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February 12, 2021

Ms. Andrea Klopenstein, P.E.
Assistant Director, Storm Water Engineer
City of Peoria Public Works Department
3505 N. Dries Ln
Peoria, IL 61604

Dear Ms. Klopenstein:

RE: Review of Storm Water Samples Collected for the Separate Storm Sewer System (MS4) Permit for the calendar year 2020.

The following is a summary report for storm water samples collected in 2020 from sample points P1 through P4. Include in this summary report are:

- ◆ Goals of the MS4 Permit, Sample Point Location and Descriptions
- ◆ Summary of Procedures Utilized to Collect Storm Water Samples
- ◆ Figure showing Sample Point Locations
- ◆ Analytical Data Summary Including Trends and Potential Areas of Concern
- ◆ Laboratory Analytical Data

Four sample locations (P1 through P4) were selected to meet requirements of the MS4 Permit and determine whether surface water quality is improving, remaining stable, or decreasing. The sample point locations are located outside of the known Combined Sewer System (CSO) system and should be storm water flowing within the City of Peoria boundaries. Sampling point 1 is located the farthest to the north and encompasses a mix of residential, industrial and commercial properties. Sampling point 2 covers the northwest and some of the middle parts of the city with a mix of residential, commercial and industrial properties. Sampling point 3 is a mix of residential and commercial properties, and sample point 4 encompasses the eastern portions of the city and is predominately residential. The four sample point locations are shown on attached Figure 1.

Per General NPDES Permit ILR40, storm water samples must be collected within 48 hours of a precipitation event greater than or equal to one quarter inch of precipitation in a 24 hour period. Only one storm water grab sample per location is required to be collected per quarter. If there is insufficient precipitation during a quarter, storm water samples would not be collected. Storm water samples were collected every quarter in 2020 beginning with the first set of samples collected on February 25, 2020.

Storm water samples were grab samples and were collected directly from the stream. Flow rate is not factored in sample collection as flow monitoring devices are not installed at the sampling point. Field observation sheets noting precipitation amount, weather conditions, sample appearance, etc. were completed at each sampling point every quarter, and are attached in Appendix A. There were no observed factors that appeared to bias sample results. Some of those factors (if present) could be sheens, discoloration, smell, animal carcass/feces, etc. The parameters analyzed are required under General NPDES Permit ILR40 Part V.(A)(2)(c) and are shown in the attached Tables 1 through 4 (2020 laboratory results) and graphically in Figures 2 through 8 (all data). A graph was not generated for the parameter grease and oil. With the exception of a grease and oil concentration of 5.9 ug/l reported 1st quarter at Sampling point 4, the rest of the grease and oil concentrations in 2020 were all reported at less than the laboratory reporting limit (not detected). As shown in the figures, the chloride, total suspended solids, nitrogen, phosphorus and TKN ammonia concentrations trended downward in 2020 when compared to the previous year concentrations. The nitrate concentration trended upward the first three quarters of 2020 but decreased for the recent 4th quarter 2020 event.

The fecal coliform concentrations in 2020 were consistent across all four sampling points. There does not appear to be a disparity between the upgradient and downgradient locations. The highest fecal coliform result for the 1st quarter 2020 sampling event was recorded at the most upgradient location (Sample Pt. 1). For the third and fourth quarters of 2020, at all four sample locations, the fecal coliform result was reported at > 2420 CFU/100 ml as shown in Tables 1 through 4. In the graphical trend analysis (Figure 8) the 3rd and 4th quarter 2020 concentration levels are shown at concentration level of 2420 CFU/100 ml. In general, the fecal concentrations at all four sample locations are relatively high compared to drinking water, but not surprising in that the streams run through a combination of residential, industrial and natural environments at the sample locations.

Analyzing the 2019 and 2020 fecal concentration data it appears that when precipitation level is at least 0.4 to 0.5 inches in twenty-four period the fecal concentration is in the 2420 CFU/100 ml or greater concentration level. Again not surprising, that with more precipitation, which can create higher flow rates, the fecal concentration level is higher as stagnant material is moved downstream. The higher precipitation level does appear to affect the fecal concentration more than the other parameters. In 2021, the fecal coliform concentration will be studied, particularly looking for evidence of trends related to precipitation amount, visible stream velocity and location and establish a background fecal coliform concentration.

Ms. Andrea Klopenstein, P.E.
City of Peoria, Public Works
February 12, 2021
Page 3

As shown in the figures, a baseline is being established for the individual parameter concentrations which future concentrations levels will be compared. After 2021, we will have three years of analytical data but only 12 sample events for reference. We can begin to understand if surface water quality is improving, remaining stable, or decreasing.

Sincerely,
Foth Infrastructure & Environment, LLC



Joshua C. Gabehart, P.E.
Lead Environmental Engineer
Licensed in IL, IA, AR, GA



Mark A. Williams
Lead Environmental Scientist

Enclosures:

- Figure 1 - Map of Sample Point Locations
- Figure 2 - Total Chloride Concentration Graph
- Figure 3 - Total Suspended Solids Concentration Graph
- Figure 4 - Total Nitrogen Concentration Graph
- Figure 5 - Total Nitrate Concentration Graph
- Figure 6 - Total Phosphorous Concentration Graph
- Figure 7 - TKN Ammonia Concentration Graph
- Figure 8 - Total Fecal Coliform Concentration Graph
- Table 1 – Sampling Point 1 Laboratory Analytical Results
- Table 2 – Sampling Point 2 Laboratory Analytical Results
- Table 3 – Sampling Point 3 Laboratory Analytical Results
- Table 4 – Sampling Point 4 Laboratory Analytical Results
- Appendix A - Field Observation Sheets

Figures

Streams in the CSO Area

Centerlines	Combined Through Storm Sewers
Creeks & Streams	Partially Separate
Creeks & Streams	Separate
City Boundaries	Zoning
City Boundaries	Commercial
CSO Area	Industrial
Combined Direct	Residential
★ Sample Points	

