely. All other comparisons appear normal. The attached table summarizes the relative percent differences between the samples and duplicates.

Attachment: Photo Log

August Photo Log

Photo 1:
Installation of Weir 1

Photo 2:
Installation of Weir 2

Photo 3:
Sampling at SW15

Photo: 4
Sampling at SW14

Attachment: Results Summary Table

Detectable Results Summary Table and
Data Qualty Summary Table

August-2017

	B1	B1.1*	B3	B4	B11	MW6	MW8	MW14
Date Collected	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/31/2017	8/31/2017	8/31/2017
Time	13:45	13:45	14:15	12:38	14:53	9:44	10:49	11:37
Sample Type	Sub-surface	Sub-surface	Sub-surface	Sub-surface	Sub-surface	Sub-surface	Sub-surface	Sub-surface
Water Temp (°C)	3.61	3.61	4.5	6.25	4.56	3.12	4.26	5.17
Conductivity	174	174	152	325	260	144	162	-
pH	8.25	8.25	8.39	7.37	7.41	8.42	7.57	-
DO	1.35	1.35	4.2	11.61	1.9	1.46	2.38	-
Total Nitrate/ Nitrite (mg/L)	ND	ND	ND	1.49	ND	ND	ND	ND
TKN (mg/L)	ND	ND	2.01	ND	ND	ND	ND	1.45
Ammonia (mg/L)	ND	ND	0.298	ND	0.166	ND	0.131	0.122
FC (col/mL)	ND	ND	ND	ND	10	ND	ND	ND

*denotes duplicate sample
** Value of "2421" means result was greater than 2420

	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	SW10	SW11	SW12	SW12.1*	SW13
Date Collected	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017
Time	9:22	9:23	10:02	10:15	10:23	11:24	11:35	12:20	12:04	11:54	13:15	13:33	13:33	13:47
Sample Type	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface
Water Temp (°C)	9.51	8.41	12.14	9.57	11.59	12.7	12.45	10.73	12.38	12.58	9.66	11.32	11.32	11.61
Conductivity	181	191	251	280	368	352	193	195	353	225	327	238	238	234
pH	6.62	6.13	6.7	6.72	7.1	6.92	6.67	6.67	7.08	6.55	7.01	7.16	7.16	6.75
DO	1	1.85	0.72	3.04	5.72	4.32	2.13	1.83	4.52	2.18	1.51	2.95	2.95	2.07
TSS (mg/L)	19	265	195	109	70.3	226	52	240	85.5	72	173	244	240	81.3
TKN (mg/L)	ND(0.500)	1.78	ND(0.500)	1.33	ND(0.500)	2.87	ND(0.500)	2.78	ND(0.500)	ND(0.500)	1.44	3.04	3.51	1.36
Total P (mg/L)	0.07	0.144	0.132	0.0874	0.0603	0.3	0.0967	0.27	0.163	0.0938	0.333	0.439	0.489	0.19
BOD (mg/L)	9.48	12.3	6.06	13.8	8.25	4.62	3.98	8.37	6.38	7.5	8.58	7.08	9.72	2.49
FC (col/100mL)	1110	10	30	10	18	2	5	ND(1)	5	16	ND(1)	330	600	160
E. Coli (col/100mL)	1733	46	2	8	12	6	7	2	ND(1)	12	2	30	18	187
TC (col/100mL)**	2420	2421	2421	2421	2420	2421	2421	2421	2421	2421	2421	2421	2421	2421

Site ID	SW14	SW15	SW16	SW16.1*
Date Collected	8/30/2107	8/30/2107	8/30/2107	8/30/2017
Time	9:45	9:30	9:20	9:20
Sample Type	Surface	Surface	Surface	Surface
Water Temp (°C)	9.35	10.96	8.92	8.92
Conductivity	346	256	145	145
pH	7.12	22:04	6.76	6.76
DO	166	6:43	0.91	0.91
TSS (mg/L)	370	0:00	805	859
TKN (mg/L)	2.15	1.72	8.56	14.5
Total P (mg/L)	0.58	0.154	0.529	0.671
BOD (mg/L)	3.14	3.51	6.12	6.75
FC (col/100mL)	280	160	ND	ND
E. Coli (col/100mL)	613	326	1	3
TC (col/100mL)**	2420	2421	2421	2421
Arsenic (mg/L)	11	ND	ND	ND
Barium (mg/L)	46.2	23.9	31.9	36.9

Site ID	SW17	SW18
Date Collected	8/30/2107	8/30/2017
Time	11:23	11:00
Sample Type	Surface	Surface
Water Temperature (°C)	8.5	9.27
Conductivity	450	525
pH	7.37	7.42
DO	6.21	6.44
Total Nitrate/Nitrite (mg/L)	2.18	4.88
TSS (mg/L)	5.77	6.84
Ammonia (mg/L)	0.122	0.131
Total P (mg/L)	0.264	0.91
BOD (mg/L)	ND	2.64
FC (col/100mL)	120	55
E. Coli (col/100mL)	236	140
TC (col/100mL)**	1203	2421

