



December 2019

Surface Water Quality Monitoring Report 2019

By the Park, Countryside Crossing,
Southlands & Eagle Creek

Climate Change Adaptation

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EXECUTIVE SUMMARY

The purpose of East St. Paul's 2019 water quality monitoring program was to investigate areas of concerns related to water quality, water levels, and aquatic plant growth in the ponds of Eagle Creek, Southlands, Countryside Crossing and By the Park. The program occurred in order to identify and assess mitigation measures and create a baseline to monitor against future conditions.

The water sampling program occurred between June 13th 2019 and September 19th, 2019. Field measurements of pH, water temperature, dissolved oxygen (DO), and conductivity were collected using a SENSION+ M150 portable water quality meter. Further samples were sent to a Canadian Association for Laboratory Accreditation (CALA) accredited analytical laboratory (ALS Laboratories, Winnipeg, MB) to be analyzed for nitrate + nitrite ($\text{NO}_3 + \text{NO}_2$), ammonia (NH_3), chlorophyll *a*, total phosphorous (TP), total suspended solids (TSS), and turbidity, and in some cases, fecal matter, total chlorine (TCL) and algae identification. Results reflected seasonal changes, including temperature, moisture, and other weather conditions, as well as nutrient inputs.

Results were communicated to the public halfway through the sampling season during the Open House that occurred on August 15th, 2019, and then further summarized in the Open House report that was published in September 2019.

Data collected during the sampling program was analyzed and used to develop recommendations on opportunities to improve water quality conditions. Future sampling programs will reference the baseline data to verify findings and assess the impact of implemented mitigation measures.

Surface Water Quality Monitoring Report 2019

1 INTRODUCTION

PURPOSE

The purpose of ESP's water quality monitoring program was to investigate sources of water quality concerns regarding stormwater retention systems within the RM in order to identify and assess mitigation measures and create a baseline to monitor against future conditions.

BACKGROUND

The RM of East St Paul has several storm water retention ponds and systems of ponds that are also viewed as an amenity. New ponds are found in Countryside Crossing and By the Park. The water quality issues in more established pond systems found in Southlands and Eagle Creek are characterized by excessive algae or aquatic plant growth, and/or odours associated with plant decay under anoxic conditions. Anoxic conditions occur when decay occurs without oxygen and sulphur gases are released as a byproduct. Certain areas are also subject to slumping bank conditions. Most ponds have little to no riparian vegetation and are surrounded by residential properties. In many instances, connectivity with upstream drainage areas is poorly understood. Several ponds receive runoff waters from upstream agricultural areas east of Highway 59 and historically the Meadows Golf Course.

2 METHODOLOGY

SAMPLING PROTOCOL

Ponds were accessed from the shoreline and water samples were collected using a sampling pole (i.e., a clean bucket attached to a long pole) in order to retrieve water from the water column. Sample water was composited in a larger (clean) bucket on the shore; the composite water was then used to collect readings with the portable water quality meter and to fill sample bottles for submission to the analytical laboratory. Sample dates and times were recorded at every site. Samples were sent to a Canadian Association for Laboratory Accreditation (CALA) accredited analytical laboratory (ALS Laboratories, Winnipeg, MB). All lab samples were kept cool and in the dark until submission to the laboratory. Laboratory samples were analyzed for nitrate + nitrite ($\text{NO}_3 + \text{NO}_2$), ammonia (NH_3), chlorophyll *a*, total phosphorous (TP), total suspended solids (TSS), and turbidity; in some cases, fecal matter, total chlorine (TCI) and algae identification were also assessed.

Field measurements of pH, water temperature, dissolved oxygen (DO), and conductivity were collected using a SENSION+ M150 portable water quality meter. The meter was calibrated in the office prior to each sampling event.

SAMPLING DATES AND PARAMETERS

Table 1. Sampling Dates

Full Parameter Sampling	Lab Results Received
June 19 th	June 27 th
June 26 th	July 19 th
July 11 th	July 24 th
July 24 th	August 7 th
August 7 th	August 21 st
August 29 th	September 9 th
September 19 th	October 19 th
Limited Parameter Sampling	
July 17 th	
August 1 st	
August 14 th	
August 21 st	

Limited parameters (pH, DO, temperature, and conductivity) with the portable meter were measured weekly at each pond in July and August. In addition, a full set of parameters were monitored in each pond approximately every two weeks. On these sampling dates, both meter readings (pH, DO, temperature, conductivity) and lab analysis samples (nitrates + nitrites, ammonia, chlorophyll *a*, total phosphorous, total suspended solids, and turbidity) were collected. DO was also measured at the laboratory six times through the summer to check the accuracy of readings from the water quality meter; all results indicated that the water quality meter was reading accurately. Based on information collected during the sampling process, additional samples (fecals, algae, total chlorine) were occasionally collected from specific waterbodies.

Water quality results were compared to the Manitoba Water Quality Standards, Objectives and Guidelines (2011)¹ as well as the Canadian Council for Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life (PAL)² in cases where a provincial guideline needed further clarification. Objectives and guidelines for the Protection of Aquatic Life (PAL) are the primary focus, although drinking water and recreational use objectives/guidelines were also considered for perspective.

Table #2 summarizes the parameters measured during the monitoring program, including the rationale for its inclusion in the program, and lists the objective/guidelines, where applicable. Further description of select parameters follows.

¹ (Manitoba Water Stewardship, 2011)

² (CCME, 2011).

Table 2. Summary of Parameters

Parameter Name	Analysis Method	Units	MB Objectives /Guidelines	Type of Objective or Guideline	Description
pH	Portable Meter	units	6.5-9	Guideline for PAL ³	Indicator of relative alkalinity or acidity of water
Water Temperature	Portable Meter	°C			Suitability for aquatic Life
Dissolved Oxygen (DO)	Portable Meter/ Lab Analysis	mg/L	Minimum 6.5	Objective for PAL	Available oxygen in water
Conductivity	Portable Meter	µS/cm			Can indicate if a pollutant has entered the waterbody/presence or absence of groundwater
Nitrate + Nitrites (NO ₃ + NO ₂)	Lab Analysis	mg/L	10	Objective for Drinking Water ⁴	Nutrient
Nitrate (NO ₃)	Lab Analysis	mg/L	2.93 ⁵	Guideline for PAL	Nutrient
Nitrite (NO ₂)	Lab Analysis	mg/L	0.06	Guideline for PAL	Nutrient
Ammonia (NH ₃)	Lab Analysis	mg/L	Dependent on pH and water temperature	Objective for PAL	Nutrient, can be toxic at high levels
Total Phosphorous (TP)	Lab Analysis	mg/L	0.025	Narrative guideline to prevent the growth of nuisance algae	Nutrient
Total Chlorine (TCI)	Lab Analysis	mg/L	0.011		Can be discharged from swimming pools- toxic to aquatic life at small quantities
Chlorophyll A	Lab Analysis	mg/L			Indicator of plant growth
Total Suspended Solids (TSS)	Lab Analysis	mg/L			Particles in water column; high TSS impairs foraging and predator avoidance behaviours
Turbidity	Lab Analysis	NTU			Relative clarity of water, how much material suspended in water decreases light passage in water ⁶
Fecal Bacteria	Lab Analysis	CFU/100 mL	200	Objective for Human Recreation	Indicator of fecal contamination
Cyanobacteria	Lab Analysis	cells/1 mL	100,000	Objective for Human Recreation	Indicator of eutrophication in waterbodies

³ PAL = Protection of Aquatic Life

⁴ Drinking water objectives are not directly applicable, however used for perspective

⁵ MB water quality states guideline as 13mg/L as N; however, it was confirmed by Province to be “13 mg/L as NO₃”, which is equivalent to 2.93 mg/L as N.

⁶ (Ohrel, R. L., & Register, K. M, 2006).

pH

pH is used to specify the alkalinity or acidity of a solution by measuring the hydrogen ion concentration. pH directly affects aquatic life and organisms become stressed and may die when the pH of water is too low or high. pH also impacts toxicity and solubility of various chemicals or heavy metals in water, one example of this being ammonia. Excessively high or low pH levels can also cause skin and eye irritations for humans, which could be a concern for individuals using the ponds for recreation⁷.

Dissolved oxygen

Dissolved oxygen (DO) is an important water quality indicator of a waterbody's ability to support aquatic life, as DO levels below a certain threshold can cause lethal effects on aquatic organisms. DO enters the water from two main sources- the atmosphere and aquatic plants. DO enters the water by diffusion through the atmosphere. Algae and submerged plants produce oxygen through photosynthesis and release it into the pond water. DO is affected by temperature and fluctuates throughout the day. Higher temperatures usually result in higher plant decomposition which can contribute to elevated DO concentration. Aeration also increases DO levels as bubbles produced by the moving water supply oxygen. Fish and aquatic animals rely on dissolved oxygen to survive, and decreasing oxygen levels puts aquatic life under stress. The overabundance of algae and other aquatic plants can deplete DO to levels below the PAL threshold. When algae blooms die-off, they can cause rapid oxygen depletions since DO is consumed by bacteria and fungi as they decompose dead organic matter⁸. Dissolved oxygen levels are also impacted by water flow, as higher flow rates increase turbulence and diffusion of atmospheric oxygen into the water, which will result in increased DO concentrations.

Nutrients

Nitrogen and Phosphorous are important naturally occurring and are the principle drivers for productivity in aquatic ecosystems. They can enter the aquatic environment through various human inputs, the most common being runoff from fertilized agricultural areas or lawns. They support the growth of aquatic vegetation including floating vegetation, submerged plants, macrophytes and emergent plants. However, excess nitrogen and phosphorus can result in nutrient pollution which may cause aquatic vegetation like algae to grow at rates higher than what can be supported naturally from the ecosystem. Eutrophication occurs when excessively high nutrient conditions result in excessive algal blooms and vegetation growth⁹. Excessive algae or plant growth will eventually die off. Oxygen-consuming bacteria will decompose dead aquatic vegetation, depleting available oxygen which is needed by aquatic life to survive.¹⁰ There have also been studies that suggest that goose fecal matter can contribute to nutrient loading as it contains nitrogen and phosphorous¹¹. The presence of large amounts of geese may result in higher nutrient levels.

Although the Manitoba Water Quality Standards, Objectives and Guidelines (2011) provides guideline values for phosphorous, the CCME provides trigger ranges for phosphorous concentration in order to classify waterbodies by trophic status and the tendency towards eutrophication.

⁷ (Health Canada, 2012)

⁸ (Ohrel, R. L., & Register, K. M., 2006).

⁹ Ibid

¹⁰ Ibid

¹¹ (Dessborn, L., Hessel, R., & Elmberg, J., 2016)

Table 3. Total Phosphorous Trigger ranges for Canadian lakes and Rivers. Adapted from *Phosphorus: Canadian Guidance Framework for the Management of Freshwater Systems*¹²

Trophic Status	Canadian Trigger Ranges Total Phosphorous (mg/L)
Ultra-oligotrophic	<0.004
Oligotrophic	0.004-0.01
Mesotrophic	0.01-0.02
Meso-eutrophic	0.02-0.035
Eutrophic	0.035-0.100
Hyper-Eutrophic	> 0.100

The proposed provincial guideline value of 0.025 mg/L of phosphorous would indicate a water body is meso-eutrophic, meaning the waterbody's biological productivity is moderate to high. Exceeding this level would indicate high biological activity within a waterbody due to excessive nutrients, and eutrophic conditions which could be detrimental to ecosystem health.

Ammonia is highly dependent on a variety of factors, the main being temperature and pH of the particular waterbody, although it can also be impacted by other factors including dissolved oxygen concentration and salinity. It can enter the environment through either natural processes, such as the breakdown of organic or animal waste, forest fires, and gas exchange in the atmosphere, as well as point sources such as emissions and effluent material from industrial plants or agricultural facilities¹³. At high concentrations, ammonia can be toxic to aquatic organisms; however, there is no uniform guideline value for ammonia toxicity because of its variability depending on other factors. For the purpose of this study, the referenced guideline value for ammonia was determined using the most stringent conditions by using the highest pH and temperature measured in each pond during the summer (i.e., conditions when ammonia would be most toxic). If that guideline was exceeded, then analysis of the guideline for the specific sample was calculated.

Aquatic vegetation

Like natural waterbodies, all ponds within the municipality have some form of aquatic vegetation, whether it be algae, duckweed, aquatic weeds, emergent macrophytes or a combination of all. Aquatic vegetation is highly receptive to the concentration of nutrients available in the water. If there are excess nutrients available in the pond ecosystem, the abundance of aquatic vegetation will increase.

Algae

Algae are a group of diverse aquatic organisms. Typically, algae are identified as green plants that clump together to cover the water surface in a mat-like manner; however, algae can be blue, green, brown or even red and take many different forms. Algae are sometimes stringy and can extend into the water column. Algae provides numerous benefits to aquatic ecosystems when present at healthy levels. It can serve as a food source for fish, waterfowl and other animals. It also produces oxygen in the water through photosynthesis and absorbs nutrients such as nitrogen and phosphorous from the water while it grows. However, excessive vegetation growth, such as algae blooms in the pond system is usually indicative of high nutrient levels. When large amounts of algae (or other vegetation) die off, oxygen levels typically decline.

¹² (CCME, 2004)

¹³ (CCME, 2010)

Submerged Aquatic Vegetation

Submerged aquatic vegetation (SAV) or seagrasses refer to rooted aquatic plants that grow throughout the water column and blanket the SAV provide habitat and shelter for many aquatic organisms, as well as serve as a food source for some species. Their root systems can help stabilize the shoreline from erosion. SAV increases oxygen in the water through the process of photosynthesis and contributes to a healthy aquatic ecosystem. The root systems of SAV blanket the pond base, and therefore disruption or loss of the vegetation bed can result in detrimental effects in the pond ecosystem¹⁴. Removal of SAV can result in overload of nutrients such as nitrogen and phosphorous, making the pond system susceptible to algal blooms¹⁵. Nutrients and suspended sediments that were tangled within the plant leaves and roots may be also released¹⁶. Dissolved oxygen levels may decrease due to loss of oxygen generated by photosynthesis.

Duckweed (Lemna)

Lemna, commonly known as Duckweed is a free floating aquatic plant that forms on the surface of still or slow moving waterbodies. It also helps to pull excess nutrients such as nitrogen and phosphorous from the water while it grows. Duckweed can be an important component of the pond ecosystem, serving as a food source for fish, waterfowl and other animals. Duckweed shades the water, which reduces water temperatures and makes the ponds more habitable for invertebrates and small fish; lower light levels also reduce the growth of nuisance algae and other plants. However, much duckweed can also cause problems for the ponds. Duckweed multiplies very quickly and can overtake the pond surface in a short amount of time. In the fall, when duckweed dies, nutrients including phosphorous are released back into the water column at once, causing further nutrient loading. There is very little duckweed growth within the ponds throughout Silver Springs.

Weather Conditions

Weather conditions impact water quality. Large precipitation events result in more water entering the retention ponds, and heavy rains will bring in increased pollutants and other substances into the system through storm drain and lawn runoff. Higher water flows will push free-floating aquatic vegetation such as duckweed through the system faster, resulting in vegetation buildup at the downstream end of the ponds as it collects near the outfall drains.

The months of May, June and the first week of July were relatively dry, with very few precipitation events, visible in Figure #1. This was reflected by lower water levels throughout the pond systems and low flow rates. In July there were numerous rain events, including significant rain events on July 9th and July 10th (Figure #1), as well as another rain even that began on July 14th, 15th, and 18th that resulted in higher water flow into the ponds system. There was another significant rain event on August 25th. September was generally wet with several smaller rain events.

¹⁴ (Ohrel, R. L., & Register, K. M, 2006).

¹⁵ Ibid

¹⁶ Ibid

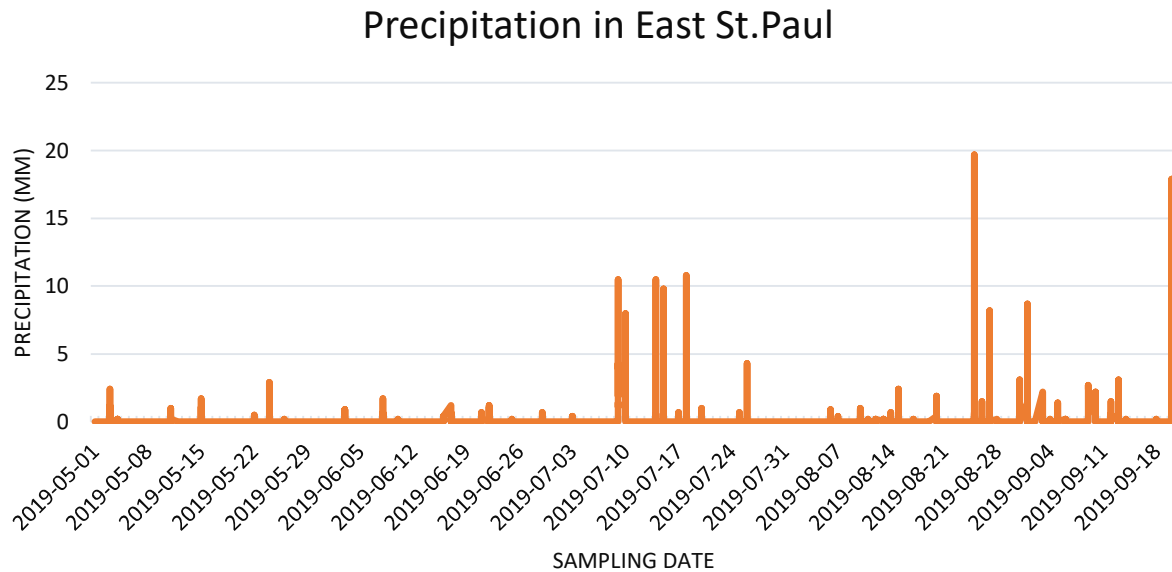


Figure 1. Precipitation in East St. Paul

3 BY THE PARK, COUNTRYSIDE CROSSING & SOUTHLANDS POND SYSTEMS

DESCRIPTION OF WATERBODIES (BY THE PARK, COUNTRYSIDE CROSSING, SOUTHLANDS)

Retention pond systems have been constructed to capture localized runoff from subdivision development. These retention pond systems have been designed as amenities, providing aesthetic appeal and limited recreation opportunities. By the Park is the most recent standalone pond constructed in 2014, it is approximately 3-acres and captures no upstream drainage. An additional 4-acre pond system was constructed in 2012 located south of the perimeter in the Countryside Crossing development, capturing drainage from the development only. Another pond development that predates 2005 is 3-acre Southlands Creek, but it has no upstream drainage contributing to the system.

Ponds receive runoff from neighbouring yards, or through storm drains collecting street and yard runoff that then deposit directly into the ponds. All ponds are designed to hold water during low water periods as well as during rain events, discharging overflow into drains and ditches leading to the Red River. Wildlife use the ponds, with most ponds showing evidence of aquatic insects, common amphibians and reptiles (turtles), aquatic mammals like muskrat, as well as waterfowl (ducks and geese), shore birds and song birds. Older ponds with more established aquatic and riparian vegetation provide a more complex habitat that attracts a wider range of wildlife species, many of which are resident during the summer months and possibly through the winter. Resident water fowl populations are joined by migratory populations during the spring and fall, with pond and surround features influencing the use by migratory species.

Table 4. Summary of Visual Observations in By the Park, Countryside and Southlands

Location	Duckweed	Algae	Aquatic Vegetation	Odour	Water Clarity	Wildlife	Other Notes
By the Park	None	Moderate Levels	Low Levels	None		Geese	
Countryside Upper	None	Moderate Levels	Moderate Levels	None		Geese, Ducks	
Countryside Lower	None	Moderate Levels	Moderate Levels	None		Geese, Ducks	
Southlands Upper	None	Moderate Levels	High Levels	None	Slightly Cloudy	Geese, Ducks, Muskrat	
Southlands Lower	None	Moderate Levels	High Levels	None	Slightly Cloudy	Geese, Ducks,	

SAMPLE LOCATIONS

By the Park water quality sampling occurred at 1 location, designated as BTP 1. Countryside Crossing and Southlands water quality sampling occurred at 2 locations each; an upper reach sample and a lower reach sample. Countryside Crossing are designated as CS U and CS L, while Southlands is designated as S U and S L.

RESULTS (BY THE PARK, COUNTRYSIDE CROSSING, SOUTHLANDS)

BY THE PARK

By the Park is a new development within the municipality. There are still homes being built surrounding the pond and, while seeding has occurred, there is virtually no riparian vegetation currently surrounding the pond banks. There is also little to no erosion control surrounding the pond to keep the exposed top soil from entering the pond.

Throughout the summer, water quality results (Table 5) showed that pH levels in the By the Park system trended upwards into July, reaching a maximum of 9.98 on July 17th 2019, then began declining as sampling occurred into August and September. Sampling conducted between July 10 and August 21 indicated pH levels exceeded the upper limit (9.0 pH units) for protection of aquatic life during that period; however, pH levels were within the guideline earlier and later in the season.

The average DO concentration in By the Park was 9.55 mg/L, which is within the healthy range for a storm water retention pond. There was only one occurrence throughout the sampling season in which dissolved oxygen levels were below the provincial objective of 6.5 mg/L; DO was recorded as 5.10 mg/L on August 29th.

Nitrogen levels fluctuated through the summer, but generally stayed below the provincial guidelines and objectives for all four parameters (nitrate, nitrite, nitrate/nitrite, and ammonia). On all but one occasion, ammonia concentrations in BTP were lower than the guideline calculated using a pH value of 9.00 and the highest temperature measured during the summer; the exception occurred on August 29th (Appendix 2). Further calculations determined that ammonia was acceptable using the site-specific ammonia guideline of 0.556 mg/L.

Total phosphorous exceeded the provincial guidelines for prevention of nuisance algae (0.025 mg/L) in all samples analyzed, indicating that phosphorous is a key nutrient in the pond system. At maximum, phosphorous was at 0.267, which is over ten times the guideline for phosphorous. The average phosphorous levels of this waterbody place it in hyper-eutrophic status as defined by Table #3, though the pond ranged from meso-eutrophic to hyper-eutrophic over the summer.

While chlorophyll *a* levels were lower than other ponds in the municipality, algae and aquatic plant growth were present and chlorophyll *a* levels were particularly high in late August and September, which indicated high nutrient levels are already occurring in the system. It is likely the algae and aquatic plant growth will increase as more homes are developed around the pond area and fertilizer nutrient loading continues. Turbidity and total suspended solids in By the Park were relatively low compared to other ponds and, in general, water clarity was clear throughout the sampling season.

Table 5. Summary of water quality results in By the Park (BTP 1)

Parameter	Units	Guideline Limit	By the Park (BTP 1)		
			Minimum	Maximum	Average
Water Temperature	°C		17.2	25.5	22.2
Conductivity	µS/cm		436	1089	797
pH	units	6.5-9	8.20	9.98	9.13
Dissolved Oxygen (field)	mg/L	Min. 6.5	5.10	13.20	9.55
Nitrate + Nitrites	mg/L	10	<0.07	0.684	0.158
Nitrate	mg/L	2.93	<0.04	0.638	0.127
Nitrite	mg/L	0.06	<0.02	0.046	0.024
Ammonia	mg/L	0.247	0.018	0.521	0.102
Total Phosphorous	mg/L	0.025	0.0293	0.267	0.113
Chlorophyll A	mg/L		3.17	88.2	23.3
Total Suspended Solids	mg/L		2.0	25.9	12.3
Turbidity	NTU		1.13	28.6	10.8
Total Chlorine	mg/L	0.019	0.020	0.090	0.055

COUNTRYSIDE CROSSING

Countryside is still under development and there is ongoing construction activity that may be contributing to declining pond conditions. In some cases, construction waste and landscaping products were observed entering the ponds. There was noticeable erosion occurring on the pond banks and very little erosion control in the form of riparian vegetation. Countryside Crossing also has a resident goose population, and numerous families totaling to approximately 20 geese were observed several times throughout the pond system. Goose fecal matter may contribute to nutrient loading in aquatic systems and can result in excessive algae blooms.¹⁷ While algae growth was observed, there was more growth of submerged aquatic vegetation in Countryside.

Both CS U and CS L had similar pH levels, and were recorded slightly above the upper limit (9.0 pH units) for protection of aquatic life. pH levels are highly dependent on several factors, such as chemical constituents that may be present in runoff flowing into the waterbody, which may come from

¹⁷ (Dessborn, L., Hessel, R., & Elmberg, J., 2016)

construction activity in the neighborhood.¹⁸ pH levels also fluctuate in response to biological activity in retention ponds- higher pH levels tend to occur in response to increased photosynthesis due to higher levels of sunlight and warmer temperatures.¹⁹

Dissolved oxygen levels in CS U were lower than in CS L; however, DO levels generally remained above the minimum value of 6.5 mg/L in both ponds during the 2019 sampling season. Exceptions occurred once in CS U (on September 19th) and twice in CS L (on July 10th and August 7th), when concentrations fell below the minimum value for protection of aquatic life (Appendix 2). Overall, Countryside ponds generally had high DO indicating conditions are normally capable of supporting aquatic life. In terms of nutrients, observed nitrate, nitrite, and nitrate/nitrite concentrations were below the provincial objectives and guidelines. Average levels for the three aforementioned parameters (nitrate, nitrite, and nitrate/nitrite) were higher in CS L than in CS U. Ammonia concentrations were also generally lower than the provincial objective for PAL during the summer of 2019, although an exceedance was recorded on July 10th (site-specific guideline = 0.32 mg/L).

Phosphorous levels were relatively similar in CS U and CS L, averaging 0.198 and 0.179 mg/L, respectively, which is approximately seven times higher than the guideline to prevent the proliferation of nuisance algae (0.025 mg/L). CS U and CS L would be considered as eutrophic to hyper-eutrophic using the trigger ranges defined in Table #3. Continued organic loading from eroding soils, lawn and garden fertilizers, and increasing resident population of Canada geese will result in increased nutrient loading over time.

Table 6. Summary of water quality results in Countryside Upper (CS U)

Parameter	Units	Guideline Limit	Countryside Upper (CS U)		
			Minimum	Maximum	Average
Water Temperature	°C		18.0	25.6	22.3
Conductivity	µS/cm		297	1009	725
pH	units	6.5-9	8.33	9.88	9.33
Dissolved Oxygen (field)	mg/L	Min. 6.5	5.30	16.40	11.42
Nitrate + Nitrites	mg/L	10	<0.010	<0.020	0.013
Nitrate	mg/L	2.93	<0.020	0.109	0.038
Nitrite	mg/L	0.06	<0.010	<0.020	0.013
Ammonia	mg/L	0.247	0.024	0.105	0.040
Total Phosphorous	mg/L	0.025	0.0706	0.198	0.149
Chlorophyll A	mg/L		5.6	108	34.6
Total Suspended Solids	mg/L		3.7	44.3	14.7
Turbidity	NTU		1.65	26.4	10.2
Total Chlorine	mg/L	0.019	<0.020	0.020	0.020

¹⁸ (Ohrel, R. L., & Register, K. M, 2006).

¹⁹ (Wakelin, S., Elefsiniotis, P., & Wareham, D., 2003)

Table 7. Summary of water quality results in Countryside Lower (CS L)

Parameter	Units	Guideline Limit	Countryside Lower (CS L)		
			Minimum	Maximum	Average
Water Temperature	°C		16.8	25.4	21.5
Conductivity	µS/cm		409	990	734
pH	units	6.5-9	8.34	9.99	9.23
Dissolved Oxygen (field)	mg/L	Min. 6.5	4.04	13.9	8.84
Nitrate + Nitrites	mg/L	10	<0.070	0.628	0.150
Nitrate	mg/L	2.93	<0.020	0.598	0.116
Nitrite	mg/L	0.06	<0.010	0.030	0.020
Ammonia	mg/L	0.247	0.017	0.362	0.098
Total Phosphorous	mg/L	0.025	0.046	0.179	0.128
Chlorophyll A	mg/L		6.06	78.0	44.12
Total Suspended Solids	mg/L		4.90	62.3	25.4
Turbidity	NTU		1.59	51.4	22.3
Total Chlorine	mg/L	0.019	0.02	0.05	0.04

SOUTHLANDS

Sampling results indicated that the pH levels in SU and SL occasionally exceeded the upper guideline for PAL (9.0 pH units) during the summer of 2019. pH in SU was within the guideline through most of the summer, but exceeded the guideline on July 10th, 17th as well as August 28th (Appendix 2); pH in SL exceeded the upper pH limit on June 13th, July 17th and 24th, and August 14th (Appendix2), but was within the guideline during all other sampling events.