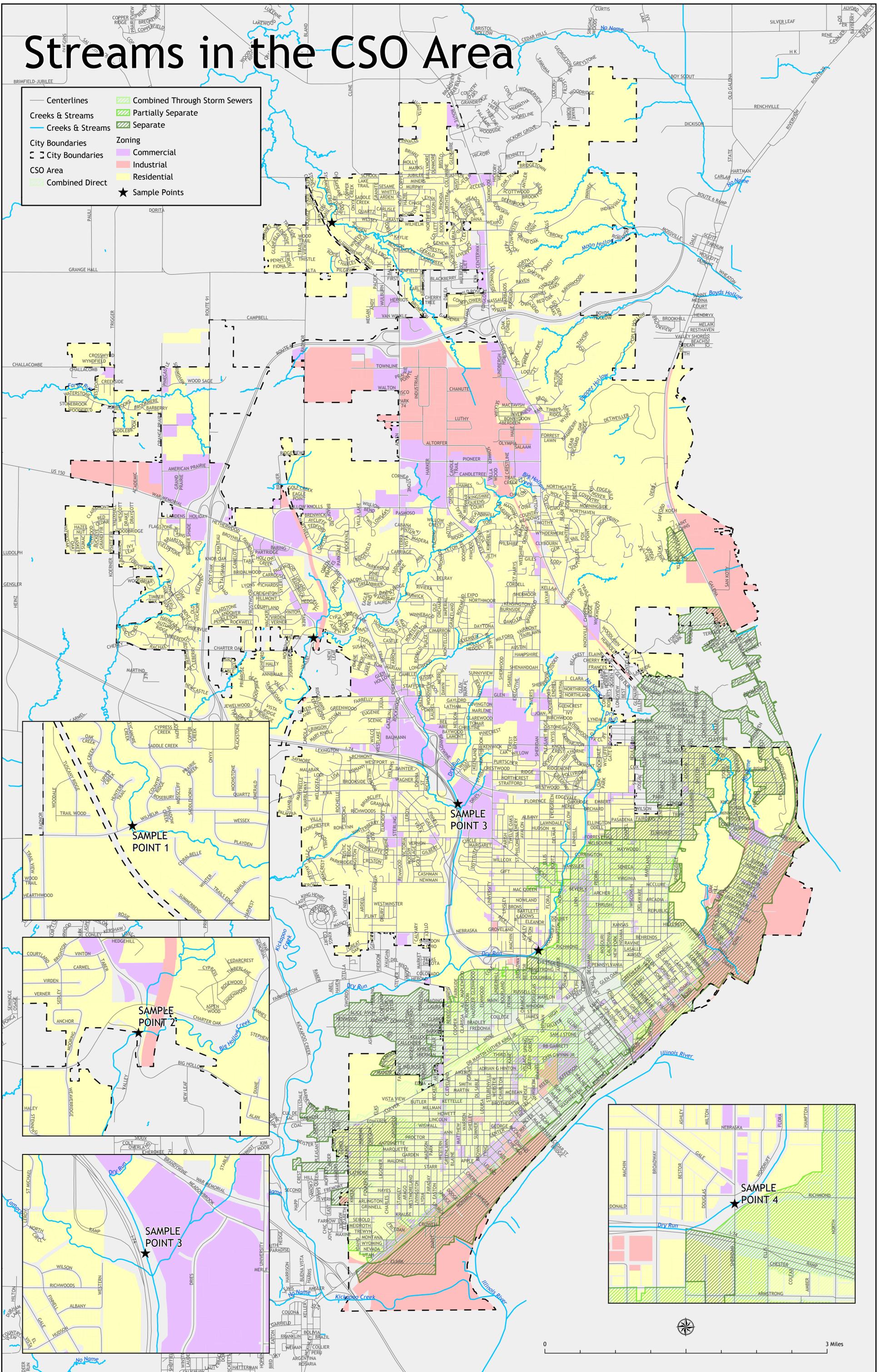
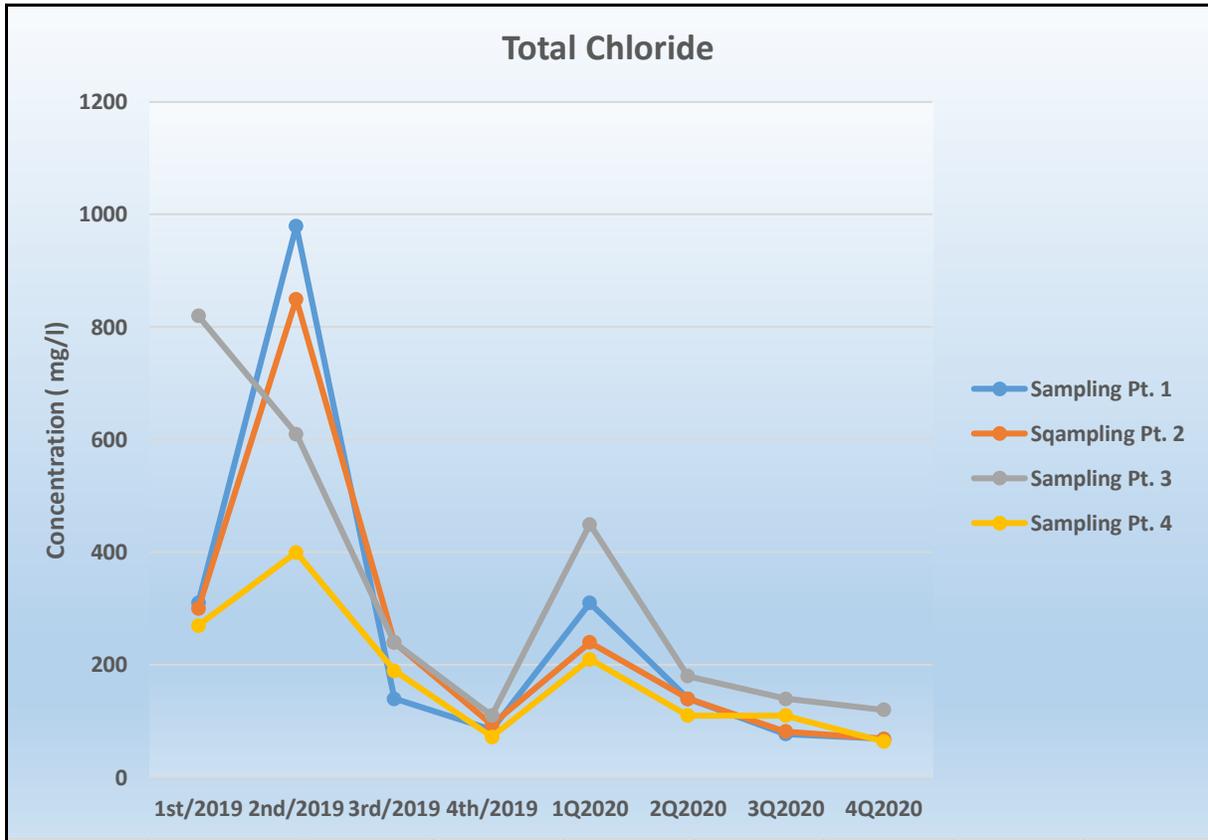
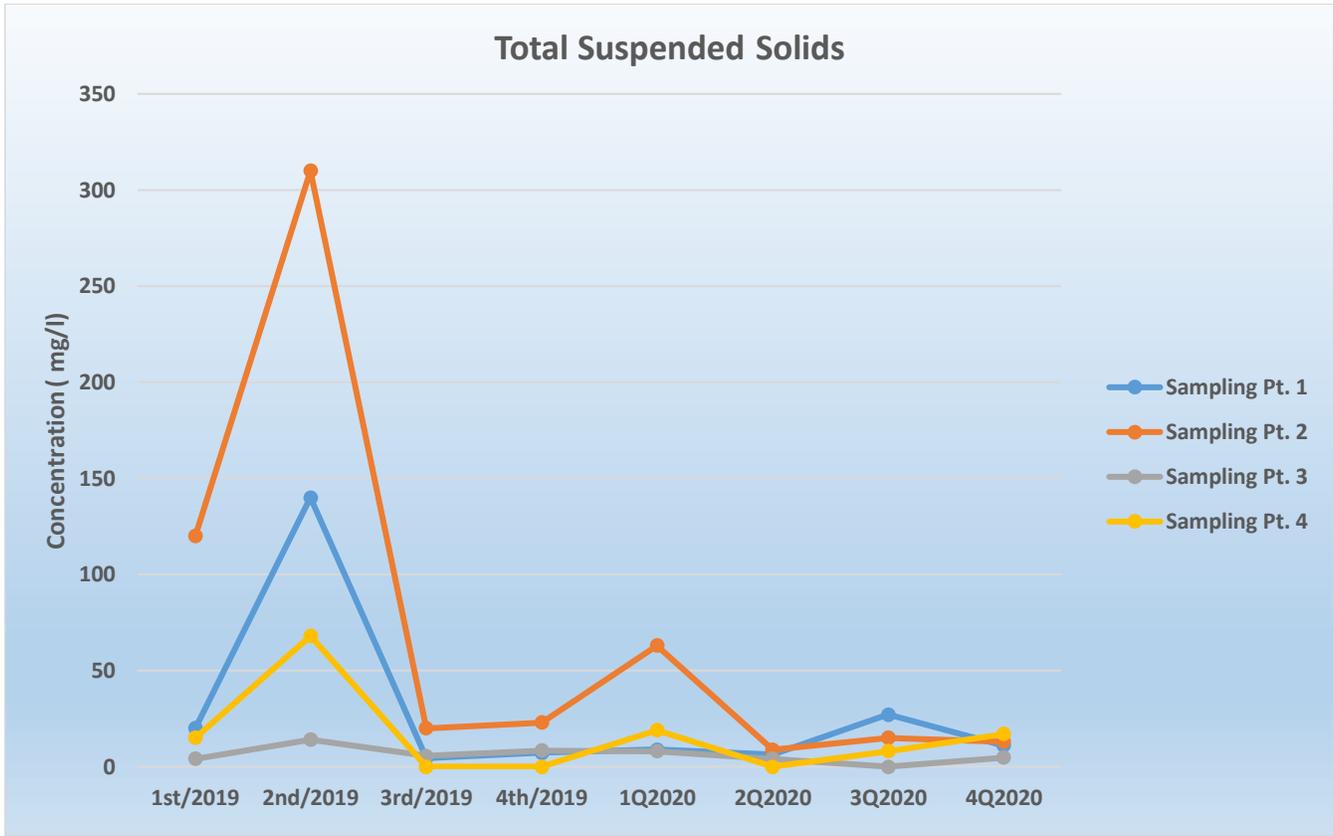