Detectable Results Summary Table and
Data Qualty Summary Table

August-2017

	B1	Dup1	% Diff	SW12	Dup2	% Diff	SW16	Dup3	% Diff
Nitrate (mg/L)	ND	ND	**0.0%**	ND	ND	**0.0%**	ND	ND	**0.0%**
Nitrite (mg/L)	ND	ND	**0.0%**	ND	ND	**0.0%**	ND	ND	**0.0%**
Total Nitrate/Nitrite	ND	ND	**0.0%**	ND	ND	**0.0%**	ND	ND	**0.0%**
TSS (mg/L)	-	-	**-**	244	240	**1.65%**	805	859	**6.49%**
TKN (mg/L)	ND	ND	**0.0%**	3.04	3.51	**14.35%**	8.56	14.5	**51.52%**
Ammonia (mg/L)	ND	ND	**0.0%**	ND	ND	**0.0%**	ND	ND	**0.0%**
Total P (mg/L)	-	-	**-**	0.439	0.489	**10.78%**	0.529	0.671	**23.67%**
BOD (mg/L)	-	-	**-**	7.08	9.72	**31.43%**	6.12	6.75	**9.79%**
FC (col/100mL)	ND	ND	**0.0%**	330	600	**58.06%**	ND	ND	**0.0%**
E. Coli (col/100mL)	-	-	**-**	30	18	**50.00%**	1	3	**100.00%**
TC ** (col/100mL)	-	-	**-**	2421	2421	**0.00%**	2421	2421	**0.0%**
Arsenic (mg/L)	-	-	**-**	-	-	**-**	ND	ND	**0.0%**
Barium (mg/L)	-	-	**-**	-	-	**-**	31.9	36.9	**14.53%**
Cadmium (mg/L)	-	-	**-**	-	-	**-**	ND	ND	**0.0%**
Chromium (mg/L)	-	-	**-**	-	-	**-**	ND	ND	**0.0%**
Copper (mg/L)	-	-	**-**	-	-	**-**	ND	ND	**0.0%**
Lead (mg/L)	-	-	**-**	-	-	**-**	ND	ND	**0.0%**
Selenium (mg/L)	-	-	**-**	-	-	**-**	ND	ND	**0.0%**
Silver (mg/L)	-	-	**-**	-	-	**-**	ND	ND	**0.0%**
Mercury (mg/L)	-	-	**-**	-	-	**-**	ND	ND	**0.0%**
Zinc (mg/L)	-	-	**-**	-	-	**-**	ND	ND	**0.0%**

Attachment: Data Collection Forms

Stantec

Field Report

FIELD DATA

Collected by/ Team Lead:			Collection Date:
John Marshall			8/29/2017
Field Team: Jake Alward and Riley Bronga			**Weather:** Cloudy
RSM01 reviewed and RSM02 Completed? (Yes) No	**Temperature:** 56°F	**Equipment Used:** YSI 556	**Equipment Calibrated?** Yes ☑ No ☐

Site ID	Time	Sample Type	Water Temperature (°C)	Conductivity (subsurface)	pH (surface)	DO (surface) (mg/l)	Well Purged? (Yes or No)	Visible Surface Water? Depth? (Yes or No)	Depth to Groundwater (feet bgs)	Photo Taken? (Yes or No)	Lab Sample ID (complete COC)	Comments
SW1	9:22	(Surface) / Subsurface Duplicate	9.51	181	6.62	1.0						
SW 2	9:43	(Surface) / Subsurface Duplicate	8.41	191	6.13	1.85						
SW3	10:02	(Surface) / Subsurface Duplicate	12.14	251	6.70	0.72						
SW4	10:15	(Surface) / Subsurface Duplicate	9.57	280	6.72	3.04						
SW5	10:23	(Surface) / Subsurface Duplicate	11.59	368	7.10	5.72						
SW6	11:24	(Surface) / Subsurface Duplicate	12.70	352	6.92	4.32						
SW7	11:35	(Surface) / Subsurface Duplicate	12.45	193	6.67	2.13						
SW8	12:20	(Surface) / Subsurface Duplicate	10.73	195	6.67	1.83						
SW9	12:04	(Surface) / Subsurface Duplicate	12.38	353	7.08	4.52						

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Field Report

FIELD DATA

Collected by/ Team Lead:			Collection Date:
John Marshall			8/29/17-8/30/17
Field Team: Jake Alward and Riley Bronga			**Weather:** Cloudy, Windy
RSM01 reviewed and RSM02 Completed? Yes (circled) No	**Temperature:** 53-57°F	**Equipment Used:** YSI 556	**Equipment Calibrated?** Yes ☑ No ☐