Dissolved oxygen levels in the Southlands system were sufficient to support aquatic life during most of the summer sampling events, though concentrations fell below the PAL guideline (6.5 mg/L) on August 1st and September 19th (Appendix 2) in SU, and on August 1st, 29th and September 19th in SL (Appendix 2).

Nitrate, nitrite, and nitrate/nitrite levels in both ponds were generally low and fell below the guidelines for PAL and the objective for drinking water. All measurements of ammonia from the ponds in summer 2019 were also less than the most stringent objective.

Total phosphorous concentrations in SU were approximately double those measured in SL in summer 2019, indicating nutrient loading from surrounding residential properties. Total phosphorous fluctuated between sampling periods, but concentrations consistently exceeded the provincial guideline to prevent the proliferation of nuisance algae (0.025 mg/L). Both S U and S L would be classified as ranging between eutrophic to hyper-eutrophic based on TP concentrations measured throughout summer 2019 in reference to CCME trigger values in Table #3.

Similar to TP, average chlorophyll *a* concentrations in SU were approximately double those measured in SL. In contrast, TSS and turbidity levels were similar between the two ponds.

Southlands has a larger riparian zone than some other ponds in the RM and some residents have helped widening the zone through naturalized planting on their properties. No duckweed growth was observed in Southlands in summer 2019 although extensive algae and aquatic plants were present, presumably

fed by the elevated nutrient concentrations in the ponds. Aquatic vegetation was removed from the Southlands pond in September 2019 using a mechanical harvester contracted by J-Con Construction; subsequent effects on aquatic vegetation growth and nutrient concentrations will be monitored in the future.

Table 8. Summary of water quality results in Southlands Upper.

Parameter	Units	Guideline Limit	Southlands Upper (S U)		
			Minimum	Maximum	Average
Water Temperature	°C		16.9	25.4	21.5
Conductivity	µS/cm		312	1089	691
pH	units	6.5-9	7.74	9.68	8.56
Dissolved Oxygen (field)	mg/L	Min. 6.5	4.75	12.9	8.12
Nitrate + Nitrites	mg/L	10	<0.07	0.145	0.085
Nitrate	mg/L	2.93	<0.02	0.145	0.061
Nitrite	mg/L	0.06	<0.010	<0.020	0.014
Ammonia	mg/L	0.247	0.013	0.156	0.054
Total Phosphorous	mg/L	0.025	0.059	0.554	0.174
Chlorophyll A	mg/L		13.6	122.0	55.0
Total Suspended Solids	mg/L		5.6	55.6	23.7
Turbidity	NTU		3.65	33.1	10.0
Total Chlorine	mg/L	0.011	0.06	0.15	0.105

Table 9. Summary of water quality results in Southlands Lower (S L)

Parameter	Units	Guideline Limit	Southlands Lower (S L)		
			Minimum	Maximum	Average
Water Temperature	°C		16.5	26.6	22.0
Conductivity	µS/cm		257	1095	654
pH	units	6.5-9	7.75	9.66	8.95
Dissolved Oxygen (field)	mg/L	Min. 6.5	4.90	18.40	9.40
Nitrate + Nitrites	mg/L	10	<0.07	0.626	0.149
Nitrate	mg/L	2.93	<0.02	0.600	0.106
Nitrite	mg/L	0.06	<0.01	0.026	0.014
Ammonia	mg/L	0.247	0.016	0.089	0.036
Total Phosphorous	mg/L	0.025	0.049	0.192	0.086
Chlorophyll A	mg/L		3.16	70.8	24.4
Total Suspended Solids	mg/L		4.4	89.3	27.6
Turbidity	NTU		1.76	54.9	14.7
Fecal Matter	CFU/100 ml	200	37	37	37
Total Chlorine	mg/L	0.011	0.03	0.05	0.04

4 EAGLE CREEK POND SYSTEM

SAMPLING LOCATIONS

The Eagle Creek Ponds are numbered sequentially, with Pond 1 being the uppermost pond and Pond 6 discharging to the Red River at the most downstream end of the of the system. Eagle Creek water quality sampling occurred at five locations within the pond system; Upper reach Pond 1 (P1U), Lower reach Pond 2 (P2L), Lower reach Pond 3 (P3L), Lower reach Pond 4 (P4L), Lower reach Pond 6 (P6L). Eagle Creek Pond 5 was not sampled and quality is assumed to be consistent with Ponds 4 and 6.

DESCRIPTION OF WATERBODIES (EAGLE CREEK)

Eagle Creek was developed in the 1990s and is one of the largest pond systems in the RM of East St. Paul. The Eagle Creek pond system captures all runoff from the subdivision and upstream areas. The ponds are designed to be a mix between naturalized and conventional in the sense that they implement naturalized planning features in some areas, such as integration of native plant species. Each of the six ponds is surrounded by a narrow or non-existent riparian zone, which is bordered by a gravel walking trail on one side. Some areas of the Eagle Creek pond system have very little bank stabilization and cannot support vegetation; in some cases, it appears that portions of the riparian vegetation have been removed from municipal owned land and private properties. All ponds are surrounded by residences, which makes them susceptible to nutrient inputs from urban runoff. Water is received in Pond 1 from upstream sources including the Texico Drain that collects drainage through agricultural areas, By-the-Park and the ditches along Raleigh and Gateway. The remainder of the Ponds are fed from runoff, either directly from adjacent yards or from street drains that connect to the ponds. The ponds are separated by culverts passing under roadways and small stretches of green space. While detailed design information is not available, it is understood that the ponds are designed to maintain water, which results in stagnant conditions during low flow periods. The Eagle Creek pond system is a mature system which has substantial sediment deposits. The organic matter likely represents a combination of sediment from upstream runoff, localized erosion during the subdivision development, unstable banks vegetated with turf grass, and decaying aquatic plants (for example, algae and duckweed).

Table 10. Summary of Visual Observations in Eagle Creek

Location	Duckweed	Algae	Aquatic Vegetation	Odour	Water Clarity	Wildlife	Other Notes
P1 U		High levels	Moderate Levels			Geese, Ducks	Frequently treated with Pond Dye
P2 L	Prolific Growth					Geese, Ducks	Frequently treated with Pond Dye
P3 L	Prolific Growth			✓	Cloudy	Ducks, Muskrat	
P4 L	Prolific Growth					Catfish, Ducks,	
P6 L	Prolific Growth				Cloudy	Ducks	

RESULTS

pH levels in the five ponds were generally within the guideline values for PAL (6.5-9), although some exceptions occurred. The pH of Pond 2 was consistently within the guideline range, but the other ponds had one or two exceedances early in the year (i.e., before July 10th, ranging from 9.08 to 9.74) and Pond 1 also exceeded the guideline on August 29th (9.59 pH units).

The five ponds typically had DO concentrations below the provincial objective for PAL (6.5 mg/L) throughout the summer of 2019. At the beginning of the sampling program, DO in Ponds 3, 4, and 6 were above the objective of 6.5mg/L; concentrations fell below the PAL thereafter except for a spike in Ponds 2, 3, and 4 on August 14th (Appendix 2). Notably, there were several instances where DO dropped below 3 mg/L in every pond. Clean Water Pro was also sampling periodically during this period. Their hand held meter showed similar low levels of DO in the ponds.²⁰ DO concentrations in the Eagle Creek system may have been lower than the other pond systems due to the addition of Muck-Away, and the higher bacterial decomposition it creates.

With three exceptions, nitrate, nitrite, and nitrate/nitrite, and ammonia concentrations were within the respective provincial objectives and guidelines during the 2019 sampling season. The exceptions occurred in Ponds 1, 2, and 3 on July 10th when the nitrite concentrations (0.073, 0.079, and 0.074 mg/L) exceeded the guideline for PAL (0.06 mg/L). These exceedances should be interpreted with caution, however, as the results were close to the analytical detection limits (DL; 0.050 or 0.020 mg/L) and results within five times the DL are associated with higher variability. There was also a significant rain event on July 9th and 10th that could have contributed to these changing conditions. Ammonia levels in Pond 4 surpassed the most stringent objective value of 0.247 mg/L calculated for the highest pH and temperature values in the pond (pH = 9.00, temperature = 25°C). Calculation of site specific objective was determined to be 3.41 mg/L using the pH value of 7.56 pH units and a temperature of 17.5 °C. Under further examination, ammonia levels in Pond 4 did not surpass PAL guidelines. The remaining ponds did not exceed the most stringent ammonia objectives at any time.

Total phosphorous concentrations in the five ponds in Eagle Creek exceeded the provincial objective for prevention of nuisance algae (0.025 mg/L) during all sampling events in the summer of 2019. The highest average TP occurred in Ponds 2 and 3, with nearly 14 times the provincial guideline value, while the lowest average TP was measured in Pond 1. All five ponds are classified as hyper-eutrophic according to average TP ranges defined by the CCME (Table #3). The high phosphorous concentration is a primary contributing factor to the high duckweed and algae growth throughout the Eagle Creek pond system. Duckweed growth is also associated with quiet water flow conditions which were common through the sampling season due to few significant rainfall events (Figure 1).

Chlorophyll *a* levels fluctuated throughout the five ponds during the sampling season, however remained fairly similar between them. The exception to this was the spike seen in Pond 3 (and to a lesser extent, Pond 4) on August 7th (Appendix 2, 3).

TSS and turbidity also varied between the five ponds however Ponds 1-4 remained fairly close in average TSS and turbidity. Pond 6 had slighter higher average levels of both TSS and turbidity compared to the other four ponds. Overall, average TSS and turbidity was the highest in Pond 6 in comparison to the rest of the ponds throughout the municipality.

²⁰ Clean Water Pro typically recorded samples from the middle of the pond compared to sampling from the shoreline.

Actions Influencing pond performance- Clean Water Pro

During the 2019 sampling season, Eagle Creek ponds were treated by an outside contractor, Clean Water Pro, with products containing bacteria to enhance the degradation process, and pond dye. Ponds were treated throughout the summer on the dates in Table #11²¹.

Pond Dye is a treatment to reduce aquatic growth. Pond Dye works by coloring the water a darker color with a nontoxic dye. This shades the pond, reduces water temperature and limits sunlight which fuels biological activity, thus inhibiting algae and submerged aquatic plant growth.

Bacteria is intended to reduce the build-up of organic sediment at the bottoms of the ponds. It is suspected that declining DO levels in the Eagle Creek ponds in may be a result of the application of these products. It is thought that the products may also be releasing nutrients from the sediments as part of the biodegradation that the products stimulate (thus releasing nutrients into the water column for uptake by aquatic plants).

Table 11. Pond Treatment Dates by Clean Water Pro

Location	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6	Treatment 7
Pond 1	Jun 18 th	Jul 3 rd	Jul 16 th	Aug 1 st	Aug 12 th	Aug 28 th	Sept 10 th
Pond 2	Jun 18 th	Jul 3 rd	Jul 16 th	Aug 1 st	Aug 12 th	Aug 28 th	Sept 10 th
Pond 3	Jun 19 th	Jul 4 th	Jul 18 th	Aug 1 st	Aug 13 th	Aug 28 th	Sept 11 th
Pond 4	Jun 19 th	Jul 4 th	Jul 18 th	Aug 13 th	Aug 28 th	Aug 29 th	Sept 11 th
Pond 6	Jun 20 th	Jul 3 rd	Jul 19 th	Aug 2 nd	Aug 14 th	Aug 29 th	Sept 10 th

Table 12. Summary of water quality results in Eagle Creek Pond 1 (P1 U)

Parameter	Units	Guideline Limit	Eagle Creek Pond 1 (P1 U)		
			Minimum	Maximum	Average
Water Temperature	°C		16.7	25.0	20.8
Conductivity	µS/cm		588	2200	1482
pH	units	6.5-9	7.71	9.59	8.41
Dissolved Oxygen (field)	mg/L	Min. 6.5	1.82	6.33	4.60
Nitrate + Nitrites	mg/L	10	<0.11	1.18	0.263
Nitrate	mg/L	2.93	<0.10	1.11	0.244
Nitrite	mg/L	0.06	<0.05	0.073	0.0538
Ammonia	mg/L	0.247	0.049	0.262	0.103
Total Phosphorous	mg/L	0.025	0.110	0.292	0.176
Chlorophyll A	mg/L		2.71	62.4	27.3
Total Suspended Solids	mg/L		10.1	82.7	25.3
Turbidity	NTU		3.70	22.4	9.75
Total Chlorine	mg/L	0.011	0.01	0.05	0.03
Fecal Matter	CFU/100 ml	200	172	687	469

²¹ Products reportedly used were Muck-Away, Pond Clear, Ecoboost and Pond Dye.

Table 13. Summary of water quality results in Eagle Creek Pond 2 (P2 L)

Parameter	Units	Guideline Limit	Eagle Creek Pond 2 (P2 L)		
			Minimum	Maximum	Average
Water Temperature	°C		15.6	25.4	20.0
Conductivity	µS/cm		591	2040	1412
pH	units	6.5-9	7.31	8.97	8.01
Dissolved Oxygen (field)	mg/L	Min. 6.5	1.00	8.22	3.66
Nitrate + Nitrites	mg/L	10	<0.11	1.36	0.320
Nitrate	mg/L	2.93	<0.10	1.28	0.301
Nitrite	mg/L	0.06	<0.05	0.079	0.054
Ammonia	mg/L	0.258	0.065	0.171	0.111
Total Phosphorous	mg/L	0.025	0.197	0.581	0.348
Chlorophyll A	mg/L		3.93	70.6	47.9
Total Suspended Solids	mg/L		11.9	40.0	27.9
Turbidity	NTU		2.47	31.2	9.60
Total Chlorine	mg/L	0.011	0.010	0.020	0.015

Table 14. Summary of water quality results in Eagle Creek Pond 3 (P3 L)

Parameter	Units	Guideline Limit	Eagle Creek Pond 3 (P3 L)		
			Minimum	Maximum	Average
Water Temperature	°C		16.0	23.5	19.7
Conductivity	µS/cm		542	2100	1269
pH	units	6.5-9	7.55	9.08	8.24
Dissolved Oxygen (field)	mg/L	Min. 6.5	1.18	9.82	4.37
Nitrate + Nitrites	mg/L	10	<0.07	1.24	0.285
Nitrate	mg/L	2.93	<0.04	1.17	0.258
Nitrite	mg/L	0.06	<0.02	0.074	0.042
Ammonia	mg/L	0.272	0.053	0.144	0.100
Total Phosphorous	mg/L	0.025	0.069	0.807	0.324
Chlorophyll A	mg/L		4.7	477	98.1
Total Suspended Solids	mg/L		3.6	58.9	33.4
Turbidity	NTU		1.97	37.5	13.7
Total Chlorine	mg/L	0.011			

Table 15. Summary of water quality results in Eagle Creek Pond 4 (P4 L)

Parameter	Units	Guideline Limit	Eagle Creek Pond 4 (P4 L)		
			Minimum	Maximum	Average
Water Temperature	°C		16.3	25.6	20.6
Conductivity	µS/cm		393	2070	1178
pH	units	6.5-9	7.56	9.74	8.41
Dissolved Oxygen (field)	mg/L	Min. 6.5	2.32	9.24	4.56
Nitrate + Nitrites	mg/L	10	<0.07	0.851	0.215
Nitrate	mg/L	2.93	<0.04	0.824	0.198
Nitrite	mg/L	0.06	<0.02	<0.05	0.034
Ammonia	mg/L	0.247	0.038	0.251	0.108
Total Phosphorous	mg/L	0.025	0.105	0.535	0.244
Chlorophyll A	mg/L		11.2	138	44.0
Total Suspended Solids	mg/L		2.3	60.0	19.2
Turbidity	NTU		2.3	25.5	8.70
Total Chlorine	mg/L	0.011	0.010	0.020	0.013

Table 16. Summary of water quality results in Eagle Creek Pond 6 (P6 L)

Parameter	Units	Guideline Limit	Eagle Creek Pond 6 (P6 L)		
			Minimum	Maximum	Average
Water Temperature	°C		16.0	24.2	19.5
Conductivity	µS/cm		498	1706	1149
pH	units	6.5-9	7.55	9.45	8.53
Dissolved Oxygen (field)	mg/L	Min. 6.5	1.16	6.98	3.35
Nitrate + Nitrites	mg/L	10	<0.07	0.113	0.099
Nitrate	mg/L	2.93	<0.04	<0.10	0.081
Nitrite	mg/L	0.06	<0.02	<0.05	0.038
Ammonia	mg/L	0.261	0.024	0.141	0.075
Total Phosphorous	mg/L	0.025	0.063	0.614	0.262
Chlorophyll A	mg/L		4.81	51.3	22.8
Total Suspended Solids	mg/L		6.00	210.0	53.4
Turbidity	NTU		2.02	107.0	25.5
Fecal	CFU/100ml	200	114	152	133
Total Chlorine	mg/L	0.011	0.010	0.020	0.015

5 RECOMMENDATIONS AND CONCLUSION

The primary issue facing the ponds within the municipality is excessive nutrient inputs, which contributes to excessive aquatic vegetation growth. The source of such nutrients varies depending on the pond system, but primary causes are runoff from fertilized lawns, gardens or via street drains, and introduction into the water through goose fecal matter. Direct release of nutrients from sediments,

agricultural runoff from upstream fields, and stormwater collection systems in the case of Eagle Creek may also be contributing nutrient load sources.

All ponds showed evidence of nutrient loading and were classified as eutrophic or hyper-eutrophic, but the aquatic vegetation (and associated aesthetics) differed between them. In the case of By the Park, Southlands, Countryside Crossing, and Eagle Creek-Pond 1, algal growth and aquatic weeds increased throughout the summer months, whereas duckweed was the primary vegetation in the remaining Eagle Creek ponds. The use of pond dye in the Eagle Creek pond system may be limiting algae growth. Nutrient inputs to the ponds in By the Park and Countryside Crossing ponds may be expected to increase after development is completed and runoff from residential lawns increases. The aforementioned developments also typically lack of riparian vegetation around the ponds, which would help to filter nutrients out of runoff before they reach the ponds.

Nutrients are also stored in sediment at the bottom of the ponds and these may be released back into the system during periods of low oxygen.²² All aquatic plants and algae remove nutrients from the pond system during the growing season, but these nutrients accumulate in the sediment after the plants die off. In late summer 2019, a trial was conducted where duckweed and aquatic vegetation were removed from Eagle Creek Ponds 3,4 and 5 and Southlands, respectively. After evaluating the impact of the removal of the two types of vegetation, it may be beneficial to continue removing vegetation from the pond systems. Macrophytes such as bulrushes are suited to removal on a longer cycle (5-8 years), while duckweed lends itself to removal annually or multiple times through the summer.

All the ponds within the RM lack adequate riparian vegetation surrounding the ponds; such vegetation helps prevent excessive nutrients from entering the aquatic system from yards. Riparian vegetation, particularly native species, traps sediment, filters incoming water, stabilizes pond banks and sides, stores floodwater and serves as a habitat zone for various species. They also draw nutrients from the water column and sediments. The ponds within the municipality have attempts at a riparian zone surrounding the water. However, in most cases, these zones are not large enough to make a substantial improvement to water quality. In some areas, namely in Eagle Creek and Southlands, riparian vegetation has been cut or removed.

Improving riparian zones around ponds will help capture nutrients from adjacent properties, reduce sediment runoff and lowering water temperatures by providing shade. Riparian vegetation, specifically native species with their deep root systems, are also extremely valuable in stabilizing areas susceptible to erosion or slumping. Implementing no mow zones adjacent to existing ponds, removing noxious weeds, and replanting areas adjacent to water bodies with native species will improve riparian zones. Setting specific requirements for the design and construction of new storm water systems that incorporate adequate riparian zones will create ponds that naturally regulate nutrient loading.

Deterring geese is another way of reducing nutrient loading. Geese are attracted to large water bodies with short grasses adjacent to or near the ponds that provide prized loafing habitat. While migratory flocks will increase loading in the spring and fall, resident populations come back to use a pond year after year, breeding and increasing the population (by approximately 8% per year). Eliminating turf grass near ponds and replacing it with taller vegetation also helps deter geese that can contribute to

²² This was observed in Eagle Creek in 2019; this is called “internal loading” and differs from the external inputs of nutrients

nutrient loading problems. Considering geese attraction in future pond design and looking for opportunities to modify existing ponds to reduce those attractants will support nutrient reductions.

Over the past two years the RM has encouraged land owners to understand how their actions contribute to the health of the pond. In 2019 through the use of the *Protect our Ponds* brochure, newsletter articles, and the Open Houses, the municipality is educating residents on the impacts of excessive fertilizer use and the importance of maintaining a naturalized riparian zone in order to encourage behavior change such as lawn care practices. This communication and education process should continue. Helping residents understand fertilizer application and how to test for nutrients will raise awareness. Residents with properties directly bordering the ponds should be encouraged to leave as much natural vegetation intact as possible and try not to mow directly to the water's edge, particularly in areas such as Eagle Creek, Southlands, and Countryside Crossing where there is already minimal riparian vegetation. It is recommended that the municipality continue looking for opportunities to expand riparian zones in public areas by working with private land owners. The municipality does not have policy concerning fertilizer use currently in place. Other options to reduce nutrient loading will require policy and fiscal considerations. One option is to encourage behavior shifts such as providing complementary soil testing kits for residents and communicating the issues with geese feeding. Other opportunities include changing bylaws, such as requiring lawn care companies to test for fertilizer use prior to applications, are additional options.

6 REFERENCES

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7 APPENDICES

Appendix 1. Sampling Location Maps

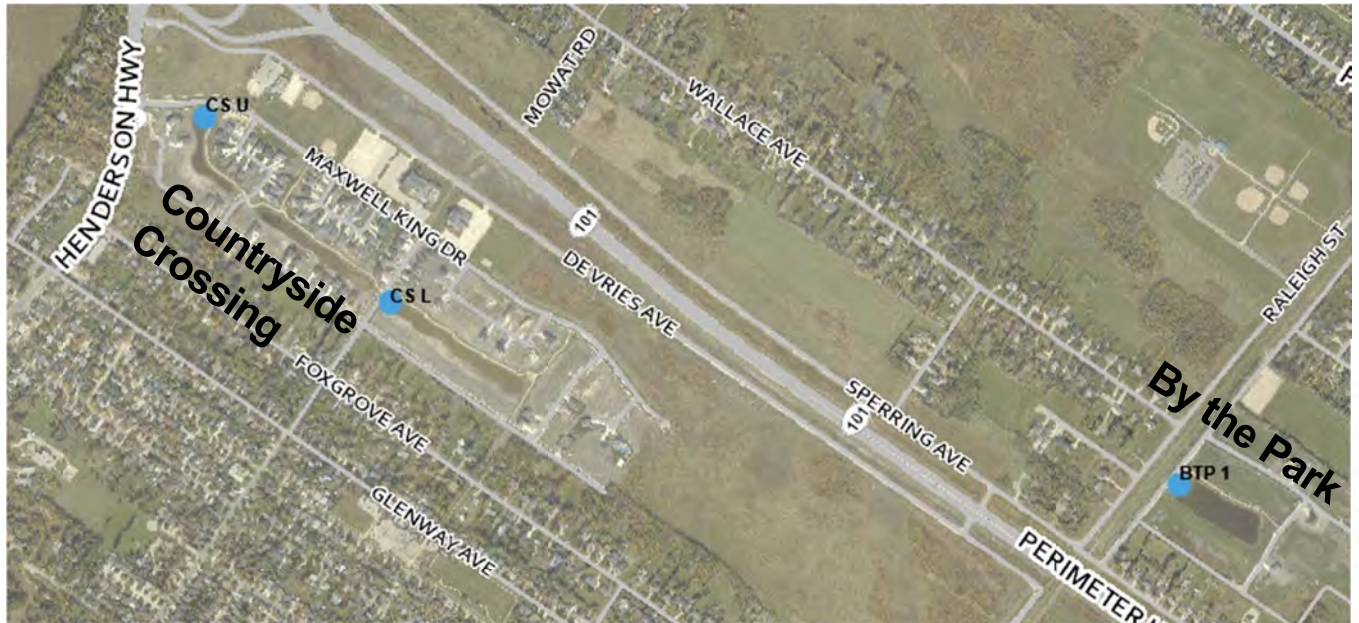
Appendix 2. Full Water Quality Data

Appendix 3. Laboratory Reports

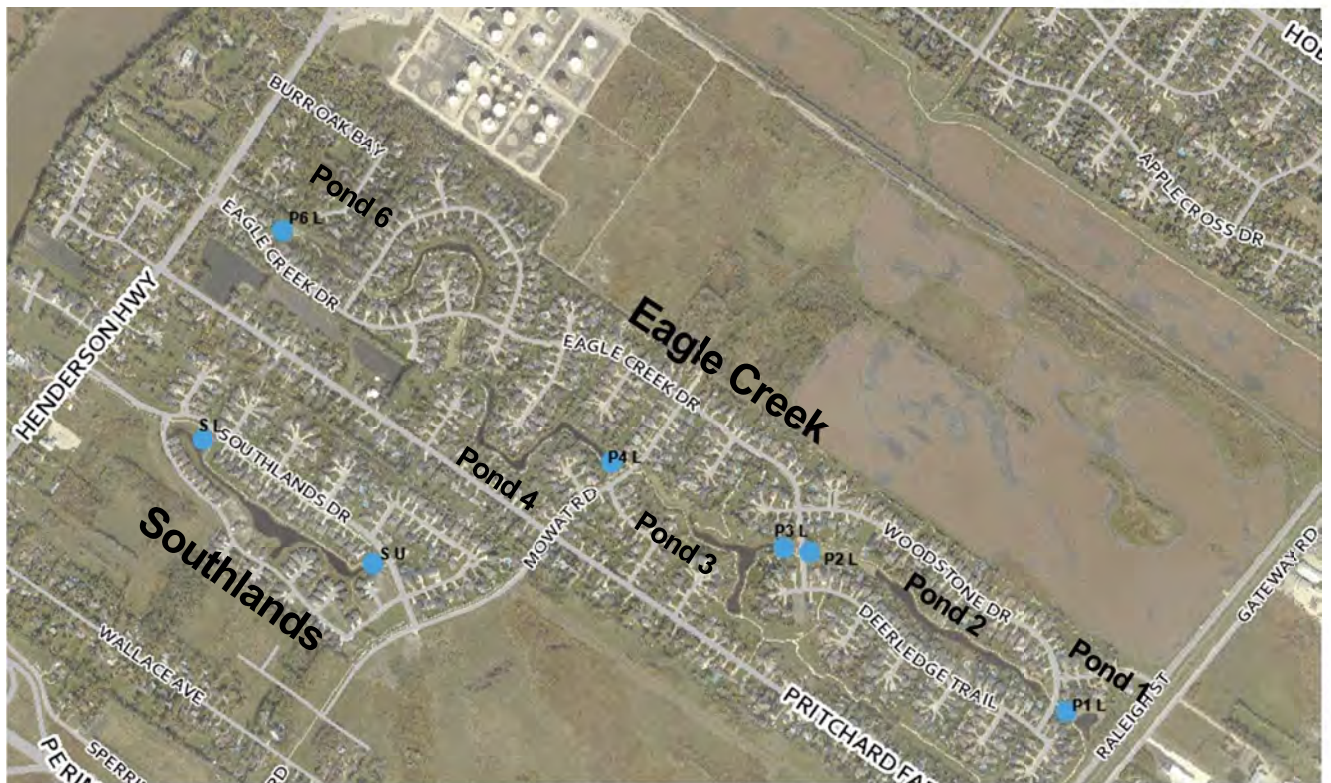
Appendix 4. Graphical Representation of Water Quality Data