Figure 2
Total Chloride
1Q19-4Q20



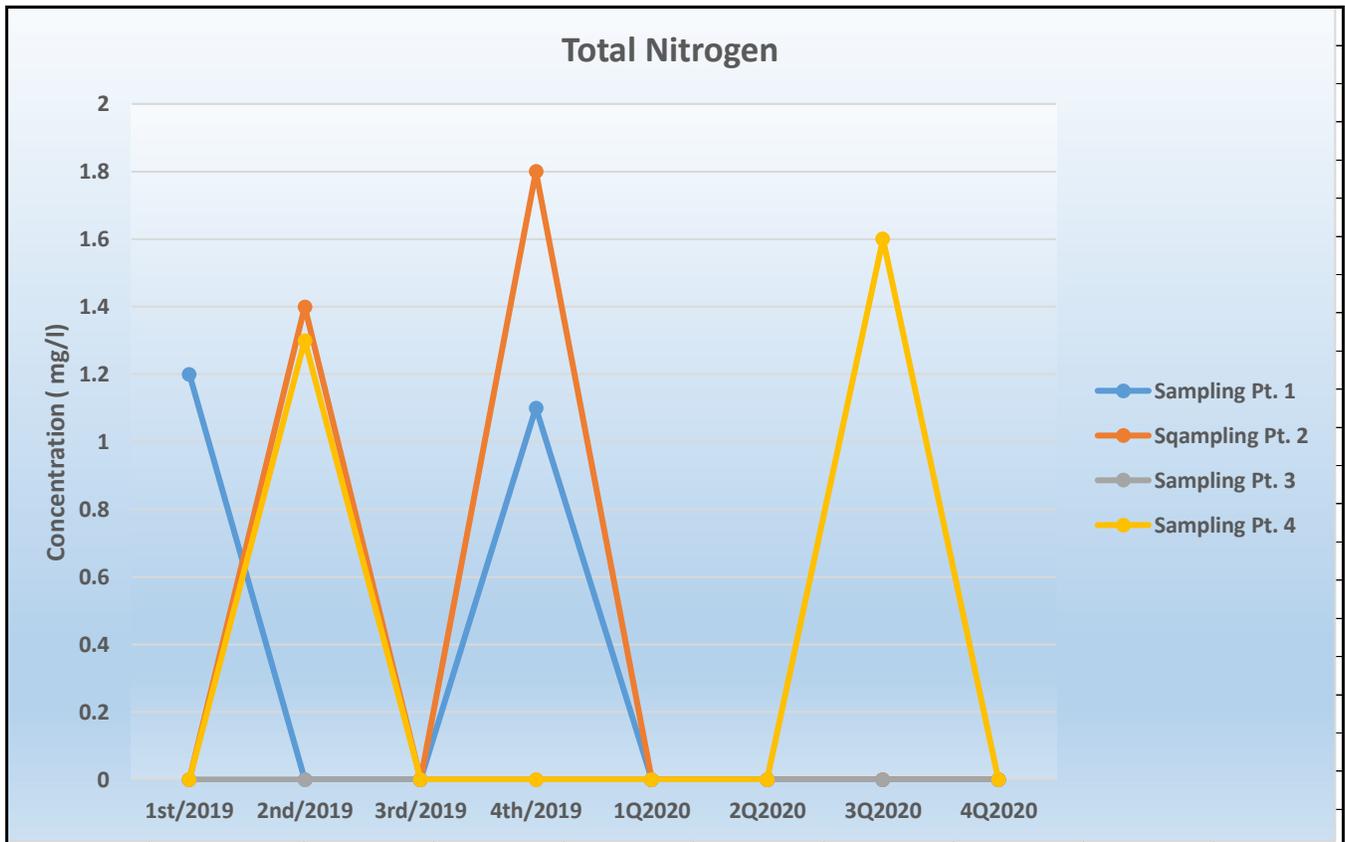
	Chloride	Pt 1	Pt 2	Pt 3	Pt 4		
	1st/2019	310	300	820	270		
	2nd/2019	980	850	610	400		
	3rd/2019	140	240	240	190		
	4th/2019	85	94	110	72		
	1Q2020	310	240	450	210		
	2Q2020	140	140	180	110		
	3Q2020	77	82	140	110		
	4Q2020	69	69	120	64		