Site ID	Time	Sample Type	Water Temperature (all)	Conductivity (subsurface)	pH (surface)	DO (surface)	Well Purged? (Yes or No)	Visible Surface Water? Depth? (Yes or No)	Depth to Groundwater (feet bgs)	Photo Taken? (Yes or No)	Lab Sample ID (complete COC)	Comments
SW10	11:54	(Surface) / Subsurface Duplicate	12.58	225	6.55	2.18						Collected 8/29
SW11	13:15	(Surface) / Subsurface Duplicate	9.66	327	7.01	1.51						Collected 8/29
SW12	13:33	(Surface) / Subsurface Duplicate	11.32	238	7.16	2.95						Collected 8/29
SW13	13:47	(Surface) / Subsurface Duplicate	11.61	234	6.75	2.07						Collected 8/29
SW14	9:45	(Surface) / Subsurface Duplicate	9.35	346	7.12	1.66						Collected 8/30
SW15	9:30	(Surface) / Subsurface Duplicate	10.96	256	6.92	2.28						Collected 8/30
SW16	9:20	(Surface) / Subsurface Duplicate	8.92	145	6.76	0.91						Collected 8/30
SW17	11:23	(Surface) / Subsurface Duplicate	8.5	450	7.37	6.21						Collected 8/30
SW18	11:00	(Surface) / Subsurface Duplicate	9.27	525	7.42	6.44						Collected 8/30

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Field Report

FIELD DATA

Collected by/ Team Lead:			Collection Date:
John Marshall			8/29/17-8/30/17
Field Team: Jake Alward and Riley Bronga			**Weather:** Cloudy, Windy
RSM01 reviewed and RSM02 Completed? Yes (circled) No	**Temperature:** 53-57°F	**Equipment Used:** YSI 556	**Equipment Calibrated?** Yes ☑ No ☐

Site ID	Time	Sample Type	Water Temperature (all)	Conductivity (subsurface)	pH (surface)	DO (surface)	Well Purged? (Yes or No)	Visible Surface Water? Depth? (Yes or No)	Depth to Groundwater (feet bgs)	Photo Taken? (Yes or No)	Lab Sample ID (complete COC)	Comments
DUP1	13:33	(Surface) / Subsurface Duplicate	11.32	238	7.16	2.95					D1	Collected 8/29, SW12
DUP2	9:20	(Surface) / Subsurface Duplicate	8.92	145	6.76	0.91					D2	Collected 8/30, SW16
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										

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Field Report

FIELD DATA

Collected by/ Team Lead:			Collection Date:
John Marshall			8/30/2017
Field Team: Jake Alward and Riley Bronga			**Weather:** Cloudy
RSM01 reviewed and RSM02 Completed? Yes (Yes) No	**Temperature:** 57°F	**Equipment Used:** YSI 556	**Equipment Calibrated?** Yes ☑ No ☐

Site ID	Time	Sample Type	Water Temperature (all)	Conductivity (subsurface)	pH (surface)	DO (surface)	Well Purged? (Yes or No)	Visible Surface Water? Depth? (Yes or No)	Depth to Groundwater (feet toc)	Detph to bottom from toc	Lab Sample ID (complete COC)	Comments
B1	13:45	Surface / (Subsurface) Duplicate	3.61	174	8.25	1.35	Y	Y	0.89	20.13	B1	1" diameter pipe, purged 3x wet volume, duplicate 3
B3	14:15	Surface / (Subsurface) Duplicate	4.50	152	8.39	4.2	Y	N	2.34	19.53	B3	1" diameter pipe, purged 3x wet volume, fine sediment at bottom of well
B4	12:38	Surface / (Subsurface) Duplicate	6.25	325	7.37	11.61	Y	N	15.9	20.05	B4	1" diameter pipe, purged 3x wet volume
B11	14:53	Surface / (Subsurface) Duplicate	4.56	260	7.41	1.90	Y	N	4.75	17.25	B11	1" diameter pipe, purged 0.5 gallons
Dup3	13:45	Surface / Subsurface Duplicate	3.61	174	8.25	1.35	Y	Y	0.89	20.13	D3	Duplicate #3, taken from B1
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										

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Field Report

FIELD DATA

Collected by/ Team Lead:			Collection Date:
John Marshall			8/31/2017
Field Team: Jake Alward and Riley Bronga			**Weather:** Cloudy
RSM01 reviewed and RSM02 Completed? Yes (Yes) No	**Temperature:** 57°F	**Equipment Used:** YSI 556	**Equipment Calibrated?** Yes ☑ No ☐

Site ID	Time	Sample Type	Water Temperature (all)	Conductivity (subsurface)	pH (surface)	DO (surface)	Well Purged? (Yes or No)	Visible Surface Water? Depth? (Yes or No)	Depth to Groundwater (feet toc)	Depth to bottom from toc	Lab Sample ID (complete COC)	Comments
MW6	09:44	Surface / (Subsurface) Duplicate	3.12	144	8.42	1.46	Y	Y	0	49.10	MW6	2" diameter pipe, artesian aquifer, constantly flowing
MW8	10:49	Surface / (Subsurface) Duplicate	4.26	162	7.57	2.38	Y	Y	1.42	50.45	MW8	2" diameter pipe, rebound to ground surface immediately
MW14	11:37	Surface / (Subsurface) Duplicate	5.17	-	-	-	Y	N	-	-	MW14	1" diameter pipe, water tape too short to measure, only 1 casing has water
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										
		Surface / Subsurface Duplicate										