Appendix 1- Sampling Location Maps

Countryside Crossing and By the Park



Southlands and Eagle Creek



Appendix 2. Full Water Quality Data

LOCATION	DATE	TIME	AIR TEMP (°C)	CONDUCTIVITY (µS/cm)	pH	DO (field) (mg/L)	Water Temp (°C)	TSS (mg/L)	TURBIDITY (NTU)	Nitrate in Water by IC (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite in Water by IC (mg/L)	TOTAL PHOSPHOROUS (mg/L)	AMMONIA as N (mg/L)	TOTAL CHLORINE (mg/L)	DO (lab) (mg/L)	CHLORO- PHYLL A (ug/L)	FECAL (MPN/100ml)
By the Park																		
BTP 1	6/13/2019	3:20	24	436	8.20	13.20	21.7	13.3	10.8	0.040	0.070	0.020	0.048	0.021	0.020		8.15	
BTP 1	6/26/2019	12:30	23	914	8.40	12.70	24.2	10.7	9.65	0.040	0.070	0.020	0.0885	0.032	0.090		9.23	
BTP 1	7/10/2019	1:25	23	753	9.53	8.13	23.0	12.9	8.1	0.638	0.684	0.046	0.152	0.048			5.5	
BTP 1	7/17/2019	12:36	24	989	9.98	12.10	25.5											
BTP 1	7/24/2019	10:40	22	949	9.91	10.52	25.5	2.0	1.1	0.040	0.070	0.020	0.029	0.027			3.17	
BTP 1	8/7/2019	11:45	18	449	9.35	7.89	23.4	8.8	6.1	0.040	0.070	0.020	0.071	0.050			18.9	
BTP 1	8/21/2019	11:57	17	1089	9.18	7.47	20.6											
BTP 1	8/29/2019	11:57	16		8.80	5.10	17.2	12.5	11.3	0.048	0.070	0.020	0.136	0.521			30.1	
BTP 1	9/19/2019	11:53	17		8.83	8.80	19.1	25.9	28.6	0.040	0.070	0.020	0.267	0.018			88.2	
MINIMUM			16	436	8.20	5.10	17.2	2.0	1.1	0.040	0.070	0.020	0.0293	0.018	0.020		3.17	
MEDIAN			22	914	9.18	8.80	23.0	12.5	9.7	0.040	0.070	0.020	0.089	0.032	0.055		9.2	
MAXIMUM			24	1089	9.98	13.20	25.5	25.9	28.6	0.638	0.684	0.046	0.267	0.521	0.090		88.2	
AVERAGE			20	797	9.13	9.55	22.2	12.3	10.8	0.127	0.158	0.024	0.113	0.102	0.055		23.3	
Countryside																		
CS U	6/13/2019	2:12	23	297	9.24	14.60	21.7	17.3	26.4	0.020	0.070	0.010	0.0813	0.024	0.020		108.0	
CS U	6/26/2019	11:40	23	892	8.98	15.02	25.6	4.8	1.65	0.040	0.070	0.020	0.0706	0.030	0.020		7.48	
CS U	7/10/2019	11:05	19	736	9.88	6.93	21.2	22.3	16.7	0.109	0.109	0.010	0.193	0.028			64.2	
CS U	7/17/2019	12:13	24	753	9.70	10.90	24.7											
CS U	7/24/2019	10:57	24	773	9.62	12.72	25.6	5.3	2.2	0.020	0.070	0.010	0.151	0.026			5.99	
CS U	8/7/2019	12:37	19	431	9.05	7.86	23.2	3.7	2.4	0.040	0.070	0.020	0.191	0.028			5.6	
CS U	8/21/2019	11:39	17	1009	9.59	16.40	21.5											
CS U	8/29/2019	11:30	16	907	9.60	13.05	18.0	44.3	18.1	0.020	0.070	0.010	0.198	0.105			43.2	
CS U	9/19/2019	11:30	17		8.33	5.30	18.8	5.3	4.1	0.020	0.070	0.010	0.156	0.038			7.71	1
MINIMUM			16	297	8.33	5.3	18.0	3.7	1.65	0.02	0.07	0.01	0.0706	0.024	0.02		5.60	1
MEDIAN			19	763	9.59	12.72	21.7	5.3	4.11	0.02	0.07	0.01	0.156	0.028	0.02		7.71	1
MAXIMUM			24	1009	9.88	16.4	25.6	44.3	26.4	0.109	0.109	0.02	0.198	0.105	0.02		108	1
AVERAGE			20	725	9.33	11.42	22.3	14.7	10.2	0.038	0.076	0.013	0.149	0.040	0		34.6	1
Countryside																		
CS L	6/13/2019	2:45	23		9.6	13.9	20.8	4.9	1.59	0.040	0.070	0.020	0.0456	0.017	0.050	15.00	6.06	
CS L	6/26/2019	12:00	23	653	8.34	9.57	22.5	19.5	23.6	0.020	0.070	0.010	0.179	0.041	0.020		78.0	
CS L	7/10/2019	11:20	19	634	9.54	4.24	21.2	62.3	51.4	0.598	0.628	0.030	0.099	0.362			74.7	
CS L	7/17/2019	12:23	24	746	9.99	11.29	25.1											
CS L	7/24/2019	11:10	24	746	9.77	10.54	25.4	49.3	28.9	0.020	0.070	0.010	0.166	0.037		10.20	46.6	
CS L	8/7/2019	12:50	19	409	8.77	4.04	22.7	19.9	26.4	0.040	0.070	0.020	0.148	0.081			24.8	
CS L	8/21/2019	11:46	17	990	8.98	8.26	19.9											
CS L	8/29/2019	11:40	16		9.22	8.99	16.8	12.5	14.8	0.051	0.070	0.020	0.140	0.120			39.6	
CS L	9/19/2019	11:38	17	960	8.83	8.70	19.3	9.7	9.6	0.040	0.070	0.020	0.116	0.027			39.1	
MINIMUM			16.00	409.00	8.34	4.04	16.80	4.90	1.59	0.02	0.07	0.01	0.046	0.017	0.02	10.20	6.06	
MEDIAN			19.00	746.00	9.22	8.99	21.20	19.50	23.60	0.04	0.07	0.02	0.14	0.04	0.04	12.60	39.60	
MAXIMUM			24	990	9.99	13.9	25.4	62.3	51.4	0.598	0.628	0.03	0.179	0.362	0.05	15	78.000	
AVERAGE			20.22	734.00	9.23	8.84	21.52	25.44	22.33	0.116	0.150	0.02	0.128	0.098	0.04	12.60	44.12	
LEGEND																		
cells = <indicated value																		

LOCATION	DATE	TIME	AIR TEMP (°C)	CONDUCTIVITY (µS/cm)	pH	DO (field) (mg/L)	Water Temp (°C)	TSS (mg/L)	TURBIDITY (NTU)	Nitrate in Water by IC (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite in Water by IC (mg/L)	TOTAL PHOSPHOROUS (mg/L)	AMMONIA as N (mg/L)	TOTAL CHLORINE (mg/L)	DO (lab) (mg/L)	CHLORO- PHYLL A (ug/L)	FECAL (MPN/100ml)
Southlands																		
S U	6/13/2019	1:30	23	n.d.	8.56	12.90	19.5	17.6	4.53	0.040	0.070	0.020	0.104	0.034	0.060		13.6	
S U	6/26/2019	10:55	22	833	8.29	11.09	22.5	11.6	3.65	0.040	0.070	0.020	0.127	0.021	0.150		31.1	
S U	7/10/2019	10:35	19	613	9.68	7.19	21.0	5.6	4.4	0.043	0.070	0.010	0.0589	0.013			20.8	
S U	7/17/2019	12:00	23	565	9.00	8.20	23.7											
S U	7/24/2019	11:50	24	716	8.43	6.62	25.4	42.7	5.2	0.020	0.070	0.010	0.554	0.072			93.0	
S U	8/1/2019	10:35	25	312	7.96	4.75	23.6											
S U	8/7/2019	12:05	19	411	8.22	8.13	22.3	20.9	11.6	0.040	0.070	0.020	0.119	0.021			72.4	
S U	8/14/2019	n.d.	n.d.	1089	8.59	7.84	22.5											
S U	8/21/2019	11:24	16	900	8.60	8.00	20.1											
S U	8/29/2019	11:10	16	651	9.09	9.30	16.9	11.9	7.35	0.145	0.145	0.010	0.0786	0.063			32.2	
S U	9/19/2019	11:15	15	824	7.74	5.33	19.0	55.6	33.1	0.097	0.097	0.010	0.175	0.156			122.0	
MINIMUM			15	312	7.74	4.75	16.9	5.6	3.7	0.020	0.070	0.010	0.059	0.013	0.060		13.6	
MEDIAN			22	651	8.56	8.00	22.3	17.6	5.2	0.040	0.070	0.010	0.119	0.034	0.105		32.2	
MAXIMUM			25	1089	9.68	12.9	25.4	55.6	33.1	0.145	0.145	0.020	0.554	0.156	0.150		122.0	
AVERAGE			20.8	691	8.56	8.12	21.5	23.7	10.0	0.061	0.085	0.014	0.174	0.054	0.105		55.0	
S L	6/13/2019	1:45	23	764	9.28	18.40	20.1	14.1	3.28	0.040	0.070	0.020	0.0565	0.016	0.050		23.6	
S L	6/26/2019	11:15	22	772	8.90	14.02	24.1	4.4	1.76	0.020	0.070	0.010	0.0495	0.041	0.030		3.16	
S L	7/10/2019	10:50	19	257	8.41	6.84	19.5	20.1	13.8	0.600	0.626	0.026	0.192	0.089			11.2	
S L	7/17/2019	11:52	23	701	9.66	7.96	25.2											
S L	7/24/2019	11:40	24	697	9.65	12.58	26.6	21.7	7.5	0.020	0.070	0.010	0.0577	0.020			17.2	
S L	8/1/2019	10:27	25	287	8.97	6.09	24.3											
S L	8/7/2019	12:20	19	375	8.92	7.39	23.0	35.3	15.4	0.020	0.070	0.010	0.0595	0.026			12.1	
S L	8/14/2019	n.d.	n.d.	1095	9.23	10.42	22.8											
S L	8/21/2019	11:15	16	942	8.95	8.40	20.1											
S L	8/29/2019	11:20	16		8.70	6.38	16.5	8.0	6.5	0.020	0.070	0.010	0.049	0.019			32.6	37
S L	9/19/2019	11:05	15		7.75	4.90	19.3	89.3	54.9	0.020	0.070	0.010	0.139	0.042			70.8	
MINIMUM			15	257	7.75	4.9	16.5	4.4	1.8	0.020	0.070	0.010	0.049	0.016	0.030		3.2	37
MEDIAN			20.5	701	8.95	7.96	22.8	20.1	7.5	0.020	0.070	0.010	0.058	0.026	0.040		17.2	37
MAXIMUM			25	1095	9.66	18.40	26.6	89.3	54.9	0.600	0.626	0.026	0.192	0.089	0.050		70.8	37
AVERAGE			20.2	654	8.95	9.40	22.0	27.6	14.7	0.106	0.149	0.014	0.086	0.036	0.040		24.4	37
LEGEND																		
cells = <indicated value																		

LOCATION	DATE	TIME	AIR TEMP (°C)	CONDUCTIVITY (µS/cm)	pH	DO (field) (mg/L)	Water Temp (°C)	TSS (mg/L)	TURBIDITY (NTU)	Nitrate in Water by IC (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite in Water by IC (mg/L)	TOTAL PHOSPHOROUS (mg/L)	AMMONIA as N (mg/L)	TOTAL CHLORINE (mg/L)	DO (lab) (mg/L)	CHLORO- PHYLL A (ug/L)	FECAL (MPN/100ml)
Eagle Creek																		
P1 U	6/19/2019	9:30	19	1390	9.13	6.33	19.7	13.9	3.7	0.100	0.110	0.050	0.144	0.064	0.010		43.6	
P1 U	6/26/2019	8:50	19	1547	8.16	4.42	19.7	15.7	6.06	0.100	0.110	0.050	0.150	0.049	0.050		10.3	
P1 U	7/10/2019	9:15	19	1659	8.36	6.33	19.2	25.6	18.9	1.110	1.180	0.073	0.292	0.063			2.7	
P1 U	7/17/2019	10:56	23	1581	8.56	4.45	24.9											
P1 U	7/24/2019	12:40	25	1563	8.64	3.54	25.0	82.7	22.4	0.100	0.110	0.050	0.189	0.071		3.30	62.4	
P1 U	8/1/2019	9:38	21	588	8.25	3.36	23.5											
P1 U	8/7/2019	10:40	18	801	7.77	1.82	21.1	17.7	4.6	0.100	0.110	0.050	0.217	0.068			27.1	687
P1 U	8/14/2019	11:38	n.d.	2200	8.20	5.35	21.8											
P1 U	8/21/2019	10:37	15	1639	8.17	4.82	19.0											
P1 U	8/29/2019	9:05	14	1690	9.59	6.31	16.7	10.1	4.9	0.100	0.110	0.050	0.110	0.141			29.7	548
P1 U	9/19/2019	10:19	15	1640	7.71	3.87	18.6	11.1	7.7	0.100	0.110	0.050	0.127	0.262			15.2	172
MINIMUM			14	588	7.71	1.82	16.7	10.1	3.7	0.100	0.110	0.050	0.110	0.049	0.010	3.30	2.7	172
MEDIAN			19	1581	8.25	4.45	19.7	15.7	6.1	0.100	0.110	0.050	0.150	0.068	0.030	3.30	27.1	548
MAXIMUM			25	2200	9.59	6.33	25.0	82.7	22.4	1.110	1.180	0.073	0.292	0.262	0.050	3.30	62.4	687
AVERAGE			19	1482	8.41	4.60	20.8	25.3	9.75	0.244	0.263	0.053	0.176	0.103	0.030	3.30	27.3	469
P2 L	6/19/2019	9:50	21	1538	8.97	5.21	18.5	24.3	2.47	0.100	0.110	0.050	0.480	0.065	0.020		61.6	
P2 L	6/26/2019	9:10	19	1473	7.31	1.32	19.4	25.1	9.15	0.100	0.110	0.050	0.458	0.171	0.010		47.3	
P2 L	7/10/2019	9:35	19	1625	8.17	6.36	19.0	40.0	31.2	1.280	1.360	0.079	0.278	0.108			3.9	
P2 L	7/17/2019	11:00	23	1619	7.98	2.97	23.7											
P2 L	7/24/2019	12:50	25	1496	8.07	4.48	25.4	11.9	4.3	0.100	0.110	0.050	0.197	0.126			55.9	
P2 L	8/1/2019	9:48	23	591	7.37	1.00	19.9											
P2 L	8/7/2019	10:50	18	748	7.74	2.84	20.9	23.2	4.43	0.100	0.110	0.050	0.581	0.073			57.2	
P2 L	8/14/2019	11:45	n.d.	2040	8.56	8.22	21.2											
P2 L	8/21/2019	10:43	15	1582	7.91	1.76	18.1											
P2 L	8/29/2019	10:25	15		8.33	2.77	15.6	36.1	11.1	0.330	0.330	0.050	0.217	0.126			39.0	
P2 L	9/19/2019	10:25	15		7.65	3.36	18.1	34.9	4.5	0.100	0.110	0.050	0.227	0.105			70.6	
MINIMUM			15	591	7.31	1.00	15.6	11.9	2.5	0.100	0.110	0.050	0.197	0.065	0.010		3.9	
MEDIAN			19	1538	7.98	2.97	19.4	25.1	4.5	0.100	0.110	0.050	0.278	0.108	0.015		55.9	
MAXIMUM			25	2040	8.97	8.22	25.4	40.0	31.2	1.280	1.360	0.079	0.581	0.171	0.020		70.6	
AVERAGE			19	1412	8.01	3.66	20.0	27.9	9.6	0.301	0.320	0.054	0.348	0.111	0.015		47.9	
P3 L	6/19/2019	10:20	22	978	9.08	9.26	17.4	58.9	15.4	0.258	0.287	0.029	0.193	0.089	0.020		49.2	
P3 L	6/26/2019	9:40	19	1046	8.17	7.52	18.7	5.9	1.97	0.040	0.070	0.020	0.113	0.053	0.020	7.10	32.6	
P3 L	7/10/2019	9:50	20	1034	8.61	2.81	19.2	48.7	37.5	1.170	1.240	0.074	0.328	0.144			20.7	
P3 L	7/17/2019	11:10	23	1679	8.12	1.93	22.7											
P3 L	7/24/2019	12:25	25	1542	8.12	1.61	23.5	55.7	19.6	0.100	0.110	0.050	0.807	0.112			69.1	
P3 L	8/1/2019	9:55	23	542	8.10	1.18	22.1											
P3 L	8/7/2019	11:20	18	762	7.66	4.04	20.3	56.0	15.9	0.100	0.110	0.050	0.635	0.060			477.0	
P3 L	8/14/2019	n.d.	n.d.	2100	8.83	9.82	20.1											
P3 L	8/21/2019	10:56	15	1740	7.95	4.41	17.5											
P3 L	8/29/2019	10:38	15		8.45	3.78	16.0	4.7	2.8	0.040	0.070	0.020	0.120	0.140			33.2	
P3 L	9/19/2019	10:37	15		7.55	1.76	18.7	3.6	2.5	0.100	0.110	0.050	0.069	0.100			4.7	
MINIMUM			15	542	7.55	1.18	16.0	3.6	2.0	0.040	0.070	0.020	0.069	0.053	0.020	7.10	4.7	
MEDIAN			19.5	1046	8.12	3.78	19.2	48.7	15.4	0.100	0.110	0.050	0.193	0.100	0.020	7.10	33.2	
MAXIMUM			25	2100	9.08	9.82	23.5	58.9	37.5	1.170	1.240	0.074	0.807	0.144	0.020	7.10	477.0	
AVERAGE			20	1269	8.24	4.37	19.7	33.4	13.7	0.258	0.285	0.042	0.324	0.100	0.020	7.10	98.1	
LEGEND																		
cells = <indicated value																		

LOCATION	DATE	TIME	AIR TEMP (°C)	CONDUCTIVITY (µS/cm)	pH	DO (field) (mg/L)	Water Temp (°C)	TSS (mg/L)	TURBIDITY (NTU)	Nitrate in Water by IC (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite in Water by IC (mg/L)	TOTAL PHOSPHOROUS (mg/L)	AMMONIA as N (mg/L)	TOTAL CHLORINE (mg/L)	DO (lab) (mg/L)	CHLORO- PHYLL A (ug/L)	FECAL (MPN/100ml)
Eagle Creek																		
P4 L	6/19/2019	10:50	22	1144	9.74	9.24	21.0	19.1	7.77	0.100	0.110	0.050	0.238	0.038	0.010		69.3	
P4 L	6/26/2019	10:15	20	1161	7.93	3.11	18.7	20.9	5.85	0.040	0.070	0.020	0.247	0.042	0.010		20.5	
P4 L	7/10/2019	10:00	20	393	9.17	4.57	19.1	17.9	13.6	0.824	0.851	0.027	0.273	0.091	0.020	4.30	14.9	
P4 L	7/17/2019	11:23	23	1390	8.44	2.32	23.5											
P4 L	7/24/2019	12:15	25	1498	8.31	3.64	23.2	8.3	2.5	0.100	0.110	0.050	0.190	0.089			30.9	
P4 L	8/1/2019	10:02	25	559	7.87	3.01	22.5											
P4 L	8/7/2019	11:06	18	749	8.14	5.46	21.4	60.0	25.5	0.100	0.110	0.050	0.535	0.042			138.0	
P4 L	8/14/2019	n.d.	n.d.	2070	8.67	8.23	25.6											
P4 L	8/21/2019	10:52	15	1591	8.31	3.72	17.9											
P4 L	8/29/2019	10:45	15	1220	8.40	4.44	16.3	6.1	3.6	0.040	0.070	0.020	0.122	0.201			23.0	
P4 L	9/19/2019	10:42	15		7.56	2.42	17.5	2.3	2.34	0.183	0.183	0.020	0.105	0.251			11.2	
MINIMUM			15	393	7.56	2.32	16.3	2.3	2.3	0.040	0.070	0.020	0.105	0.038	0.010	4.30	11.2	
MEDIAN			20	1191	8.31	3.72	21.0	17.9	5.9	0.100	0.110	0.027	0.238	0.089	0.010	4.30	23.0	
MAXIMUM			25	2070	9.74	9.24	25.6	60.0	25.5	0.824	0.851	0.050	0.535	0.251	0.020	4.30	138.0	
AVERAGE			20	1178	8.41	4.56	20.6	19.2	8.7	0.198	0.215	0.034	0.244	0.108	0.013	4.30	44.0	
P6 L	6/19/2019	11:15	22	1317	8.86	6.98	20.4	32.1	24.4	0.100	0.110	0.050	0.262	0.079	0.020		34.3	
P6 L	6/26/2019	10:35	21	1375	7.84	2.78	19.0	15.9	6.03	0.100	0.110	0.050	0.614	0.072	0.010		4.8	
P6 L	7/10/2019	10:21	20	661	9.45	3.14	19.0	37.1	14.0	0.090	0.113	0.023	0.294	0.141			15.0	
P6 L	7/17/2019	11:30	23	1179	8.69	3.22	24.2											
P6 L	7/24/2019	12:05	25	1311	8.58	1.78	21.8	43.2	19.4	0.100	0.110	0.050	0.208	0.024			24.2	
P6 L	8/1/2019	10:15	25	498	8.18	1.16	19.9											
P6 L	8/7/2019	11:35	18	630	8.87	5.72	19.5	210.0	107.0	0.100	0.110	0.050	0.312	0.107			51.3	
P6 L	8/14/2019	n.d.	n.d.	1706	8.97	3.06	18.2											
P6 L	8/21/2019	11:07	15	1591	8.31	3.72	17.9											
P6 L	8/29/2019	10:55	15		8.56	2.86	16.0	6.0	2.02	0.040	0.070	0.020	0.081	0.063			21.4	114

Appendix 3. Laboratory Reports



RM of East St. Paul
ATTN: Leanne Shewchuk
3021 Birdshill Road
East St. Paul MB R2E 1A7

Date Received: 14-JUN-19
Report Date: 24-JUN-19 15:44 (MT)
Version: FINAL

Client Phone: 204-668-8112

Certificate of Analysis

Lab Work Order #: L2291959
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2291959-1 SS A Sampled By: TM on 13-JUN-19 @ 10:00 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.020 Nitrate+Nitrite Nitrate and Nitrite as N <0.070 Nitrite in Water by IC Nitrite (as N) <0.010 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 4.09 Miscellaneous Parameters Ammonia, Total (as N) 0.072 Chlorine, Total 0.010 Phosphorus (P)-Total 0.0524 Total Suspended Solids 7.7 Turbidity 4.00							
			0.020	mg/L		14-JUN-19	R4673753
			0.070	mg/L		19-JUN-19	
			0.010	mg/L		14-JUN-19	R4673753
			0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
			0.010	mg/L		17-JUN-19	R4672883
		CLH	0.010	mg/L		15-JUN-19	R4672207
			0.0030	mg/L		18-JUN-19	R4672439
			2.0	mg/L		20-JUN-19	R4681118
			0.10	NTU		14-JUN-19	R4672328
L2291959-2 SS B Sampled By: TM on 13-JUN-19 @ 10:40 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.020 Nitrate+Nitrite Nitrate and Nitrite as N <0.070 Nitrite in Water by IC Nitrite (as N) <0.010 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 51.6 Miscellaneous Parameters Ammonia, Total (as N) 0.026 Chlorine, Total <0.010 Phosphorus (P)-Total 0.200 Total Suspended Solids 44.8 Turbidity 53.8							
			0.020	mg/L		14-JUN-19	R4673753
			0.070	mg/L		19-JUN-19	
			0.010	mg/L		14-JUN-19	R4673753
			0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
			0.010	mg/L		21-JUN-19	R4682037
		CLH	0.010	mg/L		15-JUN-19	R4672207
			0.0030	mg/L		18-JUN-19	R4672439
			2.0	mg/L		20-JUN-19	R4681118
			0.10	NTU		14-JUN-19	R4672328
L2291959-3 SS C Sampled By: TM on 13-JUN-19 @ 11:15 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) 0.035 Nitrate+Nitrite Nitrate and Nitrite as N <0.070 Nitrite in Water by IC Nitrite (as N) 0.013 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 19.2 Miscellaneous Parameters Ammonia, Total (as N) 0.66 Chlorine, Total 0.010							
			0.020	mg/L		14-JUN-19	R4673753
			0.070	mg/L		19-JUN-19	
			0.010	mg/L		14-JUN-19	R4673753
			0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
			0.10	mg/L		21-JUN-19	R4682037
		CLH	0.010	mg/L		15-JUN-19	R4672207

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2291959-3	SS C							
Sampled By: TM on 13-JUN-19 @ 11:15								
Matrix: WATER								
Phosphorus (P)-Total		0.109		0.0030	mg/L		18-JUN-19	R4672439
Total Suspended Solids		7.5		2.0	mg/L		20-JUN-19	R4681118
Turbidity		7.01		0.10	NTU		14-JUN-19	R4672328
L2291959-4	SS D							
Sampled By: TM on 13-JUN-19 @ 11:31								
Matrix: WATER								
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.020		0.020	mg/L		14-JUN-19	R4673753
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.070		0.070	mg/L		19-JUN-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.010		0.010	mg/L		14-JUN-19	R4673753
Chlorophyll a								
Chlorophyll a by fluorometry								
Chlorophyll a		0.69		0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
Miscellaneous Parameters								
Ammonia, Total (as N)		0.035	CLH	0.010	mg/L		17-JUN-19	R4672883
Chlorine, Total		0.020		0.010	mg/L		15-JUN-19	R4672207
Phosphorus (P)-Total		0.0469		0.0030	mg/L		18-JUN-19	R4672439
Total Suspended Solids		2.9		2.0	mg/L		20-JUN-19	R4681118
Turbidity		1.54		0.10	NTU		14-JUN-19	R4672328
L2291959-5	CS U							
Sampled By: TM on 13-JUN-19 @ 14:12								
Matrix: WATER								
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.020		0.020	mg/L		14-JUN-19	R4673753
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.070		0.070	mg/L		19-JUN-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.010		0.010	mg/L		14-JUN-19	R4673753
Chlorophyll a								
Chlorophyll a by fluorometry								
Chlorophyll a		108		0.20	ug/L	14-JUN-19	14-JUN-19	R4675504
Miscellaneous Parameters								
Ammonia, Total (as N)		0.024	CLH	0.010	mg/L		21-JUN-19	R4682037
Chlorine, Total		0.020		0.010	mg/L		15-JUN-19	R4672207
Phosphorus (P)-Total		0.0813		0.0030	mg/L		18-JUN-19	R4672439
Total Suspended Solids		17.3		2.0	mg/L		20-JUN-19	R4681118
Turbidity		26.4		0.10	NTU		14-JUN-19	R4672328
L2291959-6	CS L							
Sampled By: TM on 13-JUN-19 @ 14:45								
Matrix: WATER								
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.040	DLM	0.040	mg/L		14-JUN-19	R4673753
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.070		0.070	mg/L		19-JUN-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.020	DLM	0.020	mg/L		14-JUN-19	R4673753

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2291959-6 CS L Sampled By: TM on 13-JUN-19 @ 14:45 Matrix: WATER Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Oxygen, Dissolved Phosphorus (P)-Total Total Suspended Solids Turbidity	6.06 0.017 0.050 15.0 0.0456 4.9 1.59	CLH RWHS	0.10 0.010 0.010 0.10 0.0030 2.0 0.10	ug/L mg/L mg/L mg/L mg/L mg/L NTU	14-JUN-19	14-JUN-19 17-JUN-19 15-JUN-19 14-JUN-19 18-JUN-19 20-JUN-19 14-JUN-19	R4675504 R4672883 R4672207 R4672730 R4672439 R4681118 R4672328
L2291959-7 S U Sampled By: TM on 13-JUN-19 @ 13:30 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.040 <0.070 <0.020 13.6 0.034 0.060 0.104 17.6 4.53	DLM DLM CLH	0.040 0.070 0.020 0.10 0.010 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	14-JUN-19 14-JUN-19 14-JUN-19 14-JUN-19 17-JUN-19 15-JUN-19 18-JUN-19 20-JUN-19 14-JUN-19	R4673753 R4673753 R4675504 R4672883 R4672207 R4672439 R4681118 R4672328	
L2291959-8 S L Sampled By: TM on 13-JUN-19 @ 13:45 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.040 <0.070 <0.020 23.6 0.016 0.050 0.0565 14.1 3.28	DLM DLM CLH	0.040 0.070 0.020 0.10 0.010 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	14-JUN-19 14-JUN-19 14-JUN-19 14-JUN-19 17-JUN-19 15-JUN-19 18-JUN-19 20-JUN-19 14-JUN-19	R4673753 R4673753 R4675504 R4672883 R4672207 R4672439 R4681118 R4672328	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2291959-9	BTP 1							
Sampled By: TM on 13-JUN-19 @ 15:20								
Matrix: WATER								
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.040	DLM	0.040	mg/L		14-JUN-19	R4673753
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.070		0.070	mg/L		19-JUN-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.020	DLM	0.020	mg/L		14-JUN-19	R4673753
Chlorophyll a								
Chlorophyll a by fluorometry								
Chlorophyll a		8.15		0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
Miscellaneous Parameters								
Ammonia, Total (as N)		0.021		0.010	mg/L		21-JUN-19	R4682037
Chlorine, Total		0.020	CLH	0.010	mg/L		15-JUN-19	R4672207
Phosphorus (P)-Total		0.0480		0.0030	mg/L		18-JUN-19	R4672439
Total Suspended Solids		13.3		2.0	mg/L		20-JUN-19	R4681118
Turbidity		10.8		0.10	NTU		14-JUN-19	R4672328