Figure 3
Total Suspended Solids
1Q19-4Q19



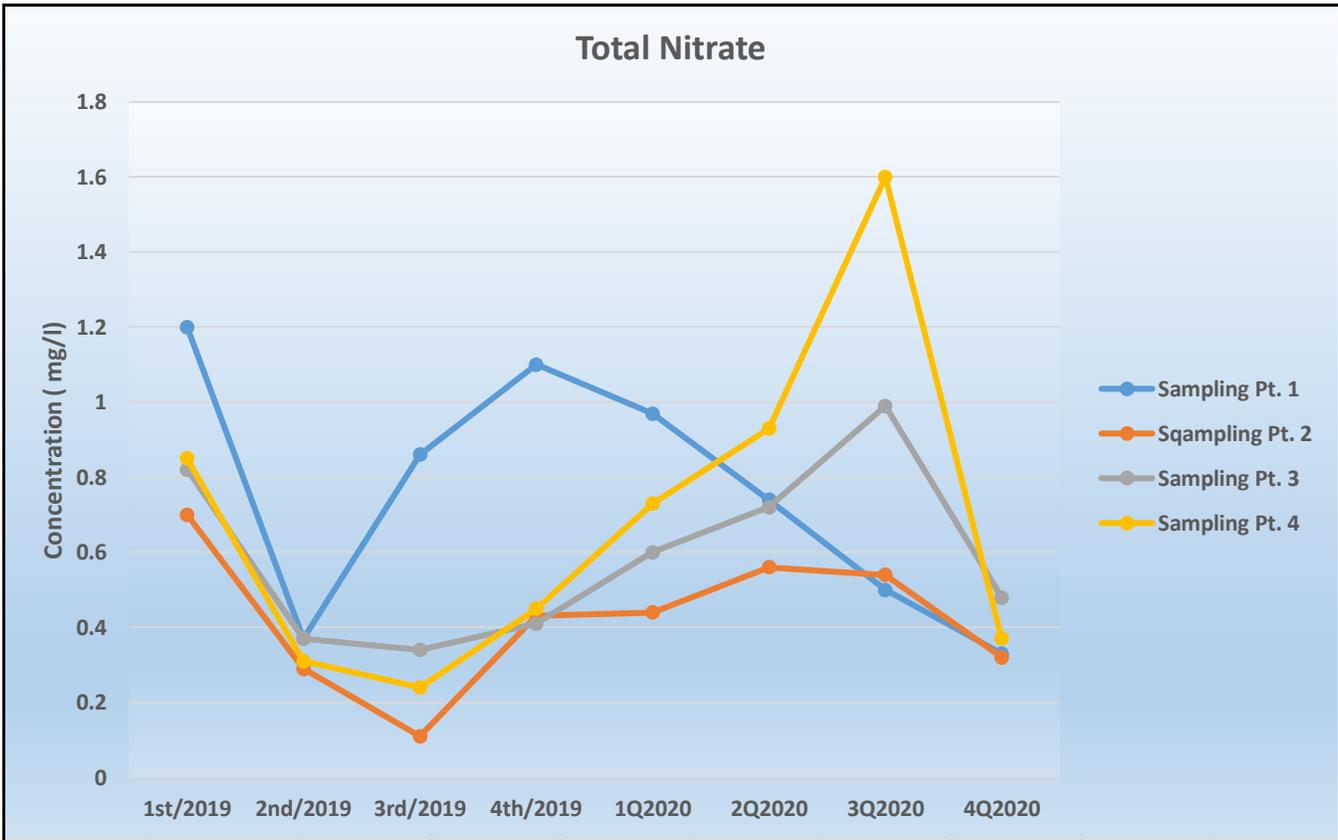
TSS	Pt 1	Pt 2	Pt 3	Pt 4
1st/2019	20	120	4	15
2nd/2019	140	310	14	68
3rd/2019	4.4	20	5.6	<4
4th/2019	7.2	23	8.4	<4
1Q2020	8.8	63	8	19
2Q2020	6.4	8.8	4	<4.0
3Q2020	27	15	<4.0	8
4Q2020	11	13	4.8	17

Figure 4
Total Nitrogen
1Q19-4Q19



	Nitrogen	Pt 1	Pt 2	Pt 3	Pt 4			
	1st/2019	1.2	<1.0	<1.0	<1.0			
	2nd/2019	<1.0	1.4	<1.0	1.3			
	3rd/2019	<1.0	<1.0	<1.0	<1.0			
	4th/2019	1.1	1.8	<1	<1			
	1Q2020	<1.0	<1.0	<1.0	<1.0			
	2Q2020	<1.0	<1.0	<1.0	<1.0			
	3Q2020	<1.0	<1	<1.0	1.6			
	4Q2020	<1.0	<1.0	<1.0	<1.0			

Figure 5
Total Nitrate
1Q19-4Q19



	Nitrate	Pt 1	Pt 2	Pt 3	Pt 4			
	1st/2019	1.2	0.7	0.82	0.85			
	2nd/2019	0.37	0.29	0.37	0.31			
	3rd/2019	0.86	0.11	0.34	0.24			
	4th/2019	1.1	0.43	0.41	0.45			
	1Q2020	0.97	0.44	0.6	0.73			
	2Q2020	0.74	0.56	0.72	0.93			
	3Q2020	0.5	0.54	0.99	1.6			
	4Q2020	0.33	0.32	0.48	0.37			

Figure 6
Total Phosphorous
1Q19-4Q19

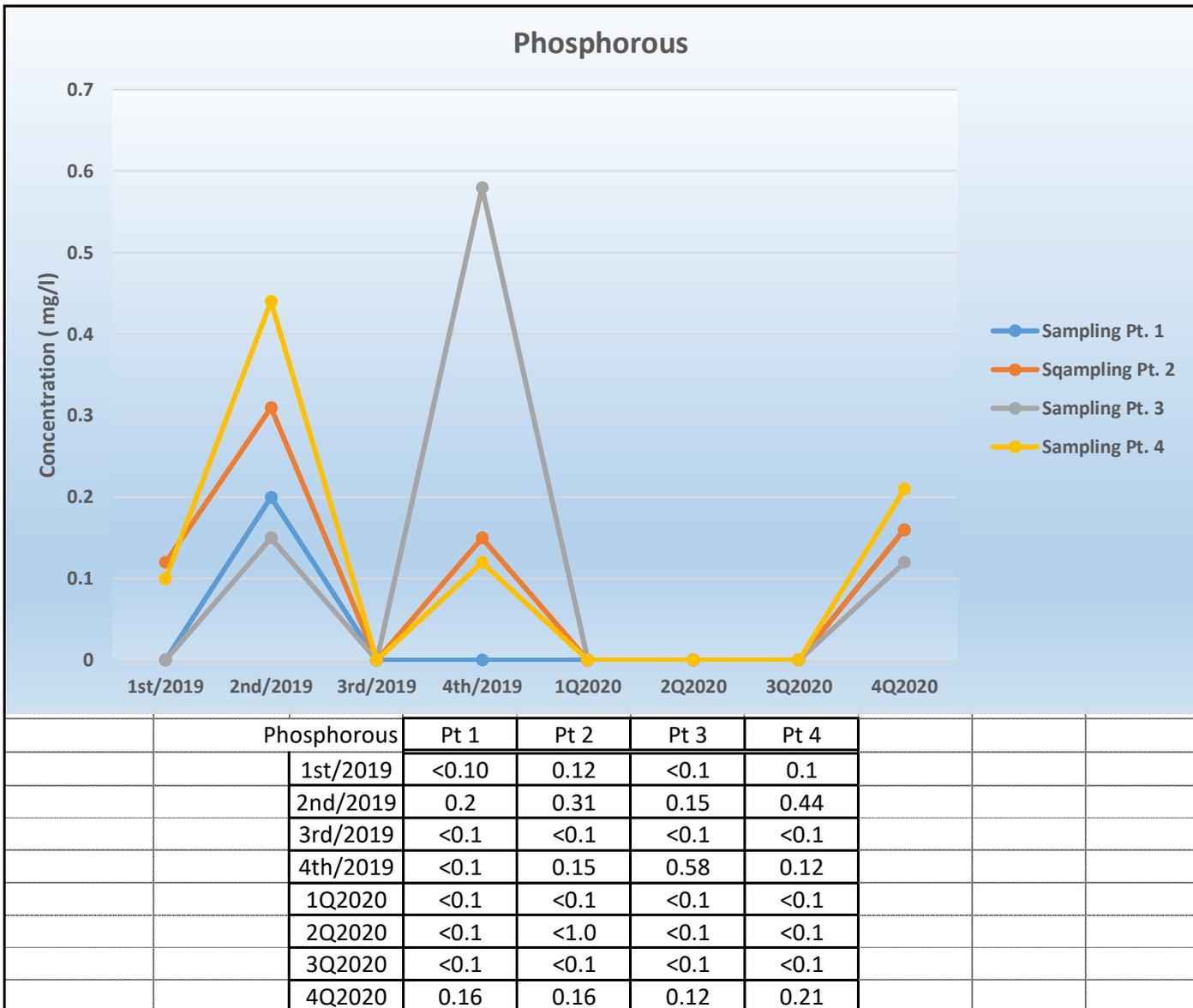


Figure 7