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
CLH	Free/Total Chlorine sample had headspace. Hold time for Chlorine tests is 15 minutes; field testing is recommended. Chlorine dissipates rapidly into headspace.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RWHS	Samples Received With Headspace

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.			
CL2-TOTAL-WP	Water	Chlorine, Total	APHA 4500-Cl Chlorine(Residual) G (mod)
Chlorine (residual), as free or total, is analyzed using the DPD colourimetric method. The recommended hold time for these tests is 15 minutes; field testing is recommended for best results. Chlorine can be rapidly consumed by organic matter, if present, and dissipates rapidly into headspace.			
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
O2-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C
Manganous sulphate reacts with potassium or sodium hydroxide to give a white precipitate of manganous hydroxide. In the presence of oxygen, brown manganic hydroxide is formed. Addition of sulfuric acid dissolves the manganic hydroxide, yielding manganic sulfate which reacts with iodide, releasing iodide in an amount equivalent to the original DO content. The iodide is then titrated with a standard solution of thiosulphate. Results for supersaturated samples may be biased low.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2291959

Report Date: 24-JUN-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP		Water						
Batch R4673753								
WG3077957-10	LCS							
Nitrate (as N)			100.8		%		90-110	14-JUN-19
WG3077957-6	LCS							
Nitrate (as N)			99.2		%		90-110	14-JUN-19
WG3077957-5	MB							
Nitrate (as N)			<0.020		mg/L		0.02	14-JUN-19
WG3077957-9	MB							
Nitrate (as N)			<0.020		mg/L		0.02	14-JUN-19
O2-DIS-WP		Water						
Batch R4672730								
WG3080665-2	LCS							
Oxygen, Dissolved			104.6		%		85-115	14-JUN-19
WG3080665-1	MB							
Oxygen, Dissolved			<0.10		mg/L		0.1	14-JUN-19
P-T-COL-WP		Water						
Batch R4672439								
WG3079595-18	LCS							
Phosphorus (P)-Total			100.5		%		80-120	18-JUN-19
WG3079595-17	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	18-JUN-19
SOLIDS-TOTSUS-WP		Water						
Batch R4681118								
WG3081869-20	LCS							
Total Suspended Solids			102.7		%		85-115	20-JUN-19
WG3081869-19	MB							
Total Suspended Solids			<2.0		mg/L		2	20-JUN-19
TURBIDITY-WP		Water						
Batch R4672328								
WG3080125-5	LCS							
Turbidity			105.0		%		85-115	14-JUN-19
WG3080125-4	MB							
Turbidity			<0.10		NTU		0.1	14-JUN-19

Quality Control Report

Workorder: L2291959

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Workorder: L2291959

Report Date: 24-JUN-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved Oxygen	6	13-JUN-19 14:45	14-JUN-19 14:36	8.0	24	hours	EHTR
Inorganic Parameters							
Chlorine, Total	1	13-JUN-19 10:00	15-JUN-19 14:00	0.25	52	hours	EHTR-FM
	2	13-JUN-19 10:40	15-JUN-19 14:00	0.25	51	hours	EHTR-FM
	3	13-JUN-19 11:15	15-JUN-19 14:00	0.25	51	hours	EHTR-FM
	4	13-JUN-19 11:31	15-JUN-19 14:00	0.25	50	hours	EHTR-FM
	5	13-JUN-19 14:12	15-JUN-19 14:00	0.25	48	hours	EHTR-FM
	6	13-JUN-19 14:45	15-JUN-19 14:00	0.25	47	hours	EHTR-FM
	7	13-JUN-19 13:30	15-JUN-19 14:00	0.25	48	hours	EHTR-FM
	8	13-JUN-19 13:45	15-JUN-19 14:00	0.25	48	hours	EHTR-FM
	9	13-JUN-19 15:20	15-JUN-19 14:00	0.25	47	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2291959 were received on 14-JUN-19 13:40.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L2291959-COFC

COC Number: 17 -

Page of

Report To Contact and company name below will appear on the final report		Report Form		Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)														
Company: RM of East St. Paul		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)		Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply						EMERGENCY								
Contact: Leanne Shewchuk		Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		4 day [P4-20%] <input type="checkbox"/>						1 Business day [E - 100%] <input type="checkbox"/>								
Phone: 204-668-8112 x 4503		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		3 day [P3-25%] <input type="checkbox"/>						Same Day, Weekend or Statutory holiday [E2 - 200%] <input type="checkbox"/>								
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		2 day [P2-50%] <input type="checkbox"/>						(Laboratory opening fees may apply)								
Street: 3021 Birdhill Road		Email 1 or Fax: leanne.shewchuk@eaststpaul.com		Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm														
City/Province: East St. Paul, MB		Email 2: operations@eaststpaul.com		For tests that can not be performed according to the service level selected, you will be contacted.														
Postal Code: R2E 1A7		Email 3:		Analysis Request														
Invoice To: Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Invoice Distribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below														
Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																
Company:		Email 1 or Fax: operations@eaststpaul.com																
Contact:		Email 2:																
Project Information		Oil and Gas Required Fields (client use)																
ALS Account # / Quote #: Q74289		AFE/Cost Center:		PO#		NUMBER OF CONTAINERS						SAMPLES ON HOLD						
Job #:		Major/Minor Code:		Routing Code:														
PO / AFE:		Requisitioner:																
LSD:		Location:																
ALS Lab Work Order # (lab use only):		ALS Contact: Connor Cattani		Sampler: JM														
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type														
1	SS A	13-06-2019	10:00	Water	4	R	R		R	R	R	R	R	R				
2	SS B	13-06-2019	10:40	Water	4	R	R		R	R	R	R	R	R				
3	SS C	13-06-2019	11:15	Water	4	R	R		R	R	R	R	R	R				
4	SS D	13-06-2019	11:31	Water	4	R	R		R	R	R	R	R	R				
5	CS U	13-06-2019	2:12	Water	4	R	R		R	R	R	R	R	R				
6	CS L	13-06-2019	2:45	Water	5	R	R	R	R	R	R	R	R	R				
7	S U	13-06-2019	1:30	Water	4	R	R		R	R	R	R	R	R				
8	S L	13-06-2019	1:45	Water	4	R	R		R	R	R	R	R	R				
9	BTP 1	13-06-2019	3:20	Water	4	R	R		R	R	R	R	R	R				
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)				SAMPLE CONDITION AS RECEIVED (lab use only)												
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO						Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>												
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO						Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>												
						Cooling Initiated <input type="checkbox"/>												
						INITIAL COOLER TEMPERATURES °C						FINAL COOLER TEMPERATURES °C						
						11.1												
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)				FINAL SHIPMENT RECEPTION (lab use only)												
Released by:		Date:		Time:		Received by: JH		Date: June 14		Time: 1:40		Received by:		Date:		Time:		

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



RM of East St. Paul
ATTN: Leanne Shewchuk
3021 Birdshill Road
East St. Paul MB R2E 1A7

Date Received: 19-JUN-19
Report Date: 27-JUN-19 07:02 (MT)
Version: FINAL

Client Phone: 204-668-8112

Certificate of Analysis

Lab Work Order #: L2295004
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295004-1 P1 U Sampled By: CLIENT on 19-JUN-19 @ 09:30 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.10 <0.11 <0.050 43.6 0.064 0.010 0.144 13.9 3.70	DLM CLH	0.10 0.11 0.050 0.10 0.010 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	 19-JUN-19 	20-JUN-19 25-JUN-19 20-JUN-19 19-JUN-19 24-JUN-19 20-JUN-19 21-JUN-19 25-JUN-19 20-JUN-19	R4684255 R4688383 R4685446 R4680488 R4682341 R4687654 R4681974
L2295004-2 P2 L Sampled By: CLIENT on 19-JUN-19 @ 09:30 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.10 <0.11 <0.050 61.6 0.065 0.020 0.480 24.3 2.47	DLM CLH	0.10 0.11 0.050 0.20 0.050 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	 19-JUN-19 	20-JUN-19 25-JUN-19 20-JUN-19 19-JUN-19 25-JUN-19 20-JUN-19 21-JUN-19 25-JUN-19 20-JUN-19	R4684255 R4688383 R4688367 R4680488 R4682341 R4687654 R4681974
L2295004-3 P3 L Sampled By: CLIENT on 19-JUN-19 @ 09:30 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total	0.258 0.287 0.029 49.2 0.089 0.020	 CLH	0.040 0.070 0.020 0.10 0.010 0.010	mg/L mg/L mg/L ug/L mg/L mg/L	 19-JUN-19 	20-JUN-19 25-JUN-19 20-JUN-19 19-JUN-19 24-JUN-19 20-JUN-19	R4684255 R4688383 R4685446 R4680488

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295004-3 P3 L Sampled By: CLIENT on 19-JUN-19 @ 09:30 Matrix: Phosphorus (P)-Total Total Suspended Solids Turbidity	0.193 58.9 15.4		0.0030 2.0 0.10	mg/L mg/L NTU		21-JUN-19 25-JUN-19 20-JUN-19	R4682341 R4687654 R4681974
L2295004-4 P4 L Sampled By: CLIENT on 19-JUN-19 @ 09:30 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.10 <0.11 <0.050 69.3 0.038 0.010 0.238 19.1 7.77	DLM DLM CLH	0.10 0.11 0.050 0.20 0.010 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	19-JUN-19	20-JUN-19 25-JUN-19 20-JUN-19 19-JUN-19 24-JUN-19 20-JUN-19 21-JUN-19 25-JUN-19 20-JUN-19	R4684255 R4684255 R4688383 R4685446 R4680488 R4682341 R4687654 R4681974
L2295004-5 P6 L Sampled By: CLIENT on 19-JUN-19 @ 09:30 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.10 <0.11 <0.050 34.3 0.079 0.020 0.262 32.1 24.4	DLM DLM CLH	0.10 0.11 0.050 0.10 0.010 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	19-JUN-19	20-JUN-19 25-JUN-19 20-JUN-19 19-JUN-19 25-JUN-19 20-JUN-19 21-JUN-19 25-JUN-19 20-JUN-19	R4684255 R4684255 R4688383 R4685446 R4680488 R4682341 R4687654 R4681974

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
CLH	Free/Total Chlorine sample had headspace. Hold time for Chlorine tests is 15 minutes; field testing is recommended. Chlorine dissipates rapidly into headspace.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.			
CL2-TOTAL-WP	Water	Chlorine, Total	APHA 4500-Cl Chlorine(Residual) G (mod)
Chlorine (residual), as free or total, is analyzed using the DPD colourimetric method. The recommended hold time for these tests is 15 minutes; field testing is recommended for best results. Chlorine can be rapidly consumed by organic matter, if present, and dissipates rapidly into headspace.			
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2295004

Report Date: 27-JUN-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP	Water							
Batch	R4684255							
WG3083246-2	LCS							
Nitrate (as N)			99.5		%		90-110	20-JUN-19
WG3083246-1	MB							
Nitrate (as N)			<0.020		mg/L		0.02	20-JUN-19
P-T-COL-WP	Water							
Batch	R4682341							
WG3083405-6	LCS							
Phosphorus (P)-Total			96.2		%		80-120	21-JUN-19
WG3083405-5	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	21-JUN-19
SOLIDS-TOTSUS-WP	Water							
Batch	R4687654							
WG3086688-22	LCS							
Total Suspended Solids			98.0		%		85-115	25-JUN-19
WG3086688-21	MB							
Total Suspended Solids			<2.0		mg/L		2	25-JUN-19
TURBIDITY-WP	Water							
Batch	R4681974							
WG3085302-8	LCS							
Turbidity			105.5		%		85-115	20-JUN-19
WG3085302-7	MB							
Turbidity			<0.10		NTU		0.1	20-JUN-19

Quality Control Report

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Quality Control Report

Workorder: L2295004

Report Date: 27-JUN-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Inorganic Parameters							
Chlorine, Total							
	1	19-JUN-19 09:30	20-JUN-19 10:00	0.25	24	hours	EHTR-FM
	2	19-JUN-19 09:30	20-JUN-19 10:00	0.25	24	hours	EHTR-FM
	3	19-JUN-19 09:30	20-JUN-19 10:00	0.25	24	hours	EHTR-FM
	4	19-JUN-19 09:30	20-JUN-19 10:00	0.25	24	hours	EHTR-FM
	5	19-JUN-19 09:30	20-JUN-19 10:00	0.25	24	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2295004 were received on 19-JUN-19 16:25.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Canada Toll Free: 1 800 668 9878



L2295004-COFC

COC Number: 17 -

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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NOV 2010 FROM

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



RM of East St. Paul
ATTN: Leanne Shewchuk
3021 Birdshill Road
East St. Paul MB R2E 1A7

Date Received: 27-JUN-19
Report Date: 09-JUL-19 08:19 (MT)
Version: FINAL

Client Phone: 204-668-8112

Certificate of Analysis

Lab Work Order #: L2300108
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:



David Inocando
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

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[illegible]

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2300108-3 P3 L Sampled By: TM on 26-JUN-19 @ 09:40 Matrix: WATER Oxygen, Dissolved Phosphorus (P)-Total Total Suspended Solids Turbidity	7.10 0.113 5.9 1.97		0.10 0.0030 2.0 0.10	mg/L mg/L mg/L NTU		27-JUN-19 05-JUL-19 03-JUL-19 27-JUN-19	R4690757 R4694643 R4693447 R4689852
L2300108-4 P4 L Sampled By: TM on 26-JUN-19 @ 10:15 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.040 <0.070 <0.020 20.5 0.042 0.010 0.247 20.9 5.85	DLM DLM CLH	0.040 0.070 0.020 0.10 0.010 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	27-JUN-19 03-JUL-19 27-JUN-19 27-JUN-19 03-JUL-19 27-JUN-19 05-JUL-19 03-JUL-19 27-JUN-19	R4692567 R4692567 R4696236 R4693823 R4689878 R4694643 R4693447 R4689852	
L2300108-5 P6 L Sampled By: TM on 26-JUN-19 @ 10:35 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.10 <0.11 <0.050 4.81 0.072 0.010 0.614 15.9 6.03	DLM DLM CLH	0.10 0.11 0.050 0.10 0.010 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	27-JUN-19 03-JUL-19 27-JUN-19 27-JUN-19 03-JUL-19 27-JUN-19 05-JUL-19 03-JUL-19 27-JUN-19	R4692567 R4692567 R4696236 R4693823 R4689878 R4694643 R4693447 R4689852	
L2300108-6 S U Sampled By: TM on 26-JUN-19 @ 10:55 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N	<0.040 <0.070	DLM	0.040 0.070	mg/L mg/L		27-JUN-19 03-JUL-19	R4692567

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2300108-6 S U Sampled By: TM on 26-JUN-19 @ 10:55 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.020	DLM	0.020	mg/L		27-JUN-19	R4692567
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	31.1		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters Ammonia, Total (as N)	0.021		0.010	mg/L		03-JUL-19	R4693823
Chlorine, Total	0.150	CLH	0.010	mg/L		27-JUN-19	R4689878
Phosphorus (P)-Total	0.127		0.0030	mg/L		05-JUL-19	R4694643
Total Suspended Solids	11.6		2.0	mg/L		03-JUL-19	R4693447
Turbidity	3.65		0.10	NTU		27-JUN-19	R4689852
L2300108-7 S L Sampled By: TM on 26-JUN-19 @ 11:15 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N)	<0.020		0.020	mg/L		27-JUN-19	R4692567
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		03-JUL-19	
Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		27-JUN-19	R4692567
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	3.16		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters Ammonia, Total (as N)	0.041		0.010	mg/L		03-JUL-19	R4693823
Chlorine, Total	0.030	CLH	0.010	mg/L		27-JUN-19	R4689878
Phosphorus (P)-Total	0.0495		0.0030	mg/L		05-JUL-19	R4694643
Total Suspended Solids	4.4		2.0	mg/L		03-JUL-19	R4693447
Turbidity	1.76		0.10	NTU		27-JUN-19	R4689852
L2300108-8 CS U Sampled By: TM on 26-JUN-19 @ 11:40 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N)	<0.040	DLM	0.040	mg/L		27-JUN-19	R4692567
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		03-JUL-19	
Nitrite in Water by IC Nitrite (as N)	<0.020	DLM	0.020	mg/L		27-JUN-19	R4692567
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	7.48		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters Ammonia, Total (as N)	0.030		0.010	mg/L		03-JUL-19	R4693823
Chlorine, Total	<0.020	CLH	0.020	mg/L		27-JUN-19	R4689878
Phosphorus (P)-Total	0.0706		0.0030	mg/L		05-JUL-19	R4694643
Total Suspended Solids	4.8		2.0	mg/L		03-JUL-19	R4693447
Turbidity	1.65		0.10	NTU		27-JUN-19	R4689852

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2300108-9 CS L Sampled By: TM on 26-JUN-19 @ 12:00 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.020 78.0 0.041 0.020 0.179 19.5 23.6		0.020 0.50 0.010 0.010 0.0030 2.0 0.10	mg/L ug/L mg/L mg/L mg/L mg/L NTU		27-JUN-19 27-JUN-19 27-JUN-19 03-JUL-19 27-JUN-19 05-JUL-19 03-JUL-19 27-JUN-19	R4692567 R4692567 R4692567 R4693823 R4689878 R4694643 R4693447 R4689852
L2300108-10 BTP 1 Sampled By: TM on 26-JUN-19 @ 12:30 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.040 9.23 0.032 0.090 0.0885 10.7 9.65	DLM CLH	0.040 0.10 0.010 0.010 0.0030 2.0 0.10	mg/L ug/L mg/L mg/L mg/L mg/L NTU		27-JUN-19 27-JUN-19 27-JUN-19 03-JUL-19 27-JUN-19 05-JUL-19 03-JUL-19 27-JUN-19	R4692567 R4692567 R4692567 R4693823 R4689878 R4694643 R4693447 R4689852
L2300108-11 SS A Sampled By: TM on 26-JUN-19 @ 10:00 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total	<0.020 4.67 0.102 0.0488		0.020 0.10 0.010 0.0030	mg/L ug/L mg/L mg/L		27-JUN-19 27-JUN-19 27-JUN-19 03-JUL-19 05-JUL-19	R4692567 R4692567 R4692567 R4693823 R4694643

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2300108-11	SS A Sampled By: TM on 26-JUN-19 @ 10:00 Matrix: WATER Total Suspended Solids Turbidity	3.7 2.36		2.0 0.10	mg/L NTU		03-JUL-19 27-JUN-19	R4693447 R4689852
L2300108-12	SS B Sampled By: TM on 26-JUN-19 @ 10:15 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.020 <0.070 <0.010 35.9 0.041 0.217 37.9 47.4		0.020 0.070 0.010 0.10 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	27-JUN-19 03-JUL-19 27-JUN-19 27-JUN-19 27-JUN-19 04-JUL-19 05-JUL-19 03-JUL-19 27-JUN-19	R4692567 R4692567 R4696236 R4694849 R4694643 R4693447 R4689852	
L2300108-13	SS C Sampled By: TM on 26-JUN-19 @ 10:35 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Oxygen, Dissolved Phosphorus (P)-Total Total Suspended Solids Turbidity	0.028 <0.070 0.017 5.62 0.474 9.40 0.0894 2.3 3.99		0.020 0.070 0.010 0.10 0.010 0.10 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	27-JUN-19 03-JUL-19 27-JUN-19 27-JUN-19 27-JUN-19 03-JUL-19 27-JUN-19 05-JUL-19 03-JUL-19 27-JUN-19	R4692567 R4692567 R4696236 R4693823 R4690757 R4694643 R4693447 R4689852	
L2300108-14	SS D Sampled By: TM on 26-JUN-19 @ 11:10 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry	<0.020 <0.070 <0.010		0.020 0.070 0.010	mg/L mg/L mg/L		27-JUN-19 03-JUL-19 27-JUN-19	R4692567 R4692567

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2300108-14	SS D							
Sampled By: TM on 26-JUN-19 @ 11:10								
Matrix: WATER								
Chlorophyll a by fluorometry								
Chlorophyll a		7.59		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters								
Ammonia, Total (as N)		0.041		0.010	mg/L		03-JUL-19	R4693823
Phosphorus (P)-Total		0.0967		0.0030	mg/L		05-JUL-19	R4694643
Total Suspended Solids		7.2		2.0	mg/L		03-JUL-19	R4693447
Turbidity		4.98		0.10	NTU		28-JUN-19	R4692344

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
CLH	Free/Total Chlorine sample had headspace. Hold time for Chlorine tests is 15 minutes; field testing is recommended. Chlorine dissipates rapidly into headspace.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.			
CL2-TOTAL-WP	Water	Chlorine, Total	APHA 4500-Cl Chlorine(Residual) G (mod)
Chlorine (residual), as free or total, is analyzed using the DPD colourimetric method. The recommended hold time for these tests is 15 minutes; field testing is recommended for best results. Chlorine can be rapidly consumed by organic matter, if present, and dissipates rapidly into headspace.			
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
O2-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C
Manganous sulphate reacts with potassium or sodium hydroxide to give a white precipitate of manganous hydroxide. In the presence of oxygen, brown manganic hydroxide is formed. Addition of sulfuric acid dissolves the manganic hydroxide, yielding manganic sulfate which reacts with iodide, releasing iodide in an amount equivalent to the original DO content. The iodide is then titrated with a standard solution of thiosulphate. Results for supersaturated samples may be biased low.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L2300108-COFC

COC Number: 17 -

Page 1 of 2

Report To Contact and company name below will appear on the final report		Report Format / Distribution		Select Service Level below - Contact your AM to confirm all E&P TATs (surcharges may apply)																																																																																																																																																																																																											
Company:	RM of East St. Paul	Select Report Format:	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)	Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply																																																																																																																																																																																																											
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Phone:	204-668-8112 x 4503	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		3 day [P3-25%] <input type="checkbox"/>		2 day [P2-50%] <input type="checkbox"/>		Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] <input type="checkbox"/>																																																																																																																																																																																																							
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Street:	3021 Birdhill Road	Email 1 or Fax	leanne.shewchuk@eaststpaul.com	For tests that can not be performed according to the service level selected, you will be contacted.																																																																																																																																																																																																											
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Invoice To	Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Invoice Distribution		<table border="1"> <tr> <th colspan="2">NUMBER OF CONTAINERS</th> <th colspan="10"></th> </tr> <tr> <td>SOLIDS-TOTSUS-WP</td> <td>TURBIDITY-WP</td> <td>O2-DIS-WP</td> <td>P-T-COL-WP</td> <td>NH3-COL-WP</td> <td>CL2-TOTAL-WP (Monochloramine)</td> <td>ANIONS-N2N3-IC-N-WP</td> <td>CHL-FLUORO-WP</td> <td colspan="3"></td> <td colspan="2"></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td></td> <td>R</td> <td>R</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										NUMBER OF CONTAINERS												SOLIDS-TOTSUS-WP	TURBIDITY-WP	O2-DIS-WP	P-T-COL-WP	NH3-COL-WP	CL2-TOTAL-WP (Monochloramine)	ANIONS-N2N3-IC-N-WP	CHL-FLUORO-WP						4	R	R		R	R	R	R	R	R				4	R	R		R	R	R	R	R	R				5	R	R	R	R	R	R	R	R	R				4	R	R		R	R	R	R	R	R				4	R	R		R	R	R	R	R	R				4	R	R		R	R	R	R	R	R				4	R	R		R	R	R	R	R	R				4	R	R		R	R	R	R	R	R				4	R	R		R	R	R	R	R	R				4	R	R		R	R	R	R	R	R				4	R	R		R	R	R	R	R	R				3	R	R		R	R		R	R					3	R	R		R	R		R	R				
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2	P2 L	26-06-2019	9:10	Water	4	R	R		R	R	R	R	R																																																																																																																																																																																																		
3	P3 L	26-06-2019	9:40	Water	5	R	R	R	R	R	R	R	R																																																																																																																																																																																																		
4	P4 L	26-06-2019	10:15	Water	4	R	R		R	R	R	R	R																																																																																																																																																																																																		
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11	SS A	27-06-2019	10:00	Water	3	R	R		R	R		R	R																																																																																																																																																																																																		
12	SS B	27-06-2019	10:15	Water	3	R	R		R	R		R	R																																																																																																																																																																																																		
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)			SAMPLE CONDITION AS RECEIVED (lab use only)																																																																																																																																																																																																										
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO					Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>																																																																																																																																																																																																										
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>																																																																																																																																																																																																										
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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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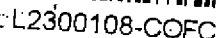
NOV 2018 FROM

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



Canada Toll Free: 1 800 668 9878



Page 2 of 2

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Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an Authorized DW COC form



RM of East St. Paul
ATTN: Leanne Shewchuk
3021 Birdshill Road
East St. Paul MB R2E 1A7

Date Received: 10-JUL-19
Report Date: 24-JUL-19 15:51 (MT)
Version: FINAL

Client Phone: 204-668-8112

Certificate of Analysis

Lab Work Order #: L2307649
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2307649-1 P1 U Sampled By: TM on 10-JUL-19 @ 09:15 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) 1.11 0.10 mg/L 11-JUL-19 R4709040 Nitrate+Nitrite Nitrate and Nitrite as N 1.18 0.11 mg/L 13-JUL-19 Nitrite in Water by IC Nitrite (as N) 0.073 0.050 mg/L 11-JUL-19 R4709040 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 2.71 0.10 ug/L 11-JUL-19 11-JUL-19 R4720596 Miscellaneous Parameters Ammonia, Total (as N) 0.063 0.010 mg/L 15-JUL-19 R4712722 Phosphorus (P)-Total 0.292 0.0030 mg/L 15-JUL-19 R4711474 Total Suspended Solids 25.6 2.0 mg/L 17-JUL-19 R4714220 Turbidity 18.9 0.10 NTU 11-JUL-19 R4708479							
L2307649-2 P2 L Sampled By: TM on 10-JUL-19 @ 09:35 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) 1.28 0.10 mg/L 11-JUL-19 R4709040 Nitrate+Nitrite Nitrate and Nitrite as N 1.36 0.11 mg/L 13-JUL-19 Nitrite in Water by IC Nitrite (as N) 0.079 0.050 mg/L 11-JUL-19 R4709040 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 3.93 0.10 ug/L 11-JUL-19 11-JUL-19 R4720596 Miscellaneous Parameters Ammonia, Total (as N) 0.108 0.010 mg/L 15-JUL-19 R4712722 Phosphorus (P)-Total 0.278 0.0030 mg/L 15-JUL-19 R4711474 Total Suspended Solids 40.0 2.0 mg/L 17-JUL-19 R4714220 Turbidity 31.2 0.10 NTU 11-JUL-19 R4708479							
L2307649-3 P3 L Sampled By: TM on 10-JUL-19 @ 09:50 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) 1.17 0.040 mg/L 11-JUL-19 R4709040 Nitrate+Nitrite Nitrate and Nitrite as N 1.24 0.070 mg/L 13-JUL-19 Nitrite in Water by IC Nitrite (as N) 0.074 0.020 mg/L 11-JUL-19 R4709040 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 20.7 0.10 ug/L 11-JUL-19 11-JUL-19 R4720596 Miscellaneous Parameters Ammonia, Total (as N) 0.144 0.010 mg/L 15-JUL-19 R4712722 Phosphorus (P)-Total 0.328 0.0030 mg/L 15-JUL-19 R4711474 Total Suspended Solids 48.7 2.0 mg/L 17-JUL-19 R4714220 Turbidity 37.5 0.10 NTU 11-JUL-19 R4708479							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2307649-3 P3 L Sampled By: TM on 10-JUL-19 @ 09:50 Matrix: WATER							
L2307649-4 P4 L Sampled By: TM on 10-JUL-19 @ 10:00 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Oxygen, Dissolved Phosphorus (P)-Total Total Suspended Solids Turbidity	0.824 0.851 0.027 14.9 0.091 0.020 4.30 0.273 17.9 13.6	 CLH	0.040 0.070 0.020 0.10 0.010 0.010 0.10 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L mg/L NTU	 11-JUL-19 11-JUL-19	11-JUL-19 13-JUL-19 11-JUL-19 11-JUL-19 11-JUL-19 15-JUL-19 11-JUL-19 11-JUL-19 15-JUL-19 17-JUL-19 11-JUL-19	R4709040 R4709040 R4720596 R4712722 R4708486 R4714825 R4711474 R4714220 R4708479
L2307649-5 P6 L Sampled By: TM on 10-JUL-19 @ 10:21 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	0.090 0.113 0.023 15.0 0.141 0.294 37.1 14.0		0.020 0.070 0.010 0.10 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	 11-JUL-19 11-JUL-19	11-JUL-19 13-JUL-19 11-JUL-19 11-JUL-19 15-JUL-19 15-JUL-19 17-JUL-19 11-JUL-19	R4709040 R4709040 R4720596 R4712722 R4711474 R4714220 R4708479
L2307649-6 SL U Sampled By: TM on 10-JUL-19 @ 10:35 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	0.043 <0.070 <0.010 20.8		0.020 0.070 0.010 0.10	mg/L mg/L mg/L ug/L	 11-JUL-19 11-JUL-19	11-JUL-19 13-JUL-19 11-JUL-19 11-JUL-19	R4709040 R4709040 R4720596