TKN Ammonia
1Q19-4Q19

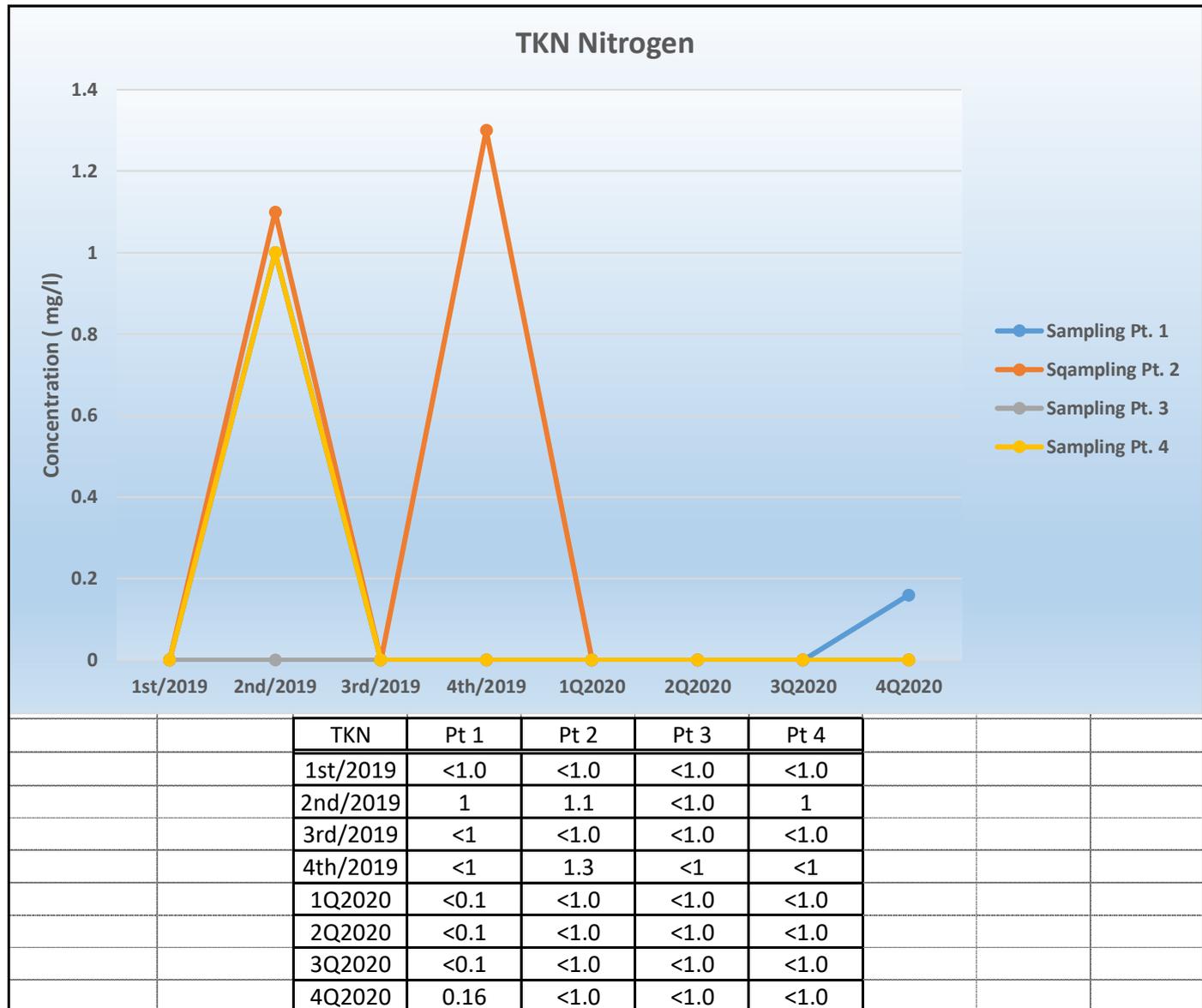
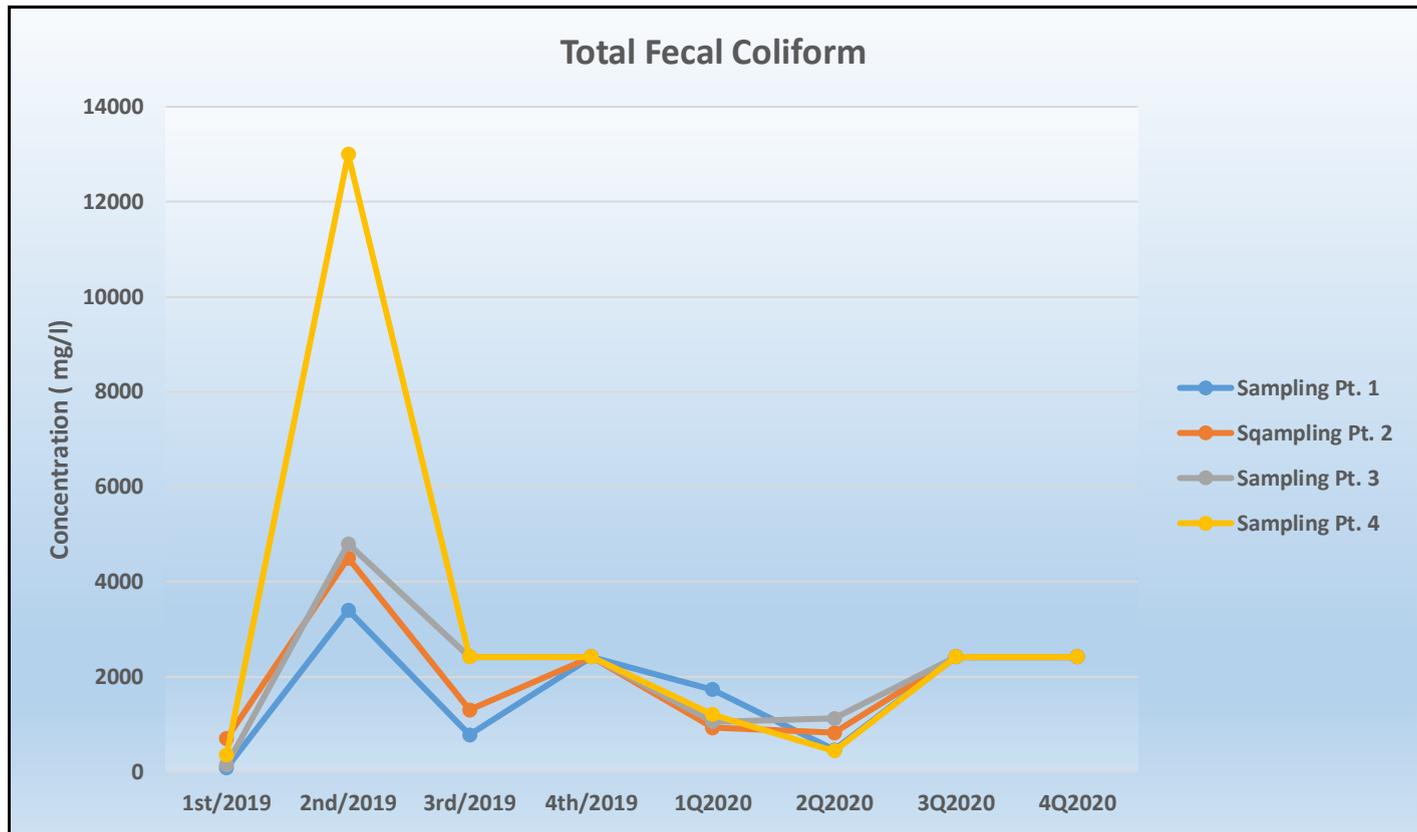


Figure 8
Total Fecal Coliform
1Q19-4Q19



Fecal Coliform		Pt 1	Pt 2	Pt 3	Pt 4
	1st/2019	81	700	140	350
	2nd/2019	3400	4500	4800	13000
	3rd/2019	770	1300	2420	2420
	4th/2019	2420	2420	2420	2420
	1Q2020	1730	921	1050	1200
	2Q2020	461	816	1120	435
	3Q2020	2420	2420	2420	2420
	4Q2020	2420	2420	2420	2420

Tables

Table 1
Sample Point 1 Analytical Results from
1Q20-4Q20

Parameters	Units	1Q2020	2Q2020	3Q2020	4Q2020
Chloride	mg/l	310	140	77	69
Oil and Grease	mg/l	<5.1	<5.4	<5.0	<5.1
Total Suspended Solids (TSS)	mg/l	8.8	6.4	27	11
Total Nitrogen	mg/l	<1.0	<1.0	<1.0	<1.0
Fecal Coliform	CFU/100 ml	1730	461	>2420	>2420
Nitrate/Nitrite	mg/l	0.97	0.74	0.5	0.33
Phosphorous Total as P	mg/l	<0.1	<0.1	<0.1	0.16
	mg/l	<1	<1.0	<1.0	<1.0
Precipitation					
Last 24 hours	inch	0.42	0.28	5.15	0.49
Last 48 hours	inch	0.42	0.28	5.15	0.49

Table 2
Sample Point 2 Analytical Results
1Q/2020-4Q2020

Parameters	Units	1Q2020	2Q2020	3Q2020	4Q2020
Chloride	mg/l	240	140	82	69
Oil and Grease	mg/l	<5.1	<5.1	<5.0	<5.1
Total Suspended Solids (TSS)	mg/l	63	8.8	15	13
Total Nitrogen	mg/l	<1.0	<1.0	<1	<1.0
Fecal Coliform	CFU/100 ml	921	816	>2420	>2420
Nitrate/Nitrite	mg/l	0.44	0.56	0.54	0.32
Phosphorous Total as P	mg/l	<0.1	<1.0	<0.1	0.16
Total Kjeldahl-Nitrogen (TKN)	mg/l	<1.0	<1.0	<1.0	<1.0
Precipitation					
Last 24 hours	inch	0.42	0.28	5.15	0.49
Last 48 hours	inch	0.42	0.28	5.15	0.49

Table 3
Sample Point 3 Analytical Results
1Q2020-4Q2020

Parameters	Units	1Q2020	2Q2020	3Q2020	4Q2020
Chloride	mg/l	450	180	140	120
Oil and Grease	mg/l	<5.1	<5.2	<5.1	<5.2
Total Suspended Solids (TSS)	mg/l	8	4	<4.0	4.8
Total Nitrogen	mg/l	<1.0	<1.0	<1.0	<1.0
Fecal Coliform	CFU/100 ml	1050	1120	>2420	>2420
Nitrate/Nitrite	mg/l	0.6	0.72	0.99	0.48
Phosphorous Total as P	mg/l	<0.1	<0.1	<0.1	0.12
Total Kjeldahl-Nitrogen (TKN)	mg/l	<1.0	<1.0	<1.0	<1.0
Precipitation					
Last 24 hours	inch	0.42	0.28	5.15	0.49
Last 48 hours	inch	0.42	0.28	5.15	0.49

Table 4
Sample Point 4 Analytical Results
1Q2020-4Q2020

Parameters	Units	1Q2020	2Q2020	3Q2020	4Q2020
Chloride	mg/l	210	110	110	64
Oil and Grease	mg/l	5.9	<5.1	<5.1	<5.4
Total Suspended Solids (TSS)	mg/l	19	<4.0	8	17
Total Nitrogen	mg/l	<1.0	<1.0	1.6	<1.0
Fecal Coliform	CFU/100 ml	1200	435	>2420	>2420
Nitrate/Nitrite	mg/l	0.73	0.93	1.6	0.37
Phosphorous Total as P	mg/l	<0.1	<0.1	<0.1	0.21
Total Kjeldahl-Nitrogen (TKN)	mg/l	<1.0	<1.0	<1.0	<1.0
Precipitation					
Last 24 hours	inch	0.42	0.28	5.15	0.49
Last 48 hours	inch	0.42	0.28	5.15	0.49

Appendix A
Field Observation Sheets

Field Sheet
1st Quarter 2020



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling	
Date:	02/25/2020	
Sampling Location Point:	Sample Pt 1	
Sampling Personnel:	Dakota Ludwig & Mark Williams	

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Normal Conditions	
	Last 24 hours	Last 48 hours
Precipitation:	0.42"	0.42"
Current Outdoor Air Temperature:	35°F	
Current Weather Conditions:	Wintery Mix	

Water Sample Observations

Odor:	None
Appearance:	
Color:	light brown
Turbidity:	Slight
Other:	

Additional Information/Comments

TOS 1015

SWIFE Flow



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	02/25/2020
Sampling Location Point:	Sample Pt 2
Sampling Personnel:	Dakota Ludwig & Mark Williams

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Normal Conditions	
Precipitation:	Last 24 hours 0.42"	Last 48 hours 0.42"
Current Outdoor Air Temperature:	35°F	
Current Weather Conditions:	Wintery Mix	

Water Sample Observations

Odor:	None
Appearance:	
Color:	light brown
Turbidity:	Slight
Other:	

Additional Information/Comments

	TOS 0955
	Swift flow



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	02/25/2020
Sampling Location Point:	Sample Point 3
Sampling Personnel:	Dakota Ladwig & Mark Williams

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Normal Conditions	
Precipitation:	Last 24 hours 0.42"	Last 48 hours 0.42"
Current Outdoor Air Temperature:	36°F	
Current Weather Conditions:	Wintery Mix	

Water Sample Observations

Odor:	None
Appearance:	
Color:	light brown
Turbidity:	Slight
Other:	

Additional Information/Comments

TOS 0940

Swift Flow



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	02/25/2020
Sampling Location Point:	Sample Pt 4
Sampling Personnel:	Dakota Ladwig & Mark Williams

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Normal conditions	
Precipitation:	Last 24 hours 0.42"	Last 48 hours 0.42"
Current Outdoor Air Temperature:	37°F	
Current Weather Conditions:	Wintery Mix	

Water Sample Observations

Odor:	None
Appearance:	
Color:	light brown
Turbidity:	Slight
Other:	

Additional Information/Comments

TOS 0925

Swift flow

Field Sheet
2nd Quarter 2020



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling	
Date:	04/29/2020	
Sampling Location Point:	Sample Point 1	
Sampling Personnel:	Mark Williams & Dakota Ludwig	

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Low flow	
Precipitation:	Last 24 hours	Last 48 hours
	0.28"	0.28"
Current Outdoor Air Temperature:	52°F	
Current Weather Conditions:	Cloudy / Misting	

Water Sample Observations

Odor:	None
Appearance:	light brown
Color:	" "
Turbidity:	slight
Other:	