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2307649-6 SL U Sampled By: TM on 10-JUL-19 @ 10:35 Matrix: WATER Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	0.013 0.0589 5.6 4.41		0.010 0.0030 2.0 0.10	mg/L mg/L mg/L NTU		15-JUL-19 15-JUL-19 17-JUL-19 11-JUL-19	R4712722 R4711474 R4714220 R4708479
L2307649-7 SL L Sampled By: TM on 10-JUL-19 @ 10:50 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	0.600 0.626 0.026 11.2 0.089 0.192 20.1 13.8		0.020 0.070 0.010 0.10 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	11-JUL-19 11-JUL-19 11-JUL-19 11-JUL-19	11-JUL-19 13-JUL-19 11-JUL-19 11-JUL-19 15-JUL-19 15-JUL-19 17-JUL-19 11-JUL-19	R4709040 R4709040 R4720596 R4712722 R4711474 R4714220 R4708479
L2307649-8 CS U Sampled By: TM on 10-JUL-19 @ 11:05 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	0.109 0.109 <0.010 64.2 0.028 0.193 22.3 16.7		0.020 0.070 0.010 0.20 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	11-JUL-19 11-JUL-19 11-JUL-19 11-JUL-19	11-JUL-19 13-JUL-19 11-JUL-19 11-JUL-19 15-JUL-19 15-JUL-19 17-JUL-19 11-JUL-19	R4709040 R4709040 R4720596 R4712722 R4711474 R4714220 R4708479
L2307649-9 CS L Sampled By: TM on 10-JUL-19 @ 11:20 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N)	0.598 0.628 0.030		0.020 0.070 0.010	mg/L mg/L mg/L		11-JUL-19 13-JUL-19 11-JUL-19	R4709040 R4709040

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2307649-9 CS L Sampled By: TM on 10-JUL-19 @ 11:20 Matrix: WATER Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	74.7 0.362 0.0990 62.3 51.4		0.10 0.010 0.0030 2.0 0.10	ug/L mg/L mg/L mg/L NTU	11-JUL-19	11-JUL-19 15-JUL-19 15-JUL-19 17-JUL-19 11-JUL-19	R4720596 R4712722 R4711474 R4714220 R4708479
L2307649-10 BTP 1 Sampled By: TM on 10-JUL-19 @ 13:25 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	0.638 0.684 0.046 5.52 0.048 0.152 12.9 8.07		0.020 0.070 0.010 0.10 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	11-JUL-19 13-JUL-19 11-JUL-19 11-JUL-19	11-JUL-19 13-JUL-19 11-JUL-19 11-JUL-19	R4709040 R4720596 R4712722 R4711474 R4714220 R4708479
L2307649-11 SS A Sampled By: TM on 10-JUL-19 @ 12:20 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Biochemical Oxygen Demand Fecal Coliforms Phosphorus (P)-Total Total Suspended Solids Turbidity Algae Identification Gomphonema (Bacillariophyceae) Scenedesmus (Chlorophyceae) Cryptomonas (Cryptophyceae) Euglena (Euglenophyceae)	<0.020 <0.070 <0.010 50.3 0.315 15.7 1410 0.275 35.8 36.4 Small amount Small amount Large amount Small amount		0.020 0.070 0.010 0.10 0.010 6.0 1 0.0030 2.7 0.10 1.0 1.0 1.0 1.0	mg/L mg/L mg/L ug/L mg/L mg/L MPN/100mL mg/L mg/L NTU	11-JUL-19 13-JUL-19 11-JUL-19 11-JUL-19	11-JUL-19 13-JUL-19 11-JUL-19 11-JUL-19	R4709040 R4720596 R4712722 R4714331 R4707712 R4711474 R4710308 R4708479 R4724019 R4724019 R4724019 R4724019

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2307649-11 SS A Sampled By: TM on 10-JUL-19 @ 12:20 Matrix: WATER Algae Identification Phacus (Euglenophyceae) Aphanocapsa (Cyanophyceae) Merismopedia (Cyanophyceae) Microcystis (Cyanophyceae) Pseudanabaena (Cyanophyceae) Limnothrix (Cyanophyceae) Planktothrix (Cyanophyceae) Unidentified Note: Unidentified: dispersed rod shaped single cells of an unidentified cyanobacteria Enumeration of blue green algae cells Total cyanobacterial cell count Aphanocapsa (Cyanophyceae) Limnothrix (Cyanophyceae) Merismopedia (Cyanophyceae) Planktothrix (Cyanophyceae) Pseudanabaena (Cyanophyceae) Unidentified blue-green Note: Unidentified: dispersed rod shaped single cells of an unidentified cyanobacteria	 Small amount Small amount Massive amount Small amount Massive amount Large amount Massive amount Large amount	 					

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2307649-13 SS C							
Sampled By: TM on 10-JUL-19 @ 12:40							
Matrix: WATER							
Chlorophyll a by fluorometry							
Chlorophyll a	88.4		0.20	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters							
Ammonia, Total (as N)	0.046		0.010	mg/L		15-JUL-19	R4712722
Fecal Coliforms	548		1	MPN/100mL		10-JUL-19	R4707712
Phosphorus (P)-Total	0.168		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	20.7		2.0	mg/L		11-JUL-19	R4710308
Turbidity	15.9		0.10	NTU		11-JUL-19	R4708479
Algae Identification							
Fragilaria (Fragilariophyceae)	Small amount		1.0			24-JUL-19	R4724019
Melosira (Coccinodiscophyceae)	Small amount		1.0			24-JUL-19	R4724019
Navicula (Bacillariophyceae)	Small amount		1.0			24-JUL-19	R4724019
Nitzschia (Bacillariophyceae)	Moderate amount		1.0			24-JUL-19	R4724019
Monoraphidium (Chlorophyceae)	Moderate amount		1.0			24-JUL-19	R4724019
Oedogonium (Chlorophyceae)	Small amount		1.0			24-JUL-19	R4724019
Pediastrum (Chlorophyceae)	Small amount		1.0			24-JUL-19	R4724019
Scenedesmus (Chlorophyceae)	Moderate amount		1.0			24-JUL-19	R4724019
Cryptomonas (Cryptophyceae)	Small amount		1.0			24-JUL-19	R4724019
Euglena (Euglenophyceae)	Small amount		1.0			24-JUL-19	R4724019
Phacus (Euglenophyceae)	Small amount		1.0			24-JUL-19	R4724019
Aphanocapsa (Cyanophyceae)	Small amount		1.0			24-JUL-19	R4724019
Gomphosphaeria (Cyanophyceae)	Small amount		1.0			24-JUL-19	R4724019
Merismopedia (Cyanophyceae)	Large amount		1.0			24-JUL-19	R4724019
Microcystis (Cyanophyceae)	Small amount		1.0			24-JUL-19	R4724019
Phormidium (Cyanophyceae)	Small amount		1.0			24-JUL-19	R4724019
Pseudanabaena (Cyanophyceae)	Small amount		1.0			24-JUL-19	R4724019
Planktolyngbya (Cyanophyceae)	Small amount		1.0			24-JUL-19	R4724019
Schroederia (Chlorophyceae)	Moderate amount		1.0			24-JUL-19	R4724019
Unidentified	Large amount		1.0			24-JUL-19	R4724019
Other	Moderate amount		1.0			24-JUL-19	R4724019
Note: Unidentified: dispersed coccoid shaped single cells of an unidentified cyanobacteria.							
Other: moderate amount of Cyanodictyon (Cyanophyceae), small amount of Arthrospira (Cyanophyceae).							
Enumeration of blue green algae cells							
Total cyanobacterial cell count	358000		1	cells/mL		24-JUL-19	R4724029
Aphanocapsa (Cyanophyceae)	2000		1	cells/mL		24-JUL-19	R4724029
Gomphosphaeria (Cyanophyceae)	100		1	cells/mL		24-JUL-19	R4724029
Merismopedia (Cyanophyceae)	169000		1	cells/mL		24-JUL-19	R4724029
Microcystis (Cyanophyceae)	2200		1	cells/mL		24-JUL-19	R4724029
Phormidium (Cyanophyceae)	720		1	cells/mL		24-JUL-19	R4724029
Planktolyngbya (Cyanophyceae)	990		1	cells/mL		24-JUL-19	R4724029
Pseudanabaena (Cyanophyceae)	8910		1	cells/mL		24-JUL-19	R4724029
Unidentified blue-green	129000		1	cells/mL		24-JUL-19	R4724029
Other blue-green	44600		1	cells/mL		24-JUL-19	R4724029
Note: Unidentified: dispersed coccoid shaped single cells of an unidentified cyanobacteria.							
Other: Cyanodictyon (Cyanophyceae).							
L2307649-14 SS D							
Sampled By: TM on 10-JUL-19 @ 12:55							
Matrix: WATER							
Nitrate + Nitrite							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2307649-14 SS D Sampled By: TM on 10-JUL-19 @ 12:55 Matrix: WATER							
Nitrate in Water by IC Nitrate (as N)	<0.020		0.020	mg/L		11-JUL-19	R4709040
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		13-JUL-19	
Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		11-JUL-19	R4709040
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	93.1		1.5	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters Ammonia, Total (as N)	0.028		0.010	mg/L		15-JUL-19	R4712722
Fecal Coliforms	131		1	MPN/100mL		10-JUL-19	R4707712
Phosphorus (P)-Total	0.113		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	34.3		2.0	mg/L		17-JUL-19	R4714220
Turbidity	12.8		0.10	NTU		11-JUL-19	R4708479

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
CLH	Free/Total Chlorine sample had headspace. Hold time for Chlorine tests is 15 minutes; field testing is recommended. Chlorine dissipates rapidly into headspace.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALGAE-CYANO-BACT-WP	Water	Enumeration of blue green algae cells	APHA 10200 C & F

Samples are prepared by sedimentation/settling and examined using a compound phase contrast inverted microscope. Cyanobacteria (also known as blue-green algae) are identified to genus and the cells are enumerated. The total cyanobacteria count is also reported.

ALGAE-ID-WP	Water	Algae Identification	Microscopic Examination
Standard Methods 10200, 2005			

This procedure is applicable to the general identification of algae occurring in samples of fresh water. Samples are prepared using a sedimentation technique, and are then examined using a compound phase contrast inverted microscope. This test is a general screen of dominant types of algae. Dominant genera of algae are reported.

BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
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Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.

CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
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This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

CL2-TOTAL-WP	Water	Chlorine, Total	APHA 4500-Cl Chlorine(Residual) G (mod)
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Chlorine (residual), as free or total, is analyzed using the DPD colourimetric method. The recommended hold time for these tests is 15 minutes; field testing is recommended for best results. Chlorine can be rapidly consumed by organic matter, if present, and dissipates rapidly into headspace.

EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
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Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc

FC-QT97-WP	Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
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This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the number of positive responses to a probability table.

NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
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Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.

NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
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NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
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Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
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Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

O2-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C
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Manganous sulphate reacts with potassium or sodium hydroxide to give a white precipitate of manganous hydroxide. In the presence of oxygen, brown manganic hydroxide is formed. Addition of sulfuric acid dissolves the manganic hydroxide, yielding manganic sulfate which reacts with iodide, releasing iodide in an amount equivalent to the original DO content. The iodide is then titrated with a standard solution of thiosulphate. Results for supersaturated samples may be biased low.

P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
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This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2307649

Report Date: 24-JUL-19

Page 2 of 5

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-N-WP		Water						
Batch	R4709040							
WG3102280-6	LCS							
Nitrite (as N)			99.8		%		90-110	11-JUL-19
WG3102280-1	MB							
Nitrite (as N)			<0.010		mg/L		0.01	11-JUL-19
WG3102280-5	MB							
Nitrite (as N)			<0.010		mg/L		0.01	11-JUL-19
NO3-IC-N-WP		Water						
Batch	R4709040							
WG3102280-2	LCS							
Nitrate (as N)			99.8		%		90-110	11-JUL-19
WG3102280-6	LCS							
Nitrate (as N)			99.5		%		90-110	11-JUL-19
WG3102280-1	MB							
Nitrate (as N)			<0.020		mg/L		0.02	11-JUL-19
WG3102280-5	MB							
Nitrate (as N)			<0.020		mg/L		0.02	11-JUL-19
O2-DIS-WP		Water						
Batch	R4714825							
WG3107252-2	LCS							
Oxygen, Dissolved			98.9		%		85-115	11-JUL-19
WG3107252-1	MB							
Oxygen, Dissolved			<0.10		mg/L		0.1	11-JUL-19
P-T-COL-WP		Water						
Batch	R4711474							
WG3103799-10	LCS							
Phosphorus (P)-Total			96.6		%		80-120	15-JUL-19
WG3103799-14	LCS							
Phosphorus (P)-Total			97.6		%		80-120	15-JUL-19
WG3103799-13	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	15-JUL-19
WG3103799-9	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	15-JUL-19
SOLIDS-TOTSUS-WP		Water						
Batch	R4710308							
WG3101355-6	LCS							
Total Suspended Solids			95.8		%		85-115	11-JUL-19
WG3101355-5	MB							



Quality Control Report

Workorder: L2307649

Report Date: 24-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-WP								
Batch R4710308								
WG3101355-5 MB								
Total Suspended Solids			<2.0		mg/L		2	11-JUL-19
Batch R4714220								
WG3106450-2 LCS								
Total Suspended Solids			86.4		%		85-115	17-JUL-19
WG3106450-1 MB								
Total Suspended Solids			<2.0		mg/L		2	17-JUL-19
TURBIDITY-WP								
Batch R4708479								
WG3103133-2 LCS								
Turbidity			103.0		%		85-115	11-JUL-19
WG3103133-1 MB								
Turbidity			<0.10		NTU		0.1	11-JUL-19

Quality Control Report

Workorder: L2307649

Report Date: 24-JUL-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Workorder: L2307649

Report Date: 24-JUL-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved Oxygen	4	10-JUL-19 10:00	11-JUL-19 15:24	8.0	30	hours	EHTL
Inorganic Parameters							
Chlorine, Total	4	10-JUL-19 10:00	11-JUL-19 10:00	0.25	24	hours	EHTR-FM
Taxonomy							
Algae Identification	11	10-JUL-19 12:20	24-JUL-19 12:00	7	14	days	EHT
	13	10-JUL-19 12:40	24-JUL-19 12:00	7	14	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2307649 were received on 10-JUL-19 15:55.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Canada Toll Free: 1 800 668 9878



COC Number: 17 -

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L2307649-COFC

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



RM of East St. Paul
ATTN: Leanne Shewchuk
3021 Birdshill Road
East St. Paul MB R2E 1A7

Date Received: 24-JUL-19
Report Date: 07-AUG-19 15:24 (MT)
Version: FINAL

Client Phone: 204-668-8112

Certificate of Analysis

Lab Work Order #: L2316302
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2316302-1 SS A Sampled By: TM on 24-JUL-19 @ 09:30 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.020 0.020 mg/L 25-JUL-19 R4730558 Nitrate+Nitrite Nitrate and Nitrite as N <0.070 0.070 mg/L 30-JUL-19 Nitrite in Water by IC Nitrite (as N) <0.010 0.010 mg/L 25-JUL-19 R4730558 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 78.8 0.10 ug/L 25-JUL-19 25-JUL-19 R4742723 Miscellaneous Parameters Ammonia, Total (as N) 0.028 0.010 mg/L 25-JUL-19 R4727748 Biochemical Oxygen Demand 11.1 2.0 mg/L 25-JUL-19 R4731628 Fecal Coliforms 45 1 MPN/100mL 24-JUL-19 R4724888 Phosphorus (P)-Total 0.211 0.0030 mg/L 31-JUL-19 R4731768 Total Suspended Solids 26.0 2.0 mg/L 31-JUL-19 R4734288 Turbidity 20.0 0.10 NTU 25-JUL-19 R4727347							
L2316302-2 SS B Sampled By: TM on 24-JUL-19 @ 09:17 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.020 0.020 mg/L 25-JUL-19 R4730558 Nitrate+Nitrite Nitrate and Nitrite as N <0.070 0.070 mg/L 30-JUL-19 Nitrite in Water by IC Nitrite (as N) <0.010 0.010 mg/L 25-JUL-19 R4730558 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 27.9 0.10 ug/L 25-JUL-19 25-JUL-19 R4742723 Miscellaneous Parameters Ammonia, Total (as N) 0.019 0.010 mg/L 25-JUL-19 R4727748 Fecal Coliforms <1 1 MPN/100mL 24-JUL-19 R4724888 Phosphorus (P)-Total 0.0839 0.0030 mg/L 31-JUL-19 R4731768 Total Suspended Solids 13.1 2.0 mg/L 31-JUL-19 R4734288 Turbidity 6.76 0.10 NTU 25-JUL-19 R4727347							
L2316302-3 SS C Sampled By: TM on 24-JUL-19 @ 09:45 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.020 0.020 mg/L 25-JUL-19 R4730558 Nitrate+Nitrite Nitrate and Nitrite as N <0.070 0.070 mg/L 30-JUL-19 Nitrite in Water by IC Nitrite (as N) <0.010 0.010 mg/L 25-JUL-19 R4730558 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 66.7 0.10 ug/L 25-JUL-19 25-JUL-19 R4742723 Miscellaneous Parameters Ammonia, Total (as N) 0.023 0.010 mg/L 25-JUL-19 R4727748							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2316302-3 SS C Sampled By: TM on 24-JUL-19 @ 09:45 Matrix: WATER							
Biochemical Oxygen Demand	6.0		2.0	mg/L		25-JUL-19	R4731628
Fecal Coliforms	7		1	MPN/100mL		24-JUL-19	R4724888
Phosphorus (P)-Total	0.220		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids	28.4		2.0	mg/L		31-JUL-19	R4734288
Turbidity	25.4		0.10	NTU		25-JUL-19	R4727347
L2316302-4 SS D Sampled By: TM on 24-JUL-19 @ 10:00 Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUL-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		25-JUL-19	R4730558
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	36.8		0.10	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters							
Ammonia, Total (as N)	0.029		0.010	mg/L		25-JUL-19	R4727748
Fecal Coliforms	3		1	MPN/100mL		24-JUL-19	R4724888
Phosphorus (P)-Total	0.133		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids	54.4		2.0	mg/L		31-JUL-19	R4734288
Turbidity	15.4		0.10	NTU		25-JUL-19	R4727347
L2316302-5 CS U Sampled By: TM on 24-JUL-19 @ 10:57 Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUL-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		25-JUL-19	R4730558
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	5.99		0.10	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters							
Ammonia, Total (as N)	0.026		0.010	mg/L		25-JUL-19	R4727748
Phosphorus (P)-Total	0.151		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids	5.3		2.0	mg/L		31-JUL-19	R4734288
Turbidity	2.21		0.10	NTU		25-JUL-19	R4727347
L2316302-6 CS L Sampled By: TM on 24-JUL-19 @ 11:10 Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUL-19	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2316302-6 CS L Sampled By: TM on 24-JUL-19 @ 11:10 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		25-JUL-19	R4730558
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	46.6		0.10	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters Ammonia, Total (as N)	0.037		0.010	mg/L		25-JUL-19	R4727748
Oxygen, Dissolved	10.2		0.10	mg/L		24-JUL-19	R4728608
Phosphorus (P)-Total	0.166		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids	49.3		3.3	mg/L		31-JUL-19	R4734288
Turbidity	28.9		0.10	NTU		25-JUL-19	R4727347
L2316302-7 BTP 1 Sampled By: TM on 24-JUL-19 @ 10:40 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N)	<0.040	DLM	0.040	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUL-19	
Nitrite in Water by IC Nitrite (as N)	<0.020	DLM	0.020	mg/L		25-JUL-19	R4730558
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	3.17		0.10	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters Ammonia, Total (as N)	0.027		0.010	mg/L		25-JUL-19	R4727748
Phosphorus (P)-Total	0.0293		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids	<2.0		2.0	mg/L		31-JUL-19	R4734288
Turbidity	1.13		0.10	NTU		25-JUL-19	R4727347
L2316302-8 S U Sampled By: TM on 24-JUL-19 @ 11:50 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N)	<0.020		0.020	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUL-19	
Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		25-JUL-19	R4730558
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	93.0		0.20	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters Ammonia, Total (as N)	0.072		0.010	mg/L		25-JUL-19	R4727748
Phosphorus (P)-Total	0.554		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids	42.7		2.0	mg/L		31-JUL-19	R4734288
Turbidity	5.24		0.10	NTU		25-JUL-19	R4727347
L2316302-9 S L Sampled By: TM on 24-JUL-19 @ 11:40 Matrix: WATER Nitrate + Nitrite							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2316302-9 S L Sampled By: TM on 24-JUL-19 @ 11:40 Matrix: WATER Nitrate in Water by IC Nitrate (as N) <0.020 Nitrate+Nitrite Nitrate and Nitrite as N <0.070 Nitrite in Water by IC Nitrite (as N) <0.010 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 17.2 Miscellaneous Parameters Ammonia, Total (as N) 0.020 Phosphorus (P)-Total 0.0577 Total Suspended Solids 21.7 Turbidity 7.49							
L2316302-10 P1 U Sampled By: TM on 24-JUL-19 @ 12:40 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.10 Nitrate+Nitrite Nitrate and Nitrite as N <0.11 Nitrite in Water by IC Nitrite (as N) <0.050 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 62.4 Miscellaneous Parameters Ammonia, Total (as N) 0.071 Oxygen, Dissolved 3.30 Phosphorus (P)-Total 0.189 Total Suspended Solids 82.7 Turbidity 22.4		DLM	0.10	mg/L	25-JUL-19	25-JUL-19	R4730558
L2316302-11 P2 L Sampled By: TM on 24-JUL-19 @ 12:50 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.10 Nitrate+Nitrite Nitrate and Nitrite as N <0.11 Nitrite in Water by IC Nitrite (as N) <0.050 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 55.9 Miscellaneous Parameters Ammonia, Total (as N) 0.126 Phosphorus (P)-Total 0.197 Total Suspended Solids 11.9 Turbidity 4.31		DLM	0.10	mg/L	25-JUL-19	25-JUL-19	R4730558

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2316302-11	P2 L							
Sampled By:	TM on 24-JUL-19 @ 12:50							
Matrix:	WATER							
L2316302-12	P3 L							
Sampled By:	TM on 24-JUL-19 @ 12:25							
Matrix:	WATER							
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.10	DLM	0.10	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.11		0.11	mg/L		30-JUL-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.050	DLM	0.050	mg/L		25-JUL-19	R4730558
Chlorophyll a								
Chlorophyll a by fluorometry								
Chlorophyll a		69.1		0.20	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters								
Ammonia, Total (as N)		0.112		0.010	mg/L		25-JUL-19	R4727748
Phosphorus (P)-Total		0.807		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids		55.7		2.0	mg/L		31-JUL-19	R4734288
Turbidity		19.6		0.10	NTU		25-JUL-19	R4727347
L2316302-13	P4 L							
Sampled By:	TM on 24-JUL-19 @ 12:15							
Matrix:	WATER							
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.10	DLM	0.10	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.11		0.11	mg/L		30-JUL-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.050	DLM	0.050	mg/L		25-JUL-19	R4730558
Chlorophyll a								
Chlorophyll a by fluorometry								
Chlorophyll a		30.9		0.20	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters								
Ammonia, Total (as N)		0.089		0.010	mg/L		25-JUL-19	R4727748
Phosphorus (P)-Total		0.190		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids		8.3		2.0	mg/L		31-JUL-19	R4734288
Turbidity		2.50		0.10	NTU		25-JUL-19	R4727347
L2316302-14	P6 L							
Sampled By:	TM on 24-JUL-19 @ 12:05							
Matrix:	WATER							
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.10	DLM	0.10	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.11		0.11	mg/L		30-JUL-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.050	DLM	0.050	mg/L		25-JUL-19	R4730558
Chlorophyll a								
Chlorophyll a by fluorometry								
Chlorophyll a		24.2		0.20	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters								
Ammonia, Total (as N)		0.024		0.010	mg/L		26-JUL-19	R4729344

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2316302-14	P6 L							
Sampled By:		TM on 24-JUL-19 @ 12:05						
Matrix:		WATER						
Phosphorus (P)-Total		0.208		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids		43.2		2.0	mg/L		31-JUL-19	R4734288
Turbidity		19.4		0.10	NTU		25-JUL-19	R4727347

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.			
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
FC-QT97-WP	Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the number of positive responses to a probability table.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
O2-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C
Manganous sulphate reacts with potassium or sodium hydroxide to give a white precipitate of manganous hydroxide. In the presence of oxygen, brown manganic hydroxide is formed. Addition of sulfuric acid dissolves the manganic hydroxide, yielding manganic sulfate which reacts with iodide, releasing iodide in an amount equivalent to the original DO content. The iodide is then titrated with a standard solution of thiosulphate. Results for supersaturated samples may be biased low.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2316302

Report Date: 07-AUG-19

Page 2 of 3

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP	Water							
Batch	R4730558							
WG3115270-10 LCS								
Nitrate (as N)			96.7		%		90-110	25-JUL-19
WG3115270-9 MB								
Nitrate (as N)			<0.020		mg/L		0.02	25-JUL-19
O2-DIS-WP	Water							
Batch	R4728608							
WG3117330-2 LCS								
Oxygen, Dissolved			94.7		%		85-115	24-JUL-19
WG3117330-1 MB								
Oxygen, Dissolved			<0.10		mg/L		0.1	24-JUL-19
P-T-COL-WP	Water							
Batch	R4731768							
WG3119582-2 LCS								
Phosphorus (P)-Total			102.5		%		80-120	31-JUL-19
WG3119582-1 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	31-JUL-19
SOLIDS-TOTSUS-WP	Water							
Batch	R4734288							
WG3119451-2 LCS								
Total Suspended Solids			94.4		%		85-115	31-JUL-19
WG3119451-1 MB								
Total Suspended Solids			<2.0		mg/L		2	31-JUL-19
TURBIDITY-WP	Water							
Batch	R4727347							
WG3116063-5 LCS								
Turbidity			99.98		%		85-115	25-JUL-19
WG3116063-4 MB								
Turbidity			<0.10		NTU		0.1	25-JUL-19

Quality Control Report

Workorder: L2316302

Report Date: 07-AUG-19

Page 3 of 3

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

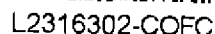
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Canada



Barcode label here
(b use only)

COC Number: 17 -

Page 1 of 2

Report To															
Contact and company name below will appear on the final report															
Company:		RM of East St. Paul		Select Report Format:	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> BDO (DIGITAL)										
Contact:		Leanne Shewchuk		Quality Control (QC) Report with Report	<input type="checkbox"/> YES <input type="checkbox"/> NO										
Phone:		204-688-8112 x 4503		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked											
Company address below will appear on the final report				Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX										
Street:		3021 Birdhill Road		Email 1 or Fax:	leanne.shewchuk@eaststpaul.com										
City/Province:		East St. Paul, MB		Email 2:	operations@eaststpaul.com										
Postal Code:		R2E 1A7		Email 3:											
Invoice To:		Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Invoice Distribution											
		Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input checked="" type="checkbox"/> FAX										
Company:		Email 1 or Fax operations@eaststpaul.com													
Contact:		Email 2													
Project Information															
ALS Account # / Quote #:		Q74289		Oil and Gas Required Fields (client use)											
Job #:				A/E/Cost Center:	PO#										
PC / AFE:				Major/Minor Code:	Routing Code:										
LSD:				Regulation:											
				Location:											
ALS Lab Work Order # (lab use only):		ALS Contact: Connor Cattani		Sampler:	TM										
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mm-yyyy)	Time (hh:mm)	Sample Type									
	SS A			24-Jul-19	9:30	Water									
	SS B			24-Jul-19	9:17	Water									
	SS C			24-Jul-19	9:45	Water									
	SS D			24-Jul-19	10:00	Water									
	CS U			24-Jul-19	10:57	Water									
	CS L			24-Jul-19	11:10	Water									
	BTP 1			24-Jul-19	10:40	Water									
	S U			24-Jul-19	11:50	Water									
	S L			24-Jul-19	11:40	Water									
	P1 U			24-Jul-19	12:40	Water									
	P2 L			24-Jul-19	12:50	Water									
	P3 L			24-Jul-19	12:25	Water									
Drinking Water (DW) Samples¹ (client use)				Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)											
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO															
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO															
Select Service Level Below - Select your AM to confirm all E&P TATs (surcharges may apply)															
Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply															
PRIORITY (Business Days)	4 day [P4-20%] <input type="checkbox"/>			EMERGENCY	1 Business day [E - 100%]										
	3 day [P3-25%] <input type="checkbox"/>				Same Day, Weekend or Statutory holiday [E2 -200%										
	2 day [P2-50%] <input type="checkbox"/>				(Laboratory opening fees may apply)]										
Date and Time Required for all E&P TATs: dd-mm-yyyy hh:mm															
For tests that can not be performed according to the service level selected, you will be contacted.															
Analysis Request															
Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below															
NUMBER OF CONTAINERS															
SAMPLE CONDITION AS RECEIVED (lab use only)															
Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>															
Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>															
Cooling Initiated <input type="checkbox"/>															
INITIAL COOLER TEMPERATURES °C FINAL COOLER TEMPERATURES °C															
20.7															
SHIPMENT RELEASE (client use)						FINAL SHIPMENT RECEPTION (lab use only)									
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:							
			JH	July 24	4:07	CCL		4:06							

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

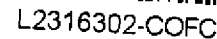
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white-report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

1974-1975



Canada Toll Free: 1 800 668 9878



COC Number: 17 -

Page 2 of 2

[illegible]

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NOV 2016 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.



RM of East St. Paul
ATTN: Leanne Shewchuk
3021 Birdshill Road
East St. Paul MB R2E 1A7

Date Received: 07-AUG-19
Report Date: 21-AUG-19 13:14 (MT)
Version: FINAL

Client Phone: 204-668-8112

Certificate of Analysis

Lab Work Order #: L2324295
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2324295-2 SS B Sampled By: TM on 07-AUG-19 @ 09:20 Matrix: WATER							
Algae Identification							
Chlamydomonas (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Cosmarium (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Dictyosphaerium (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Monoraphidium (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Oocystis (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Scenedesmus (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Staurastrum (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Tetraedron (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Cryptomonas (Cryptophyceae)	Small amount		1.0			09-AUG-19	R4746767
Euglena (Euglenophyceae)	Small amount		1.0			09-AUG-19	R4746767
Anabaena (Cyanophyceae)	Small amount		1.0			09-AUG-19	R4746767
Gomphosphaeria (Cyanophyceae)	Large amount		1.0			09-AUG-19	R4746767
Merismopedia (Cyanophyceae)	Massive amount		1.0			09-AUG-19	R4746767
Microcystis (Cyanophyceae)	Large amount		1.0			09-AUG-19	R4746767
Pseudanabaena (Cyanophyceae)	Moderate amount		1.0			09-AUG-19	R4746767
Planktolyngbya (Cyanophyceae)	Small amount		1.0			09-AUG-19	R4746767
Other	Small amount		1.0			09-AUG-19	R4746767
Note: Other: Rhopalodia (Bacillariophyceae)							
L2324295-3 SS C Sampled By: TM on 07-AUG-19 @ 09:52 Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-AUG-19	R4750115
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		13-AUG-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-AUG-19	R4750115
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	82.3		0.50	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters							
Ammonia, Total (as N)	0.033		0.010	mg/L		12-AUG-19	R4751433
Fecal Coliforms	28		1	MPN/100mL		07-AUG-19	R4744466
Phosphorus (P)-Total	0.258		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	41.9		2.0	mg/L		14-AUG-19	R4754769
Turbidity	36.5		0.10	NTU		08-AUG-19	R4744903
Algae Identification							
Chlamydomonas (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Closterium (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Cosmarium (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Monoraphidium (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Oocystis (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Scenedesmus (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Tetraedron (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Cryptomonas (Cryptophyceae)	Small amount		1.0			09-AUG-19	R4746767
Euglena (Euglenophyceae)	Small amount		1.0			09-AUG-19	R4746767
Aphanizomenon (Cyanophyceae)	Large amount		1.0			09-AUG-19	R4746767
Merismopedia (Cyanophyceae)	Massive amount		1.0			09-AUG-19	R4746767
Microcystis (Cyanophyceae)	Massive amount		1.0			09-AUG-19	R4746767
Phormidium (Cyanophyceae)	Small amount		1.0			09-AUG-19	R4746767

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2324295-3	SS C							
Sampled By: TM on 07-AUG-19 @ 09:52								
Matrix: WATER								
Algae Identification								
Pseudanabaena (Cyanophyceae)		Moderate amount		1.0			09-AUG-19	R4746767
Planktolyngbya (Cyanophyceae)		Large amount		1.0			09-AUG-19	R4746767
L2324295-4	SS D							
Sampled By: TM on 07-AUG-19 @ 10:05								
Matrix: WATER								
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.020		0.020	mg/L		09-AUG-19	R4750115
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.070		0.070	mg/L		13-AUG-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.010		0.010	mg/L		09-AUG-19	R4750115
Chlorophyll a								
Chlorophyll a by fluorometry								
Chlorophyll a		50.1		0.50	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters								
Ammonia, Total (as N)		0.027		0.010	mg/L		12-AUG-19	R4751433
Oxygen, Dissolved		11.5		0.10	mg/L		08-AUG-19	R4744914
Fecal Coliforms		<1		1	MPN/100mL		07-AUG-19	R4744466
Phosphorus (P)-Total		0.200		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids		120		6.0	mg/L		14-AUG-19	R4754769
Turbidity		24.1		0.10	NTU		08-AUG-19	R4744903
Algae Identification								
Cosmarium (Chlorophyceae)		Small amount		1.0			09-AUG-19	R4746767
Monoraphidium (Chlorophyceae)		Small amount		1.0			09-AUG-19	R4746767
Oocystis (Chlorophyceae)		Small amount		1.0			09-AUG-19	R4746767
Pediastrum (Chlorophyceae)		Small amount		1.0			09-AUG-19	R4746767
Scenedesmus (Chlorophyceae)		Moderate amount		1.0			09-AUG-19	R4746767
Cryptomonas (Cryptophyceae)		Small amount		1.0			09-AUG-19	R4746767
Euglena (Euglenophyceae)		Small amount		1.0			09-AUG-19	R4746767
Phacus (Euglenophyceae)		Small amount		1.0			09-AUG-19	R4746767
Aphanizomenon (Cyanophyceae)		Small amount		1.0			09-AUG-19	R4746767
Chroococcus (Cyanophyceae)		Moderate amount		1.0			09-AUG-19	R4746767
Gomphosphaeria (Cyanophyceae)		Large amount		1.0			09-AUG-19	R4746767
Merismopedia (Cyanophyceae)		Moderate amount		1.0			09-AUG-19	R4746767
Microcystis (Cyanophyceae)		Small amount		1.0			09-AUG-19	R4746767
Pseudanabaena (Cyanophyceae)		Small amount		1.0			09-AUG-19	R4746767
Gymnodinium (Dinophyceae)		Moderate amount		1.0			09-AUG-19	R4746767
Planktolyngbya (Cyanophyceae)		Moderate amount		1.0			09-AUG-19	R4746767
Other		Small amount		1.0			09-AUG-19	R4746767
Note: Other: Eucapsis (Cyanophyceae)								
L2324295-5	CS U							
Sampled By: TM on 07-AUG-19 @ 12:37								
Matrix: WATER								
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.040	DLM	0.040	mg/L		09-AUG-19	R4752545
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.070		0.070	mg/L		14-AUG-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.020	DLM	0.020	mg/L		09-AUG-19	R4752545

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2324295-5 CS U Sampled By: TM on 07-AUG-19 @ 12:37 Matrix: WATER Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	 5.60 0.028 0.191 3.7 2.37		 0.10 0.010 0.0030 2.0 0.10	 ug/L mg/L mg/L mg/L NTU	 08-AUG-19 08-AUG-19	 08-AUG-19 12-AUG-19 09-AUG-19 14-AUG-19 08-AUG-19	 R4762235 R4751433 R4745230 R4754769 R4744903
L2324295-6 CS L Sampled By: TM on 07-AUG-19 @ 12:50 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	 <0.040 <0.070 <0.020 24.8 0.081 0.148 19.9 26.4	 DLM DLM	 0.040 0.070 0.020 0.10 0.010 0.0030 2.0 0.10	 mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	 08-AUG-19 08-AUG-19	 09-AUG-19 14-AUG-19 09-AUG-19 08-AUG-19 12-AUG-19 09-AUG-19 14-AUG-19 08-AUG-19	 R4752545 R4752545 R4762235 R4751433 R4745230 R4754769 R4744903
L2324295-7 BTP 1 Sampled By: TM on 07-AUG-19 @ 11:45 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	 <0.040 <0.070 <0.020 18.9 0.050 0.0710 8.8 6.11	 DLM DLM	 0.040 0.070 0.020 0.10 0.010 0.0030 2.0 0.10	 mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	 08-AUG-19 08-AUG-19	 09-AUG-19 14-AUG-19 09-AUG-19 08-AUG-19 12-AUG-19 09-AUG-19 14-AUG-19 08-AUG-19	 R4752545 R4752545 R4762235 R4751433 R4745230 R4754769 R4744903
L2324295-8 S U Sampled By: TM on 07-AUG-19 @ 12:05 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite	 <0.040	 DLM	 0.040	 mg/L	 	 09-AUG-19	 R4752545

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2324295-8 S U Sampled By: TM on 07-AUG-19 @ 12:05 Matrix: WATER Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	 <0.070 <0.020 72.4 0.021 0.119 20.9 11.6	 DLM 	 0.070 0.020 0.20 0.010 0.0030 2.0 0.10	 mg/L mg/L ug/L mg/L mg/L mg/L NTU	 08-AUG-19 	 08-AUG-19 12-AUG-19 09-AUG-19 14-AUG-19 08-AUG-19	 R4752545 R4762235 R4751433 R4745230 R4754769 R4744903
L2324295-9 S L Sampled By: TM on 07-AUG-19 @ 12:20 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	 <0.020 <0.070 <0.010 12.1 0.026 0.0595 35.3 15.4	 	 0.020 0.070 0.010 0.10 0.010 0.0030 2.0 0.10	 mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	 08-AUG-19 	 08-AUG-19 12-AUG-19 09-AUG-19 14-AUG-19 08-AUG-19	 R4752545 R4762235 R4751433 R4745230 R4754769 R4744903
L2324295-10 P1 U Sampled By: TM on 07-AUG-19 @ 10:40 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Fecal Coliforms Phosphorus (P)-Total Total Suspended Solids Turbidity	 <0.10 <0.11 <0.050 27.1 0.068 687 0.217 17.7 4.61	 DLM DLM 	 0.10 0.11 0.050 0.10 0.010 1 0.0030 2.0 0.10	 mg/L mg/L mg/L ug/L mg/L MPN/100mL mg/L mg/L NTU	 08-AUG-19 	 08-AUG-19 12-AUG-19 07-AUG-19 09-AUG-19 14-AUG-19 08-AUG-19	 R4752545 R4762235 R4751433 R4744466 R4745230 R4754769 R4744903

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2324295-11	P2 L Sampled By: TM on 07-AUG-19 @ 10:50 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.10 57.2 0.073 0.581 23.2 4.43	DLM 	0.10 0.11 0.050 0.20 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	 08-AUG-19 08-AUG-19 12-AUG-19 09-AUG-19 14-AUG-19 08-AUG-19	 08-AUG-19 R4762235 R4751433 R4745230 R4754769 R4744903	
L2324295-12	P3 L Sampled By: TM on 07-AUG-19 @ 11:20 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.10 477 0.060 0.635 56.0 15.9	DLM 	0.10 0.11 0.050 1.0 0.020 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	 08-AUG-19 08-AUG-19 13-AUG-19 09-AUG-19 14-AUG-19 08-AUG-19	 R4762235 R4753069 R4745230 R4754769 R4744903	
L2324295-13	P4 L Sampled By: TM on 07-AUG-19 @ 11:06 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.10 138 0.042 0.535 60.0 25.5	DLM 	0.10 0.11 0.050 0.20 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	 08-AUG-19 08-AUG-19 12-AUG-19 09-AUG-19 14-AUG-19 08-AUG-19	 R4762235 R4751433 R4745230 R4754769 R4744903	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2324295-13	P4 L							
Sampled By:	TM on 07-AUG-19 @ 11:06							
Matrix:	WATER							
L2324295-14	P6 L							
Sampled By:	TM on 07-AUG-19 @ 11:35							
Matrix:	WATER							
Nitrate + Nitrite								
Nitrate in Water by IC								
Nitrate (as N)		<0.10	DLM	0.10	mg/L		09-AUG-19	R4752545
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.11		0.11	mg/L		14-AUG-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.050	DLM	0.050	mg/L		09-AUG-19	R4752545
Chlorophyll a								
Chlorophyll a by fluorometry								
Chlorophyll a		51.3		0.50	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters								
Ammonia, Total (as N)		0.107		0.010	mg/L		12-AUG-19	R4751433
Phosphorus (P)-Total		0.312		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids		210		3.3	mg/L		14-AUG-19	R4754769
Turbidity		107		0.10	NTU		08-AUG-19	R4744903

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALGAE-ID-WP	Water	Algae Identification	Microscopic Examination
Standard Methods 10200, 2005			
This procedure is applicable to the general identification of algae occurring in samples of fresh water. Samples are prepared using a sedimentation technique, and are then examined using a compound phase contrast inverted microscope. This test is a general screen of dominant types of algae. Dominant genera of algae are reported.			
CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.			
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
FC-QT97-WP	Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the number of positive responses to a probability table.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
O2-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C
Manganous sulphate reacts with potassium or sodium hydroxide to give a white precipitate of manganous hydroxide. In the presence of oxygen, brown manganic hydroxide is formed. Addition of sulfuric acid dissolves the manganic hydroxide, yielding manganic sulfate which reacts with iodide, releasing iodide in an amount equivalent to the original DO content. The iodide is then titrated with a standard solution of thiosulphate. Results for supersaturated samples may be biased low.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2324295

Report Date: 21-AUG-19

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Client: RM of East St. Paul
3021 Birdshill Road
East St. Paul MB R2E 1A7

Contact: Leanne Shewchuk

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CHL/A-ACET-FLUORO-WP Water								
Batch	R4762235							
WG3138205-3	DUP	L2324295-5						
Chlorophyll a		5.60	6.16		ug/L	9.5	35	08-AUG-19
WG3138205-2	LCS		105.9		%		80-120	20-AUG-19
Chlorophyll a								
WG3138205-1	MB		<0.10		ug/L		0.1	08-AUG-19
Chlorophyll a								
FC-QT97-WP Water								
Batch	R4744466							
WG3126316-2	DUP	L2324295-1						
Fecal Coliforms		84	54		MPN/100mL	43	65	07-AUG-19
WG3126316-1	MB		<1		MPN/100mL		1	07-AUG-19
Fecal Coliforms								
NH3-COL-WP Water								
Batch	R4751433							
WG3131497-2	LCS		100.0		%		85-115	12-AUG-19
Ammonia, Total (as N)								
WG3131497-22	LCS		100.6		%		85-115	12-AUG-19
Ammonia, Total (as N)								
WG3131497-1	MB		<0.010		mg/L		0.01	12-AUG-19
Ammonia, Total (as N)								
WG3131497-21	MB		<0.010		mg/L		0.01	12-AUG-19
Ammonia, Total (as N)								
Batch	R4753069							
WG3132727-2	LCS		95.6		%		85-115	13-AUG-19
Ammonia, Total (as N)								
WG3132727-1	MB		<0.010		mg/L		0.01	13-AUG-19
Ammonia, Total (as N)								
NO2-IC-N-WP Water								
Batch	R4750115							
WG3128328-2	LCS		99.4		%		90-110	09-AUG-19
Nitrite (as N)								
WG3128328-1	MB		<0.010		mg/L		0.01	09-AUG-19
Nitrite (as N)								
Batch	R4752545							
WG3128319-2	LCS		102.2		%		90-110	09-AUG-19
Nitrite (as N)								
WG3128319-1	MB		<0.010		mg/L		0.01	09-AUG-19
Nitrite (as N)								



Quality Control Report

Workorder: L2324295

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-WP		Water						
Batch	R4744903							
WG3127403-2	LCS							
Turbidity			104.5		%		85-115	08-AUG-19
WG3127403-1	MB							
Turbidity			<0.10		NTU		0.1	08-AUG-19

Quality Control Report

Workorder: L2324295

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved Oxygen	4	07-AUG-19 10:05	08-AUG-19 08:45	8.0	23	hours	EHTL

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2324295 were received on 07-AUG-19 16:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



www.alsglobal.com

Chain of Custody (COC) / Analytical
Request Form

Canada Toll Free: 1 800 668 9878



L2324295-COFC

COC Number: 17 -

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Report To Contact and company name below will appear on the final report			Report Format / Distribution			Standard TAT if received by 3 pm - business days - no surcharges apply																																																																																																																																																							
Company: RM of East St. Paul			Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply																																																																																																																																																							
Contact: Leanne Shewchuk			Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO			4 day [P4-20%] <input type="checkbox"/>																																																																																																																																																							
Phone: 204-668-8112 x 4503			<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked			3 day [P3-25%] <input type="checkbox"/>																																																																																																																																																							
Company address below will appear on the final report			Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			2 day [P2-50%] <input type="checkbox"/>																																																																																																																																																							
Street: 3021 Birdhill Road			Email 1 or Fax leanne.shewchuk@eaststpaul.com			1 Business day [E - 100%] <input type="checkbox"/>																																																																																																																																																							
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LSD:			Location:			<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">SOLIDS-TOTSUS-WP</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">TURBIDITY-WP</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">O2-DIS-WP</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">P-T-COL-WP</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">NH3-COL-WP</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">CL2-TOTAL-WP (Monochloramine)</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">ANIONS-N23-IC-N-WP</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">CHL-FLUORO-WP</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">FECALS</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">ALGAE IDENTIFICATION</td> <td colspan="12"></td> </tr> <tr><td colspan="12"></td></tr> </table>												SOLIDS-TOTSUS-WP	TURBIDITY-WP	O2-DIS-WP	P-T-COL-WP	NH3-COL-WP	CL2-TOTAL-WP (Monochloramine)	ANIONS-N23-IC-N-WP	CHL-FLUORO-WP	FECALS	ALGAE IDENTIFICATION																																																																																																																																		
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ALS Sample # (lab use only)			Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)			Time (hh:mm)			Sample Type			<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">NUMBER OF CONTAINERS</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">SOLIDS-TOTSUS-WP</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">TURBIDITY-WP</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">O2-DIS-WP</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">P-T-COL-WP</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">NH3-COL-WP</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">CL2-TOTAL-WP (Monochloramine)</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">ANIONS-N23-IC-N-WP</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">CHL-FLUORO-WP</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">FECALS</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">ALGAE IDENTIFICATION</td> <td colspan="12"></td> </tr> <tr><td colspan="12"></td></tr> <tr><td colspan="12"></td></tr> <tr><td colspan="12"></td></tr> <tr><td colspan="12"></td></tr> <tr><td colspan="12"></td></tr> <tr><td colspan="12"></td></tr> <tr><td colspan="12"></td></tr> <tr><td colspan="12"></td></tr> <tr><td colspan="12"></td></tr> </table>												NUMBER OF CONTAINERS	SOLIDS-TOTSUS-WP	TURBIDITY-WP	O2-DIS-WP	P-T-COL-WP	NH3-COL-WP	CL2-TOTAL-WP (Monochloramine)	ANIONS-N23-IC-N-WP	CHL-FLUORO-WP	FECALS	ALGAE IDENTIFICATION																																																																																																																								
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SS A			7-Aug-19			9:30			Water																																																																																																																																																				
SS B			7-Aug-19			9:20			Water																																																																																																																																																				
SS C			7-Aug-19			9:52			Water																																																																																																																																																				
SS D			7-Aug-19			10:05			Water																																																																																																																																																				
CS U			7-Aug-19			12:37			Water																																																																																																																																																				
CS L			7-Aug-19			12:50			Water																																																																																																																																																				
BTP 1			7-Aug-19			11:45			Water																																																																																																																																																				
S U			7-Aug-19			12:05			Water																																																																																																																																																				
S L			7-Aug-19			12:20			Water																																																																																																																																																				
P1 U			7-Aug-19			10:40			Water																																																																																																																																																				
P2 L			7-Aug-19			10:50			Water																																																																																																																																																				
P3 L			7-Aug-19			11:20			Water																																																																																																																																																				
Drinking Water (DW) Samples¹ (client use)			Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)			SAMPLE CONDITION AS RECEIVED (lab use only)																																																																																																																																																							
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO						Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>																																																																																																																																																							
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO						Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>																																																																																																																																																							
						Cooling Initiated <input type="checkbox"/>																																																																																																																																																							
						INITIAL COOLER TEMPERATURES °C: 18.5 FINAL COOLER TEMPERATURES °C:																																																																																																																																																							
SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)																																																																																																																																																							
Released by:			Received by: CM			Received by:																																																																																																																																																							
Date:			Date: 7-8-19			Date:																																																																																																																																																							
Time:			Time: 4:00			Time:																																																																																																																																																							

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Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



Canada Toll Free: 1 800 668 9878

COC Number: 17 -

Page 2 of 2



L2324295-COFC

Report To Contact and company name below will appear on the final report		Report Format / Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/>		L2324295-COFC		Contact your AM to confirm all E&P TATs (surcharges may apply)							
Company: RM of East St. Paul		Quality Control (QC) Report with Rep		AT if received by 3 pm - business days - no surcharges apply		1 Business day [E - 100%]							
Contact: Leanne Shewchuk		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		3 day [P3-25%] <input type="checkbox"/>		Same Day, Weekend or Statutory holiday [E2 -200%]							
Phone: 204-668-8112 x 4503		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		2 day [P2-50%] <input type="checkbox"/>		[Laboratory opening fees may apply]							
Company address below will appear on the final report		Email 1 or Fax: leanne.shewchuk@eaststpaul.com		Date and Time Required for all E&P TATs:		dd-mm-yy hh:mm							
Street: 3021 Birdhill Road		Email 2: operations@eaststpaul.com		For tests that can not be performed according to the service level selected, you will be contacted.									
City/Province: East St. Paul, MB		Email 3:		Analysis Request									
Postal Code: R2E 1A7				Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below									
Invoice To		Invoice Distribution		NUMBER OF CONTAINERS				SAMPLES ON HOLD					
Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX											
Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Email 1 or Fax: operations@eaststpaul.com											
Company:		Email 2:											
Contact:													
Project Information		Oil and Gas Required Fields (client use)											
ALS Account # / Quote #: Q74289		AFE/Cost Center:											
Job #:		Major/Minor Code:											
PO / AFE:		Routing Code:											
LSD:		Requisitioner:											
ALS Lab Work Order # (lab use only):		Location:											
		ALS Contact: Connor Cattani											
		Sampler: TM											
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This description will appear on the report)		Date (dd-mm-yy)		Time (hh:mm)		Sample Type					
P4 L		7-Aug-19		11:06		Water		3 R R					
P6 L		7-Aug-19		11:35		Water		3 R R					

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.



RM of East St. Paul
ATTN: Leanne Shewchuk
3021 Birdshill Road
East St. Paul MB R2E 1A7

Date Received: 29-AUG-19
Report Date: 10-SEP-19 12:09 (MT)
Version: FINAL

Client Phone: 204-668-8112

Certificate of Analysis

Lab Work Order #: L2338601
Project P.O. #: NOT SUBMITTED
Job Reference: WATER
C of C Numbers:
Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2338601-1 S U Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) 0.145 0.020 mg/L 30-AUG-19 R4782488 Nitrate+Nitrite Nitrate and Nitrite as N 0.145 0.070 mg/L 04-SEP-19 Nitrite in Water by IC Nitrite (as N) <0.010 0.010 mg/L 30-AUG-19 R4782488 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 32.2 0.10 ug/L 29-AUG-19 29-AUG-19 R4782973 Miscellaneous Parameters Ammonia, Total (as N) 0.063 0.010 mg/L 06-SEP-19 R4786151 Conductivity 651 1.0 umhos/cm 30-AUG-19 R4780896 Phosphorus (P)-Total 0.0786 0.0030 mg/L 03-SEP-19 R4781470 Total Suspended Solids 11.9 2.0 mg/L 05-SEP-19 R4784577 Turbidity 7.35 0.10 NTU 30-AUG-19 R4778918							
L2338601-2 S L Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.020 0.020 mg/L 30-AUG-19 R4782488 Nitrate+Nitrite Nitrate and Nitrite as N <0.070 0.070 mg/L 04-SEP-19 Nitrite in Water by IC Nitrite (as N) <0.010 0.010 mg/L 30-AUG-19 R4782488 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 32.6 0.10 ug/L 29-AUG-19 29-AUG-19 R4782973 Miscellaneous Parameters Ammonia, Total (as N) 0.019 0.010 mg/L 06-SEP-19 R4786151 Fecal Coliforms 37 1 MPN/100mL 29-AUG-19 R4778222 Phosphorus (P)-Total 0.0494 0.0030 mg/L 03-SEP-19 R4781470 Total Suspended Solids 8.0 2.0 mg/L 05-SEP-19 R4784577 Turbidity 6.50 0.10 NTU 30-AUG-19 R4778918							
L2338601-3 P1 U Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.10 DLM 0.10 mg/L 30-AUG-19 R4782488 Nitrate+Nitrite Nitrate and Nitrite as N <0.11 0.11 mg/L 04-SEP-19 Nitrite in Water by IC Nitrite (as N) <0.050 DLM 0.050 mg/L 30-AUG-19 R4782488 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 29.7 0.10 ug/L 29-AUG-19 29-AUG-19 R4782973 Miscellaneous Parameters Ammonia, Total (as N) 0.141 0.010 mg/L 06-SEP-19 R4786151 Conductivity 1690 1.0 umhos/cm 30-AUG-19 R4780896							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2338601-3 P1 U Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Fecal Coliforms Phosphorus (P)-Total Total Suspended Solids Turbidity	548 0.110 10.1 4.90		1 0.0030 2.0 0.10	MPN/100mL mg/L mg/L NTU		29-AUG-19 03-SEP-19 05-SEP-19 30-AUG-19	R4778222 R4781470 R4784577 R4778918
L2338601-4 P2 L Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	0.33 0.33 <0.050 39.0 0.126 0.217 36.1 11.1	DLM	0.10 0.11 0.050 0.10 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	29-AUG-19	29-AUG-19 04-SEP-19 30-AUG-19 29-AUG-19 06-SEP-19 03-SEP-19 05-SEP-19 30-AUG-19	R4782488 R4782488 R4782973 R4786151 R4781470 R4784577 R4778918
L2338601-5 P3 L Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.040 <0.070 <0.020 33.2 0.140 0.120 4.7 2.80	DLM DLM	0.040 0.070 0.020 0.10 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	29-AUG-19	29-AUG-19 04-SEP-19 30-AUG-19 29-AUG-19 06-SEP-19 03-SEP-19 05-SEP-19 30-AUG-19	R4782488 R4782488 R4782973 R4786151 R4781470 R4784577 R4778918
L2338601-6 P4 L Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a	<0.040 <0.070 <0.020	DLM DLM	0.040 0.070 0.020	mg/L mg/L mg/L		30-AUG-19 04-SEP-19 30-AUG-19	R4782488 R4782488