Additional Information/Comments

TOS: 1025



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	04/29/2020
Sampling Location Point:	Sample Point 2
Sampling Personnel:	Mark Williams & Dakota Ladwig

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Low - Med flow	
Precipitation:	Last 24 hours 0.28"	Last 48 hours 0.28"
Current Outdoor Air Temperature:	52°F	
Current Weather Conditions:	Cloudy / Misting	

Water Sample Observations

Odor:	none
Appearance:	light brown
Color:	"
Turbidity:	low
Other:	

Additional Information/Comments

TOS: 10:05



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling	
Date:	04/29/2020	
Sampling Location Point:	Sample Point 3	
Sampling Personnel:	Mark Williams & Dakota Ludwig	

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	low flow	
Precipitation:	Last 24 hours 0.28"	Last 48 hours 0.28"
Current Outdoor Air Temperature:	53°F	
Current Weather Conditions:	Cloudy	

Water Sample Observations

Odor:	None
Appearance:	light brown
Color:	11
Turbidity:	Slight
Other:	

Additional Information/Comments

TOS: 09:10



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	04/29/2020
Sampling Location Point:	Sample Point 4
Sampling Personnel:	Mark Williams & Dakota Ludwig

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	low flow	
Precipitation:	Last 24 hours 0.28"	Last 48 hours 0.28"
Current Outdoor Air Temperature:	53°	
Current Weather Conditions:	cloudy	

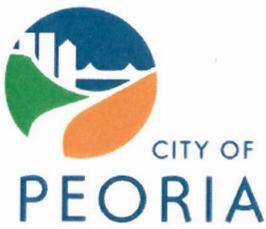
Water Sample Observations

Odor:	-None
Appearance:	light-brown
Color:	" "
Turbidity:	low
Other:	

Additional Information/Comments

TOS: 09100

Field Sheet
3rd Quarter 2020



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	07-16-2020
Sampling Location Point:	Sample Pt 1
Sampling Personnel:	Mark Williams & Dakota Ludwig

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	N/A	
Precipitation:	Last 24 hours 5.15"	Last 48 hours 5.15"
Current Outdoor Air Temperature:	82	
Current Weather Conditions:	Sunny, Wind NW 5 mph	

Water Sample Observations

Odor:	None
Appearance:	lt brown
Color:	" "
Turbidity:	Moderate
Other:	

Additional Information/Comments	Swift flow
	TOS 11:10



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling	
Date:	07-16-2020	
Sampling Location Point:	Sample Pt 2	
Sampling Personnel:	Mark Williams & Dakota Ladwig	

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	N/A	
Precipitation:	Last 24 hours 5.15"	Last 48 hours 5.15"
Current Outdoor Air Temperature:	82	
Current Weather Conditions:	Sunny, wind NW 5mph	

Water Sample Observations

Odor:	None	
Appearance:	lt brn	
Color:	" "	
Turbidity:	Moderate	
Other:		

Additional Information/Comments	Swift flow
	Tos 10:50



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	07-16-2020
Sampling Location Point:	Sample 3
Sampling Personnel:	Mark Williams & Dakota Ludwig

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	N/A	
Precipitation:	Last 24 hours 5.15"	Last 48 hours 5.15"
Current Outdoor Air Temperature:	82	
Current Weather Conditions:	Sunny, wind NW 5mph	

Water Sample Observations

Odor:	None
Appearance:	lt brn
Color:	" "
Turbidity:	Moderate
Other:	

Additional Information/Comments	Swift flow
	TGS 1030



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling	
Date:	07-16-2020	
Sampling Location Point:	Sample Pt 4	
Sampling Personnel:	Mark Williams & Dakota Ludwig	

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Large pile of broken cement (12x20) & debris	
Precipitation:	Last 24 hours	Last 48 hours
	5.15"	5.15"
Current Outdoor Air Temperature:	79	
Current Weather Conditions:	Sunny, wind NW 5 mph	

Water Sample Observations

Odor:	None
Appearance:	lt brn
Color:	lt brn
Turbidity:	slight
Other:	

Additional Information/Comments

swift flow

TOS 10:15

Field Sheet
4th Quarter 2020



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	10/22/20
Sampling Location Point:	Sample Pt 1.
Sampling Personnel:	Alisha Weatherspoon, Mark Williams

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Normal conditions	
	- stream Banks Full	
	Last 24 hours	Last 48 hours
Precipitation:	0.49 inches	0.49 inches
Current Outdoor Air Temperature:	55°	
Current Weather Conditions:	Overcast	

Water Sample Observations

Odor:	None
Appearance:	
Color:	light tan
Turbidity:	slight
Other:	

Additional Information/Comments



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	10/22/20
Sampling Location Point:	Sample Pt #2
Sampling Personnel:	Mark Williams, Alisha Weatherspoon

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Normal	
Precipitation:	Last 24 hours	Last 48 hours
	0.49 inches	0.49 inches
Current Outdoor Air Temperature:	55°	
Current Weather Conditions:	overcast	

Water Sample Observations

Odor:	None
Appearance:	
Color:	light Tan.
Turbidity:	slight
Other:	

Additional Information/Comments

Moderate Flow



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	10/22/20
Sampling Location Point:	Sample pt # 3
Sampling Personnel:	Mark Williams, Alisha Weatherspoon

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Normal conditions	
	Last 24 hours	Last 48 hours
Precipitation:	0.49 inches	0.49 inches
Current Outdoor Air Temperature:	55°	
Current Weather Conditions:	overcast	

Water Sample Observations

Odor:	None
Appearance:	
Color:	light Tan
Turbidity:	slight
Other:	

Additional Information/Comments

Moderate Flow



Storm Water Sample Collection Form

Proj. Name:	City of Peoria, IL - Storm Water Sampling
Date:	10/22/20
Sampling Location Point:	Sample pt. 4
Sampling Personnel:	Mark Williams Alisha Weatherspoon

Conditions of Sampling Point Location

Observations of Sampling Point Location (e.g., debris, downed trees, erosion, excessive sediment, etc.):	Normal Conditions	
	Last 24 hours	Last 48 hours
Precipitation:	0.49 inches	0.49 inches
Current Outdoor Air Temperature:	55°	
Current Weather Conditions:	overcast	

Water Sample Observations

Odor:	None
Appearance:	light Tan
Color:	" "
Turbidity:	slight Turbidity
Other:	Moderate Flow

Additional Information/Comments