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2338601-6 P4 L Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Conductivity Phosphorus (P)-Total Total Suspended Solids Turbidity	 23.0 0.201 1220 0.122 6.1 3.60	 	 0.10 0.010 1.0 0.0030 2.0 0.10	 ug/L mg/L umhos/cm mg/L mg/L NTU	 29-AUG-19 	 29-AUG-19 06-SEP-19 30-AUG-19 03-SEP-19 05-SEP-19 30-AUG-19	 R4782973 R4786151 R4780896 R4781470 R4784577 R4778918
L2338601-7 P6 L Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Fecal Coliforms Phosphorus (P)-Total Total Suspended Solids Turbidity	 21.4 0.063 114 0.0810 6.0 2.02	 DLM DLM 	 0.040 0.070 0.020 0.10 0.010 1 0.0030 2.0 0.10	 mg/L mg/L mg/L MPN/100mL mg/L mg/L NTU	 29-AUG-19 	 30-AUG-19 04-SEP-19 30-AUG-19 29-AUG-19 06-SEP-19 29-AUG-19 03-SEP-19 05-SEP-19 30-AUG-19	 R4782488 R4782488 R4782973 R4786151 R4778222 R4781470 R4784577 R4778918
L2338601-8 SS A Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Conductivity Fecal Coliforms Phosphorus (P)-Total Total Suspended Solids Turbidity	 187 0.037 455 411 0.207 37.9 31.1	 	 0.020 0.070 0.010 0.40 0.010 1 0.0030 2.0 0.10	 mg/L mg/L mg/L MPN/100mL mg/L mg/L NTU	 29-AUG-19 	 30-AUG-19 04-SEP-19 30-AUG-19 29-AUG-19 06-SEP-19 30-AUG-19 03-SEP-19 05-SEP-19 30-AUG-19	 R4782488 R4782488 R4782973 R4786151 R4780896 R4778222 R4781470 R4784577 R4778918
L2338601-9 SS B Sampled By: TM on 29-AUG-19 @ 11:10 Matrix:							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2338601-9 SS B Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Fecal Coliforms Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.020 <0.070 <0.010 86.3 0.194 4 0.131 44.7 24.3		0.020 0.070 0.010 0.70 0.010 1 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L MPN/100mL mg/L mg/L NTU	 29-AUG-19 	30-AUG-19 04-SEP-19 30-AUG-19 29-AUG-19 06-SEP-19 29-AUG-19 03-SEP-19 05-SEP-19 30-AUG-19	R4782488 R4782488 R4782488 R4782973 R4786151 R4778222 R4781470 R4784577 R4778918
L2338601-10 SS C Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Fecal Coliforms Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.020 <0.070 <0.010 97.6 0.037 308 0.198 46.1 32.8		0.020 0.070 0.010 0.70 0.010 1 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L MPN/100mL mg/L mg/L NTU	 29-AUG-19 	30-AUG-19 04-SEP-19 30-AUG-19 29-AUG-19 06-SEP-19 29-AUG-19 03-SEP-19 05-SEP-19 30-AUG-19	R4782488 R4782488 R4782973 R4786151 R4778222 R4781470 R4784577 R4778918
L2338601-11 SS D Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Fecal Coliforms	<0.020 <0.070 <0.010 74.3 0.103 25		0.020 0.070 0.010 1.0 0.010 1	mg/L mg/L mg/L ug/L mg/L MPN/100mL	 29-AUG-19 	30-AUG-19 04-SEP-19 30-AUG-19 29-AUG-19 06-SEP-19 29-AUG-19	R4782488 R4782488 R4782973 R4786151 R4778222

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2338601-11 SS D Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Phosphorus (P)-Total Total Suspended Solids Turbidity	0.249 134 59.9		0.0030 7.5 0.10	mg/L mg/L NTU		03-SEP-19 05-SEP-19 30-AUG-19	R4781470 R4784577 R4778918
L2338601-12 CS U Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Conductivity Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.020 <0.070 <0.010 43.2 0.105 907 0.198 44.3 18.1		0.020 0.070 0.010 0.10 0.010 1.0 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L umhos/cm mg/L mg/L NTU	29-AUG-19	30-AUG-19 04-SEP-19 30-AUG-19 29-AUG-19 06-SEP-19 30-AUG-19 03-SEP-19 05-SEP-19 30-AUG-19	R4782488 R4782973 R4786151 R4780896 R4781470 R4784577 R4778918
L2338601-13 CS L Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	0.051 <0.070 <0.020 39.6 0.120 0.140 12.5 14.8	DLM	0.040 0.070 0.020 0.10 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L NTU	29-AUG-19	30-AUG-19 04-SEP-19 30-AUG-19 29-AUG-19 06-SEP-19 03-SEP-19 05-SEP-19 30-AUG-19	R4782488 R4782488 R4782973 R4786151 R4781470 R4784577 R4778918
L2338601-14 BTP 1 Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a	0.048 <0.070 <0.020	DLM	0.040 0.070 0.020	mg/L mg/L mg/L		30-AUG-19 05-SEP-19 30-AUG-19	R4782488 R4782488

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2338601-14 BTP 1 Sampled By: TM on 29-AUG-19 @ 11:10 Matrix: Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Phosphorus (P)-Total Total Suspended Solids Turbidity	 30.1 0.521 0.136 12.5 11.3	 	 0.10 0.020 0.0030 2.0 0.10	 ug/L mg/L mg/L mg/L NTU	 29-AUG-19 	 29-AUG-19 06-SEP-19 03-SEP-19 05-SEP-19 30-AUG-19	 R4782973 R4790690 R4781470 R4784577 R4778918

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.			
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
FC-QT97-WP	Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the number of positive responses to a probability table.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg ww - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2338601

Report Date: 10-SEP-19

Page 1 of 3

Client: RM of East St. Paul
3021 Birdshill Road
East St. Paul MB R2E 1A7

Contact: Leanne Shewchuk

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CHL/A-ACET-FLUORO-WP Water								
Batch	R4782973							
WG3151694-2	LCS							
Chlorophyll a			109.7		%		80-120	04-SEP-19
WG3151694-1	MB							
Chlorophyll a			<0.10		ug/L		0.1	29-AUG-19
EC-WP Water								
Batch	R4780896							
WG3150168-13	LCS							
Conductivity			98.9		%		90-110	30-AUG-19
WG3150168-8	LCS							
Conductivity			99.1		%		90-110	30-AUG-19
WG3150168-11	MB							
Conductivity			<1.0		umhos/cm		1	30-AUG-19
WG3150168-6	MB							
Conductivity			<1.0		umhos/cm		1	30-AUG-19
FC-QT97-WP Water								
Batch	R4778222							
WG3147776-2	DUP	L2338601-2						
Fecal Coliforms		37	37		MPN/100mL	1.1	65	29-AUG-19
WG3147776-1	MB							
Fecal Coliforms			<1		MPN/100mL		1	29-AUG-19
NH3-COL-WP Water								
Batch	R4786151							
WG3154633-6	LCS							
Ammonia, Total (as N)			100.4		%		85-115	05-SEP-19
WG3154633-5	MB							
Ammonia, Total (as N)			<0.010		mg/L		0.01	05-SEP-19
Batch	R4790690							
WG3156239-2	LCS							
Ammonia, Total (as N)			100.2		%		85-115	06-SEP-19
WG3156239-1	MB							
Ammonia, Total (as N)			<0.010		mg/L		0.01	06-SEP-19
NO2-IC-N-WP Water								
Batch	R4782488							
WG3148511-2	LCS							
Nitrite (as N)			99.99		%		90-110	30-AUG-19
WG3148511-1	MB							
Nitrite (as N)			<0.010		mg/L		0.01	30-AUG-19



Quality Control Report

Workorder: L2338601

Report Date: 10-SEP-19

Page 2 of 3

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP								
Water								
Batch	R4782488							
WG3148511-2	LCS							
Nitrate (as N)			99.6		%		90-110	30-AUG-19
WG3148511-1	MB							
Nitrate (as N)			<0.020		mg/L		0.02	30-AUG-19
P-T-COL-WP								
Water								
Batch	R4781470							
WG3148886-10	LCS							
Phosphorus (P)-Total			94.9		%		80-120	03-SEP-19
WG3148886-6	LCS							
Phosphorus (P)-Total			94.3		%		80-120	03-SEP-19
WG3148886-5	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	03-SEP-19
WG3148886-9	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	03-SEP-19
SOLIDS-TOTSUS-WP								
Water								
Batch	R4784577							
WG3151613-18	LCS							
Total Suspended Solids			106.2		%		85-115	05-SEP-19
WG3151613-17	MB							
Total Suspended Solids			<2.0		mg/L		2	05-SEP-19
TURBIDITY-WP								
Water								
Batch	R4778918							
WG3148398-3	DUP	L2338601-1						
Turbidity		7.35	7.54		NTU	2.6	15	30-AUG-19
WG3148398-2	LCS							
Turbidity			103.5		%		85-115	30-AUG-19
WG3148398-1	MB							
Turbidity			<0.10		NTU		0.1	30-AUG-19

Quality Control Report

Workorder: L2338601

Report Date: 10-SEP-19

Page 3 of 3

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

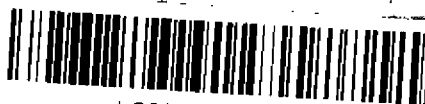
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Canada Toll Free: 1 800 668 9878



L2338601-COFC

COC Number: 17 -

Page 2 of 2

[illegible]

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

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NOTE: 20 mL GROW



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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L2338601-COFC

COC Number: 17 -

Page 1 of 2

Report To Contact and company name below will appear on the final report		Report Format / Distribution		Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)																					
Company:	RM of East St. Paul	Select Report Format:	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)	Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply																					
Contact:	Leanne Shewchuk	Quality Control (QC) Report with Report	<input type="checkbox"/> YES <input type="checkbox"/> NO	1 Business day [E - 100%] <input type="checkbox"/>																					
Phone:	204-668-8112 x 4503	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		Same Day, Weekend or Statutory holiday [E2 -200%] <input type="checkbox"/> (Laboratory opening fees may apply)																					
Company address below will appear on the final report		Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																						
Street:	3021 Birdhill Road	Email 1 or Fax	leanne.shewchuk@eaststpaul.com	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm																					
City/Province:	East St. Paul, MB	Email 2	operations@eaststpaul.com	For tests that can not be performed according to the service level selected, you will be contacted.																					
Postal Code:	R2E 1A7	Email 3																							
Invoice To	Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Invoice Distribution		Analysis Request																					
	Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Select Invoice Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input checked="" type="checkbox"/> FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																					
Company:		Email 1 or Fax	operations@eaststpaul.com																						
Contact:		Email 2																							
Project Information		Oil and Gas Required Fields (client use)		<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">NUMBER OF CONTAINERS</div> <div> <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>SOLIDS-TOTSUS-WP</td><td></td></tr> <tr><td>TURBIDITY-WP</td><td></td></tr> <tr><td>O2-DIS-WP</td><td></td></tr> <tr><td>P-T-COL-WP</td><td></td></tr> <tr><td>NH3-COL-WP</td><td></td></tr> <tr><td>CL2-TOTAL-WP (Monochloramine)</td><td></td></tr> <tr><td>ANIONS-N23-(C-N-WP</td><td></td></tr> <tr><td>CHL-FLUORO-WP</td><td></td></tr> <tr><td>FECALS</td><td></td></tr> <tr><td>CONDUCTIVITY</td><td></td></tr> </table> </div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">SAMPLES ON HOLD</div> </div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small;">SUSPECTED HAZARD (see Special Instructions)</div>		SOLIDS-TOTSUS-WP		TURBIDITY-WP		O2-DIS-WP		P-T-COL-WP		NH3-COL-WP		CL2-TOTAL-WP (Monochloramine)		ANIONS-N23-(C-N-WP		CHL-FLUORO-WP		FECALS		CONDUCTIVITY	
SOLIDS-TOTSUS-WP																									
TURBIDITY-WP																									
O2-DIS-WP																									
P-T-COL-WP																									
NH3-COL-WP																									
CL2-TOTAL-WP (Monochloramine)																									
ANIONS-N23-(C-N-WP																									
CHL-FLUORO-WP																									
FECALS																									
CONDUCTIVITY																									
ALS Account # / Quote #:	Q74289	AFE/Cost Center:	PO#																						
Job #:		Major/Minor Code:	Routing Code:																						
PO / AFE:		Requisitioner:																							
LSD:		Location:																							
ALS Lab Work Order # (lab use only): L2338601		ALS Contact:	Connor Cattani	Sampler:	TM																				
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type																					
1	S U	29-Aug-19	11:10	Water	3 R R																				
2	S L	29-Aug-19	11:20	Water	4 R R																				
3	P1 U	29-Aug-19	10:16	Water	4 R R																				
4	P2 L	29-Aug-19	10:25	Water	3 R R																				
5	P3 L	29-Aug-19	10:35	Water	3 R R																				
6	P4 L	29-Aug-19	10:45	Water	3 R R																				
7	P6 L	29-Aug-19	10:55	Water	4 R R																				
8	SS A	29-Aug-19	9:05	Water	4 R R																				
9	SS B	29-Aug-19	9:00	Water	4 R R																				
10	SS C	29-Aug-19	9:37	Water	4 R R																				
11	SS D	29-Aug-19	9:50	Water	4 R R																				
12	CS U	29-Aug-19	11:30	Water	3 R R																				
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)		SAMPLE CONDITION AS RECEIVED (lab use only)																					
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO				Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>																					
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO				Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>																					
				Cooling Initiated <input type="checkbox"/>																					
				INITIAL COOLER TEMPERATURES °C																					
				FINAL COOLER TEMPERATURES °C																					
				10.5																					
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)																					
Released by:	Date:	Time:	Received by:	Date:	Time:																				
			CM	29-8-19	3:59																				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

NOV 2013 FRONT



RM of East St. Paul
ATTN: Leanne Shewchuk
3021 Birdshill Road
East St. Paul MB R2E 1A7

Date Received: 19-SEP-19
Report Date: 08-OCT-19 08:46 (MT)
Version: FINAL

Client Phone: 204-668-8112

Certificate of Analysis

Lab Work Order #: L2351375
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Connor Cattani
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2351375-1 S U Sampled By: TM on 19-SEP-19 @ 11:15 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) 0.097 0.020 mg/L 21-SEP-19 R4841049 Nitrate+Nitrite Nitrate and Nitrite as N 0.097 0.070 mg/L 26-SEP-19 Nitrite in Water by IC Nitrite (as N) <0.010 0.010 mg/L 21-SEP-19 R4841049 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 122 0.50 ug/L 21-SEP-19 21-SEP-19 R4859789 Miscellaneous Parameters Ammonia, Total (as N) 0.156 0.010 mg/L 27-SEP-19 R4850813 Chlorine, Total 0.100 RRR 0.010 mg/L 21-SEP-19 R4838770 Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace. Conductivity 824 1.0 umhos/cm 22-SEP-19 R4835269 Phosphorus (P)-Total 0.175 0.0030 mg/L 25-SEP-19 R4839654 Total Suspended Solids 55.6 2.0 mg/L 26-SEP-19 R4848528 Turbidity 33.1 0.10 NTU 20-SEP-19 R4838752							
L2351375-2 S L Sampled By: TM on 19-SEP-19 @ 11:05 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.020 0.020 mg/L 21-SEP-19 R4841049 Nitrate+Nitrite Nitrate and Nitrite as N <0.070 0.070 mg/L 26-SEP-19 Nitrite in Water by IC Nitrite (as N) <0.010 0.010 mg/L 21-SEP-19 R4841049 Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a 70.8 0.20 ug/L 21-SEP-19 21-SEP-19 R4859789 Miscellaneous Parameters Ammonia, Total (as N) 0.042 0.010 mg/L 27-SEP-19 R4850813 Chlorine, Total 0.080 RRR 0.010 mg/L 21-SEP-19 R4838770 Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace. Phosphorus (P)-Total 0.139 0.0030 mg/L 25-SEP-19 R4839654 Total Suspended Solids 89.3 2.0 mg/L 26-SEP-19 R4848528 Turbidity 54.9 0.10 NTU 20-SEP-19 R4838752							
L2351375-3 P1 U Sampled By: TM on 19-SEP-19 @ 10:19 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) <0.10 DLM 0.10 mg/L 21-SEP-19 R4841049 Nitrate+Nitrite Nitrate and Nitrite as N <0.11 0.11 mg/L 26-SEP-19 Nitrite in Water by IC							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2351375-3 P1 U Sampled By: TM on 19-SEP-19 @ 10:19 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.050	DLM	0.050	mg/L		21-SEP-19	R4841049
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	15.2		0.10	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters Ammonia, Total (as N)	0.262		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.070	RRR	0.010	mg/L		21-SEP-19	R4838770
Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace.							
Conductivity	1640		1.0	umhos/cm		22-SEP-19	R4835269
Fecal Coliforms	172	MBHT	1	MPN/100mL		20-SEP-19	R4832299
Phosphorus (P)-Total	0.127		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	11.1		2.0	mg/L		26-SEP-19	R4848528
Turbidity	7.69		0.10	NTU		20-SEP-19	R4838752
L2351375-4 P2 L Sampled By: TM on 19-SEP-19 @ 10:25 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N)	<0.10	DLM	0.10	mg/L		21-SEP-19	R4841049
Nitrate+Nitrite Nitrate and Nitrite as N	<0.11		0.11	mg/L		26-SEP-19	
Nitrite in Water by IC Nitrite (as N)	<0.050	DLM	0.050	mg/L		21-SEP-19	R4841049
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	70.6		0.20	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters Ammonia, Total (as N)	0.105		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.020	RRR	0.010	mg/L		21-SEP-19	R4838770
Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace.							
Phosphorus (P)-Total	0.227		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	34.9		2.0	mg/L		26-SEP-19	R4848528
Turbidity	4.49		0.10	NTU		20-SEP-19	R4838752
L2351375-5 P3 L Sampled By: TM on 19-SEP-19 @ 10:37 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N)	<0.10	DLM	0.10	mg/L		21-SEP-19	R4841049
Nitrate+Nitrite Nitrate and Nitrite as N	<0.11		0.11	mg/L		26-SEP-19	
Nitrite in Water by IC Nitrite (as N)	<0.050	DLM	0.050	mg/L		21-SEP-19	R4841049
Chlorophyll a Chlorophyll a by fluorometry							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2351375-5 P3 L Sampled By: TM on 19-SEP-19 @ 10:37 Matrix: WATER Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace. Phosphorus (P)-Total Total Suspended Solids Turbidity	4.68 0.100 0.050 0.0689 3.6 2.48	RRR 	0.10 0.010 0.010 0.0030 2.0 0.10	ug/L mg/L mg/L mg/L mg/L NTU	21-SEP-19 21-SEP-19 27-SEP-19 21-SEP-19 25-SEP-19 26-SEP-19 20-SEP-19	21-SEP-19 21-SEP-19 27-SEP-19 21-SEP-19 25-SEP-19 26-SEP-19 20-SEP-19	R4859789 R4850813 R4838770 R4839654 R4848528 R4838752
L2351375-6 P4 L Sampled By: TM on 19-SEP-19 @ 10:42 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace. Phosphorus (P)-Total Total Suspended Solids Turbidity	0.183 0.183 <0.020 11.2 0.251 0.030 0.105 2.3 2.34	DLM RRR 	0.040 0.070 0.020 0.10 0.010 0.010 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L mg/L mg/L NTU	21-SEP-19 21-SEP-19 27-SEP-19 21-SEP-19 25-SEP-19 26-SEP-19 20-SEP-19	21-SEP-19 21-SEP-19 27-SEP-19 21-SEP-19 25-SEP-19 26-SEP-19 20-SEP-19	R4841049 R4841049 R4841049 R4859789 R4850813 R4838770 R4839654 R4848528 R4838752
L2351375-7 P6 L Sampled By: TM on 19-SEP-19 @ 10:55 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Note: RRR: Sample received in improper sampling bottle. Method requires amber glass	<0.040 <0.070 <0.020 8.48 0.039 0.060	DLM RRR 	0.040 0.070 0.020 0.10 0.010 0.010	mg/L mg/L mg/L ug/L mg/L mg/L	21-SEP-19 21-SEP-19 27-SEP-19 21-SEP-19 21-SEP-19 21-SEP-19	21-SEP-19 21-SEP-19 27-SEP-19 21-SEP-19 21-SEP-19 21-SEP-19	R4841049 R4841049 R4841049 R4859789 R4850813 R4838770

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2351375-7	P6 L Sampled By: TM on 19-SEP-19 @ 10:55 Matrix: WATER bottle with no headspace. Also, Total Chlorine sample had headspace.							
Conductivity	1220	MBHT	1.0	umhos/cm		22-SEP-19	R4835269	
Fecal Coliforms	152		1	MPN/100mL		20-SEP-19	R4832299	
Phosphorus (P)-Total	0.0630		0.0030	mg/L		25-SEP-19	R4839654	
Total Suspended Solids	29.6		2.0	mg/L		26-SEP-19	R4848528	
Turbidity	5.35		0.10	NTU		20-SEP-19	R4838752	
L2351375-8	SS A Sampled By: TM on 19-SEP-19 @ 09:20 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace.							
Nitrate (as N)	<0.020	RRR	0.020	mg/L	21-SEP-19	21-SEP-19	R4841049	
Nitrate and Nitrite as N	<0.070		0.070	mg/L		26-SEP-19		
Nitrite (as N)	<0.010		0.010	mg/L		21-SEP-19	R4841049	
Chlorophyll a	164		0.50	ug/L		21-SEP-19	R4859789	
Ammonia, Total (as N)	0.033		0.010	mg/L		27-SEP-19	R4850813	
Chlorine, Total	0.020	MBHT	0.010	mg/L		21-SEP-19	R4838770	
Fecal Coliforms	461		1	MPN/100mL	20-SEP-19	R4832299		
Phosphorus (P)-Total	0.142		0.0030	mg/L	25-SEP-19	R4839654		
Total Suspended Solids	26.9		2.0	mg/L	26-SEP-19	R4848528		
Turbidity	30.7		0.10	NTU	20-SEP-19	R4838752		
L2351375-9	SS B Sampled By: TM on 19-SEP-19 @ 09:13 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace.							
Nitrate (as N)	<0.020	RRR	0.020	mg/L	21-SEP-19	21-SEP-19	R4841049	
Nitrate and Nitrite as N	<0.070		0.070	mg/L		26-SEP-19		
Nitrite (as N)	<0.010		0.010	mg/L		21-SEP-19	R4841049	
Chlorophyll a	31.3		0.10	ug/L		21-SEP-19	R4859789	
Ammonia, Total (as N)	0.050		0.010	mg/L		27-SEP-19	R4850813	
Chlorine, Total	0.050		0.010	mg/L		21-SEP-19	R4838770	
Conductivity	389		1.0	umhos/cm		22-SEP-19	R4835269	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2351375-9 SS B Sampled By: TM on 19-SEP-19 @ 09:13 Matrix: WATER							
Fecal Coliforms	21	MBHT	1	MPN/100mL		20-SEP-19	R4832299
Phosphorus (P)-Total	0.113		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	15.9		2.0	mg/L		26-SEP-19	R4848528
Turbidity	11.3		0.10	NTU		20-SEP-19	R4838752
L2351375-10 SS C Sampled By: TM on 19-SEP-19 @ 09:37 Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		21-SEP-19	R4841049
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		26-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		21-SEP-19	R4841049
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	136		0.20	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters							
Ammonia, Total (as N)	0.025		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.010	RRR	0.010	mg/L		21-SEP-19	R4838770
Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace.							
Fecal Coliforms	629	MBHT	1	MPN/100mL		20-SEP-19	R4832299
Phosphorus (P)-Total	0.242		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	47.5		2.0	mg/L		26-SEP-19	R4848528
Turbidity	29.8		0.10	NTU		20-SEP-19	R4838752
L2351375-11 SS D Sampled By: TM on 19-SEP-19 @ 09:47 Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		21-SEP-19	R4841049
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		26-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		21-SEP-19	R4841049
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	76.5		0.10	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters							
Ammonia, Total (as N)	0.069		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.020	RRR	0.010	mg/L		21-SEP-19	R4838770
Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace.							
Fecal Coliforms	10	MBHT	1	MPN/100mL		20-SEP-19	R4832299
Phosphorus (P)-Total	0.215		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	112		6.0	mg/L		26-SEP-19	R4848528
Turbidity	55.2		0.10	NTU		20-SEP-19	R4838752

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2351375-11	SS D Sampled By: TM on 19-SEP-19 @ 09:47 Matrix: WATER							
L2351375-12	CS U Sampled By: TM on 19-SEP-19 @ 11:30 Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite as N Nitrite in Water by IC Nitrite (as N) Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a Miscellaneous Parameters Ammonia, Total (as N) Chlorine, Total Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace. Fecal Coliforms Phosphorus (P)-Total Total Suspended Solids Turbidity	<0.020 <0.070 <0.010 7.71 0.038 0.050 1 0.156 5.3 4.11	RRR MBHT	0.020 0.070 0.010 0.10 0.010 0.010 1 0.0030 2.0 0.10	mg/L mg/L mg/L ug/L mg/L mg/L MPN/100mL mg/L mg/L NTU	21-SEP-19 26-SEP-19 21-SEP-19 21-SEP-19 27-SEP-19 21-SEP-19 20-SEP-19 25-SEP-19 26-SEP-19 20-SEP-19	R4841049 	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2351375-14 BTP 1 Sampled By: TM on 19-SEP-19 @ 11:53 Matrix: WATER							
Nitrate in Water by IC Nitrate (as N)	<0.040	DLM	0.040	mg/L		21-SEP-19	R4841049
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		26-SEP-19	
Nitrite in Water by IC Nitrite (as N)	<0.020	DLM	0.020	mg/L		21-SEP-19	R4841049
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a	88.2		0.20	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters Ammonia, Total (as N)	0.018		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.030	RRR	0.010	mg/L		21-SEP-19	R4838770
Note: RRR: Sample received in improper sampling bottle. Method requires amber glass bottle with no headspace. Also, Total Chlorine sample had headspace.							
Phosphorus (P)-Total	0.267		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	25.9		2.0	mg/L		26-SEP-19	R4848528
Turbidity	28.6		0.10	NTU		20-SEP-19	R4838752

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MBHT	The APHA 30 hour hold time was exceeded for microbiological testing. Samples processed within 48 hours from time of sampling may be valid in some cases (refer to Health Canada guidance).
RRR	Refer to Report Remarks for issues regarding this analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.			
CL2-TOTAL-WP	Water	Chlorine, Total	APHA 4500-Cl Chlorine(Residual) G (mod)
Chlorine (residual), as free or total, is analyzed using the DPD colourimetric method. The recommended hold time for these tests is 15 minutes; field testing is recommended for best results. Chlorine can be rapidly consumed by organic matter, if present, and dissipates rapidly into headspace.			
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
FC-QT97-WP	Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the number of positive responses to a probability table.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
Chain of Custody Numbers:	

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L2351375-COFC

COC Number: 17 -

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Report To Contact and company name below will appear on the final report		Report Format / Distribution Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		Priority / Turnaround Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply 4 day [P4-20%] <input type="checkbox"/> 3 day [P3-25%] <input type="checkbox"/> 2 day [P2-50%] <input type="checkbox"/> 1 Business day [E - 100%] <input type="checkbox"/> Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] <input type="checkbox"/> Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm																																																																																																																																																																
Company: RM of East St. Paul Contact: Leanne Shewchuk Phone: 204-668-8112 x 4503 Company address below will appear on the final report Street: 3021 Birdhill Road City/Province: East St. Paul, MB Postal Code: R2E 1A7		Email 1 or Fax: leanne.shewchuk@eaststpaul.com Email 2: operations@eaststpaul.com Email 3:		For tests that can not be performed according to the service level selected, you will be contacted.																																																																																																																																																																
Invoice To: Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Company: Contact:		Invoice Distribution Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input checked="" type="checkbox"/> FAX Email 1 or Fax: operations@eaststpaul.com Email 2:		Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																																																																																																																																																																
Project Information ALS Account # / Quote #: Q74289 Job #: PO / AFE: LSD:		Oil and Gas Required Fields (client use) AFE/Cost Center: Major/Minor Code: Requisitioner: Location:		<table border="1"> <tr> <th rowspan="10">NUMBER OF CONTAINERS</th> <th colspan="12">Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below</th> <th rowspan="10">SAMPLES ON HOLD</th> <th rowspan="10">SUSPECTED HAZARD (see Special Instructions)</th> </tr> <tr> <th>SOLIDS-TOTALSUS-WP</th> <th>TURBIDITY-WP</th> <th>CO-DIS-WP</th> <th>P-T-COL-WP</th> <th>NH3-COL-WP</th> <th>CL2-TOTAL-WP (Monochloramine)</th> <th>ANIONS-NZNS-IC-AL-WP</th> <th>CHL-FLUORO-WP</th> <th>FECALS</th> <th>CONDUCTIVITY</th> <th></th> <th></th> </tr> <tr><td>3</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td></tr> <tr><td>4</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td></tr> <tr><td>4</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td></tr> <tr><td>4</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td></tr> <tr><td>4</td><td>R</td><td>R</td><td></td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td>R</td><td></td><td></td></tr> </table>		NUMBER OF CONTAINERS	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below												SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)	SOLIDS-TOTALSUS-WP	TURBIDITY-WP	CO-DIS-WP	P-T-COL-WP	NH3-COL-WP	CL2-TOTAL-WP (Monochloramine)	ANIONS-NZNS-IC-AL-WP	CHL-FLUORO-WP	FECALS	CONDUCTIVITY			3	R	R		R	R	R	R	R				3	R	R		R	R	R	R	R				4	R	R		R	R	R	R	R				3	R	R		R	R	R	R	R				3	R	R		R	R	R	R	R				3	R	R		R	R	R	R	R				4	R	R		R	R	R	R	R	R			4	R	R		R	R	R	R	R	R			4	R	R		R	R	R	R	R	R			4	R	R		R	R	R	R	R	R			4	R	R		R	R	R	R	R	R		
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ALS Lab Work Order # (lab use only): L2351375		ALS Contact: Connor Cattani		Sampler: TM																																																																																																																																																																
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type																																																																																																																																																																
1	S U	19-Sep-19	11:15	Water																																																																																																																																																																
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12	CS U	19-Sep-19	11:30	Water																																																																																																																																																																
Drinking Water (DW) Samples¹ (client use) Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)		SAMPLE CONDITION AS RECEIVED (lab use only) Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/> Cooling Initiated <input type="checkbox"/> INITIAL COOLER TEMPERATURES °C: 11.3 FINAL COOLER TEMPERATURES °C:																																																																																																																																																																
SHIPMENT RELEASE (client use) Released by: Date: Time:		INITIAL SHIPMENT RECEPTION (lab use only) Received by: Date: Time:		FINAL SHIPMENT RECEPTION (lab use only) Received by: Date: Time:																																																																																																																																																																

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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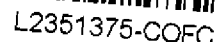
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

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Canada Toll Free: 1 800 668 9878



LOC Number: 17 -

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Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

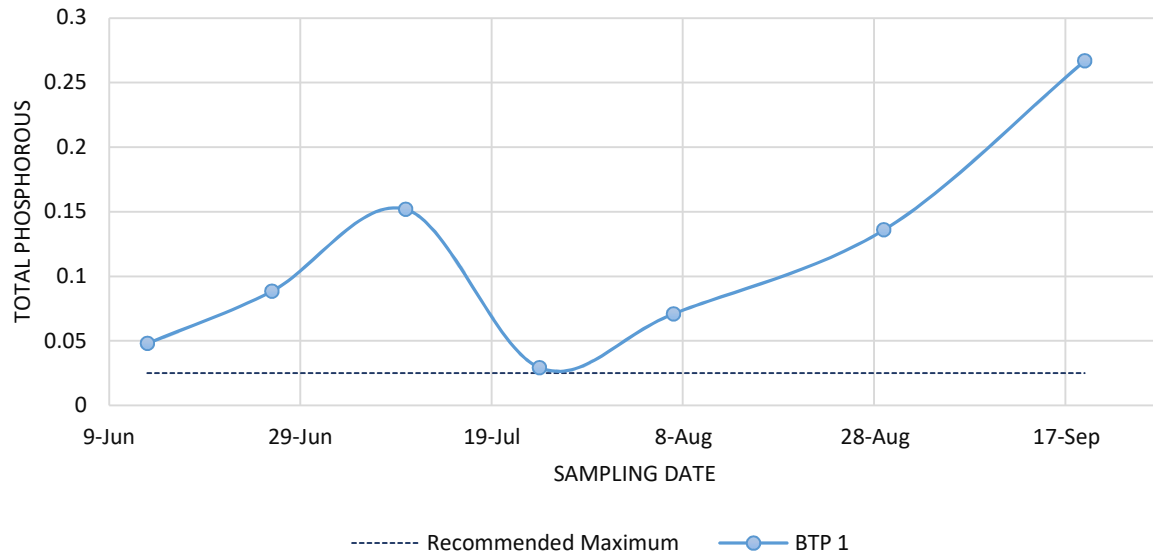
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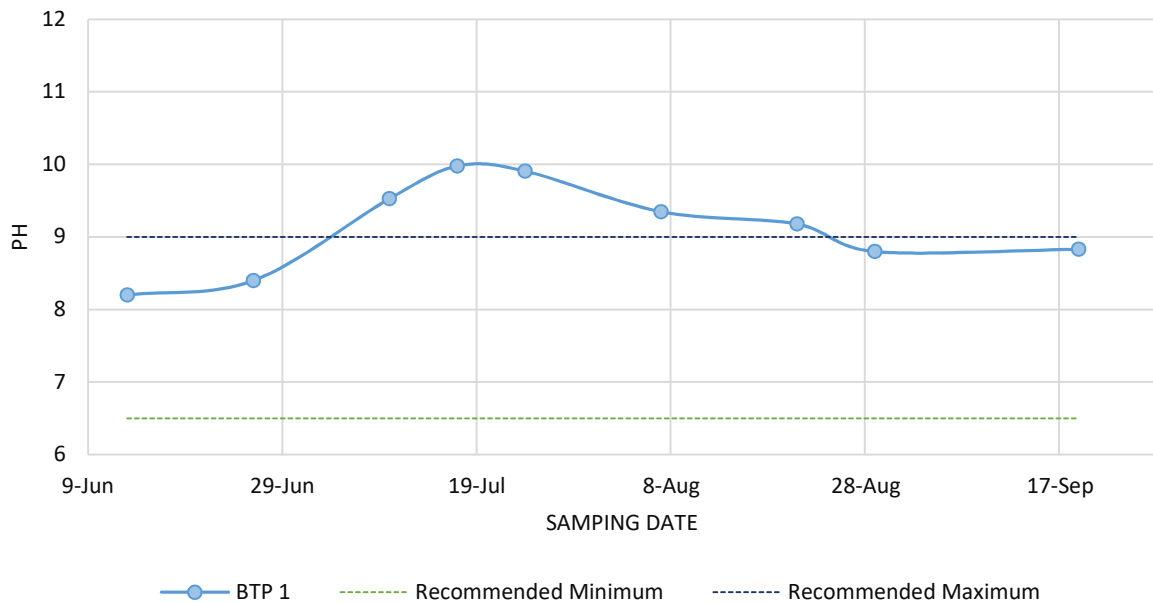
Appendix 4. Graphical Representation of Water Quality Data

By the Park

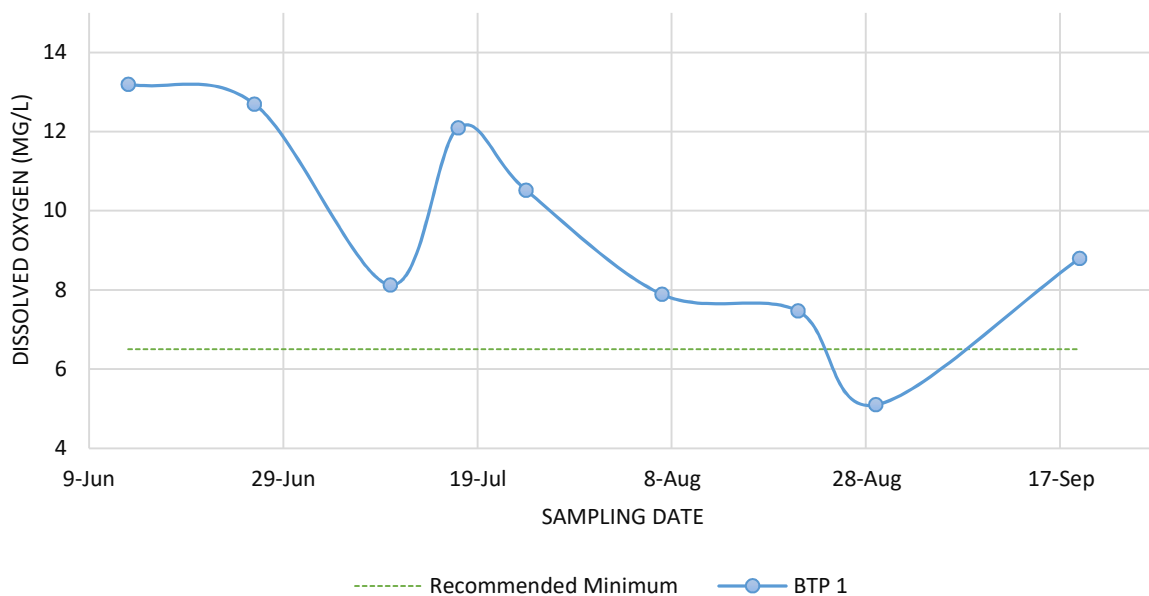
Total Phosphorous in By the Park



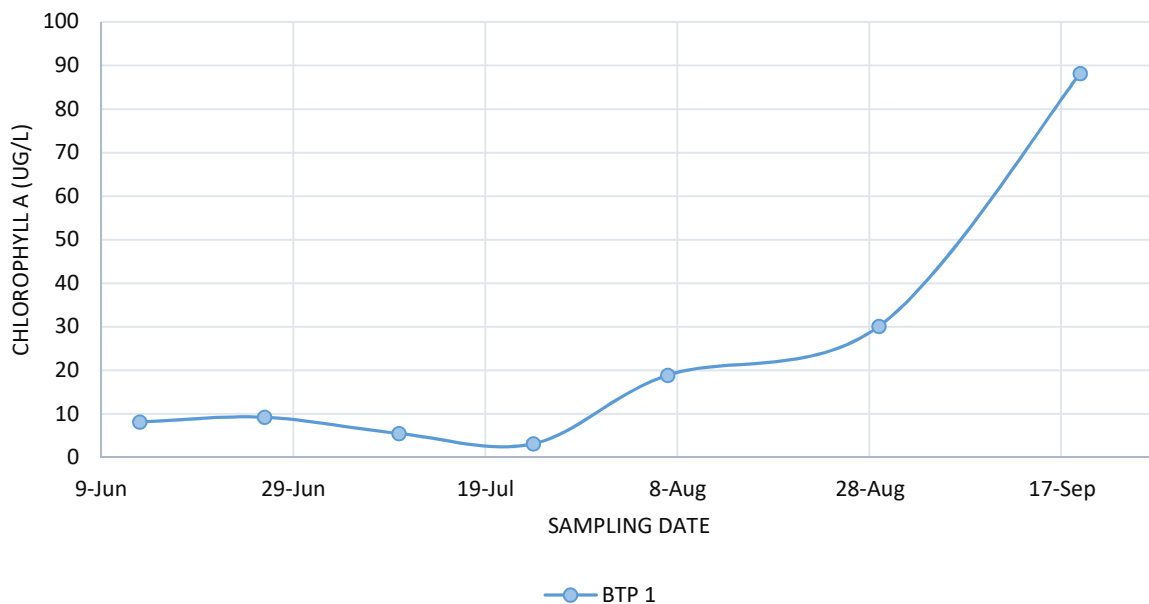
pH Levels in By the Park



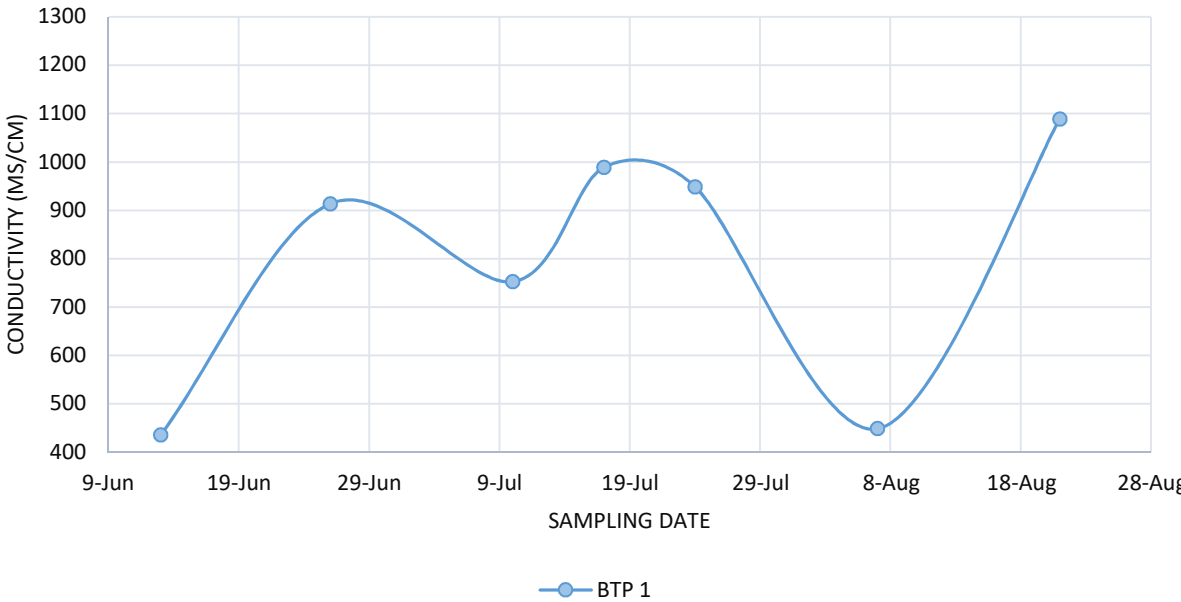
Dissolved Oxygen in By the Park



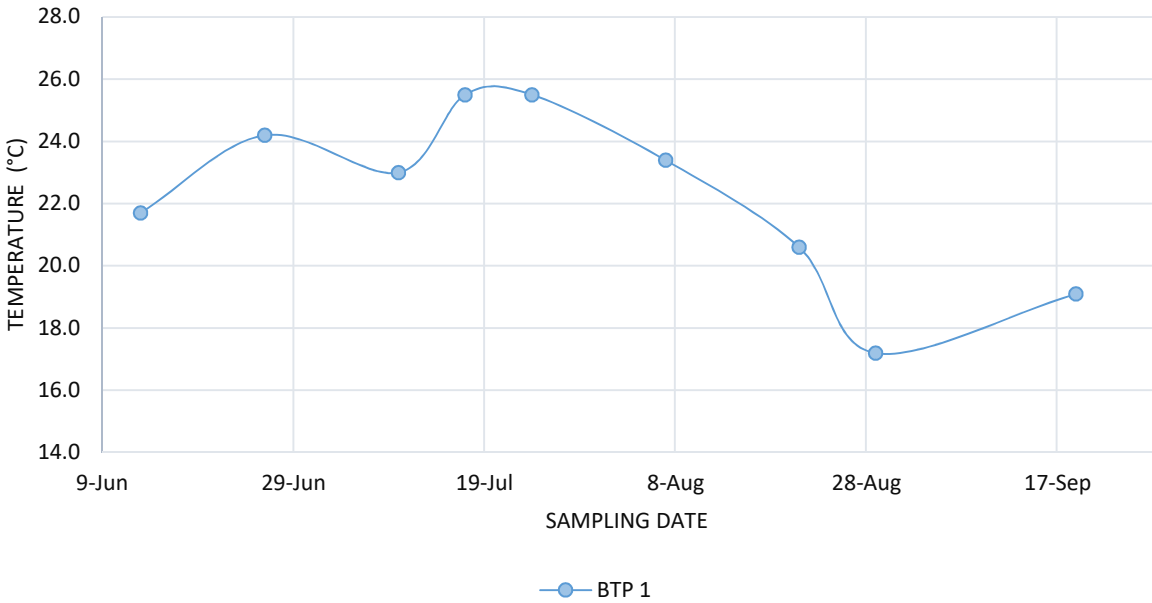
Chlorophyll-A in By the Park



Conductivity in By the Park

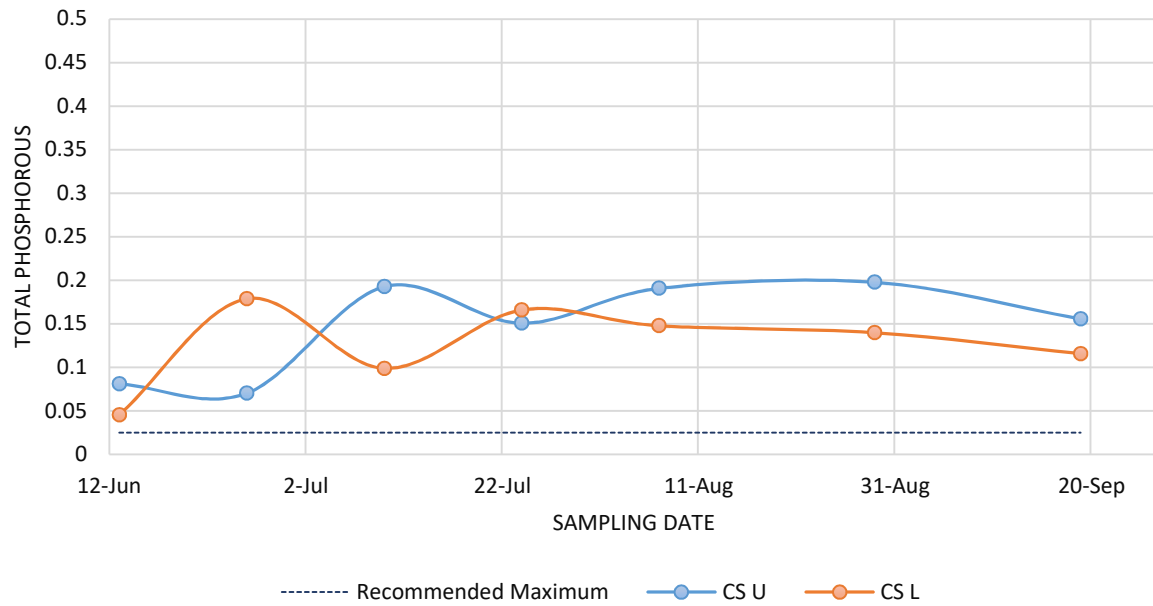


Water Temperature in By the Park

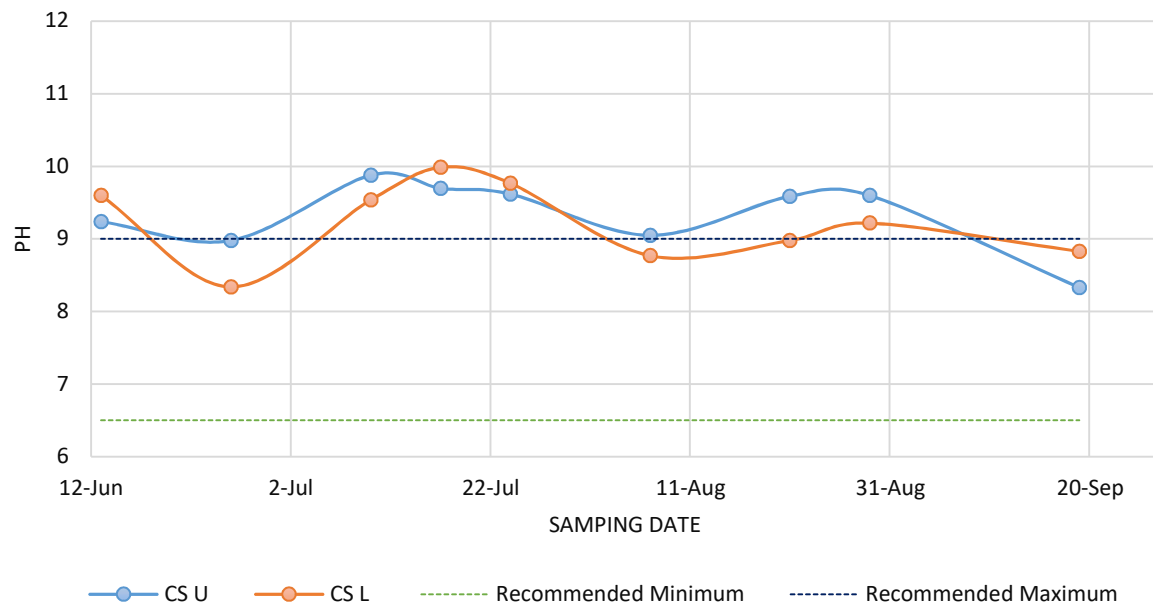


Countryside Crossing

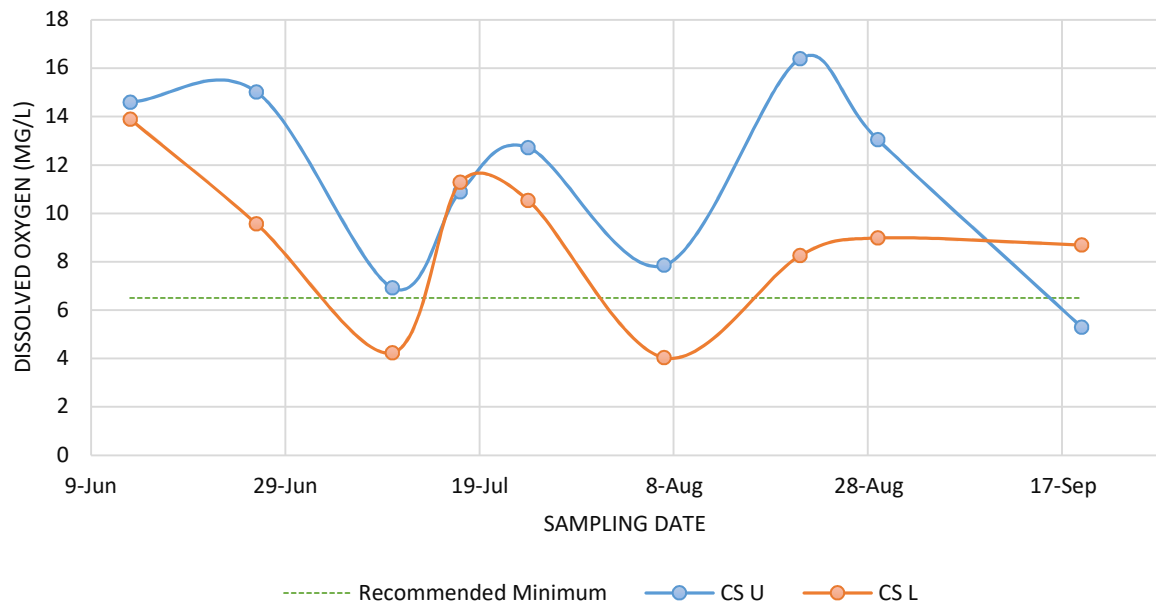
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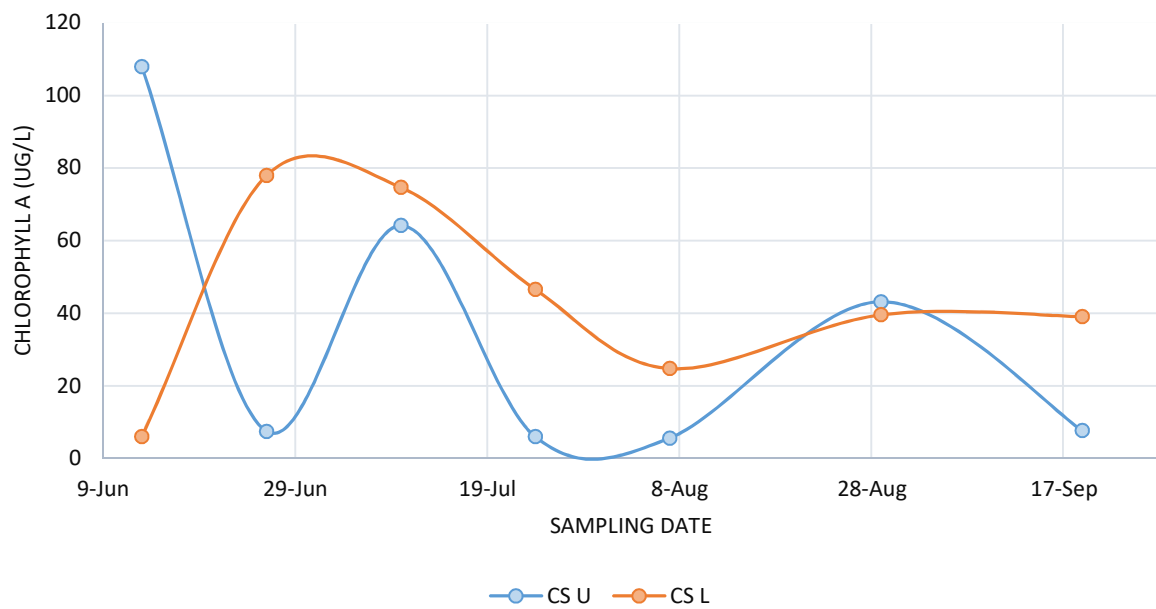
pH levels in Countryside Crossing



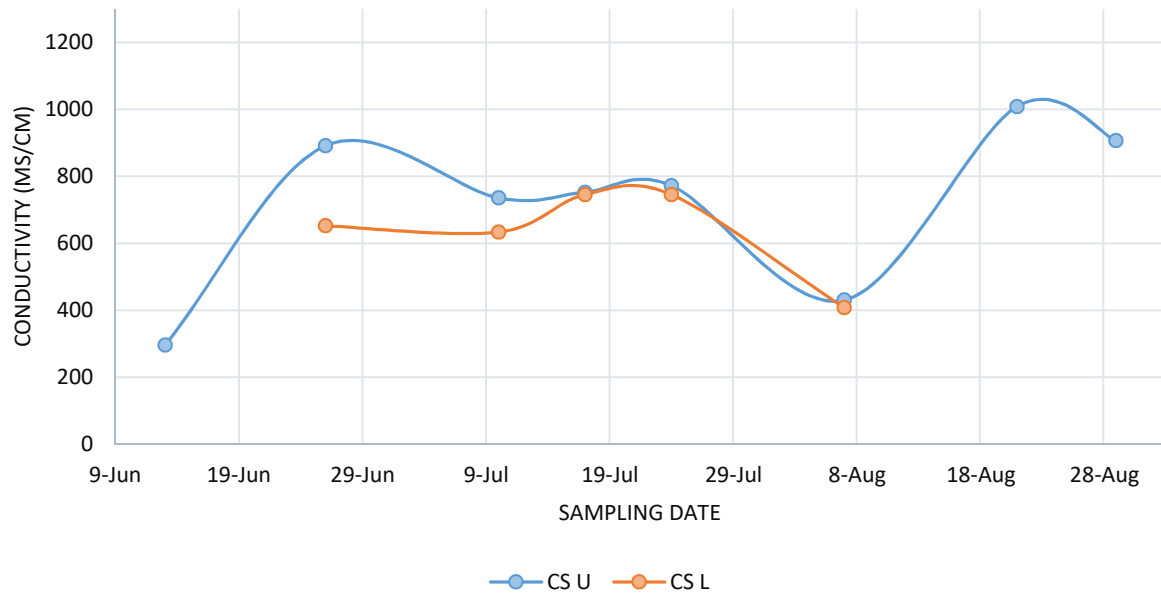
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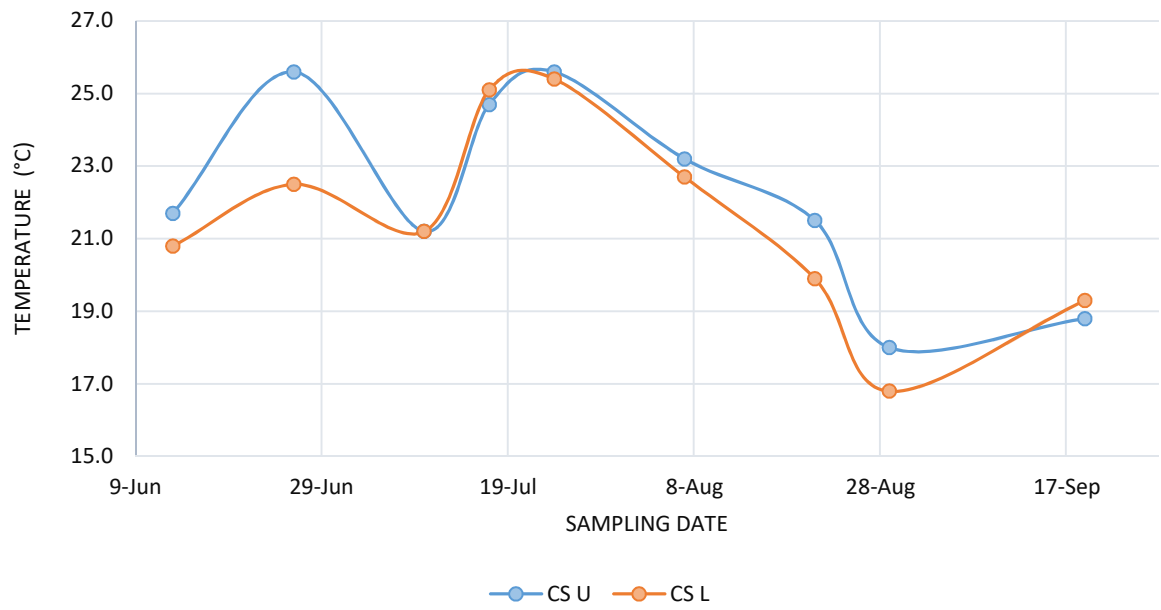
Chlorophyll-A in Countryside Crossing



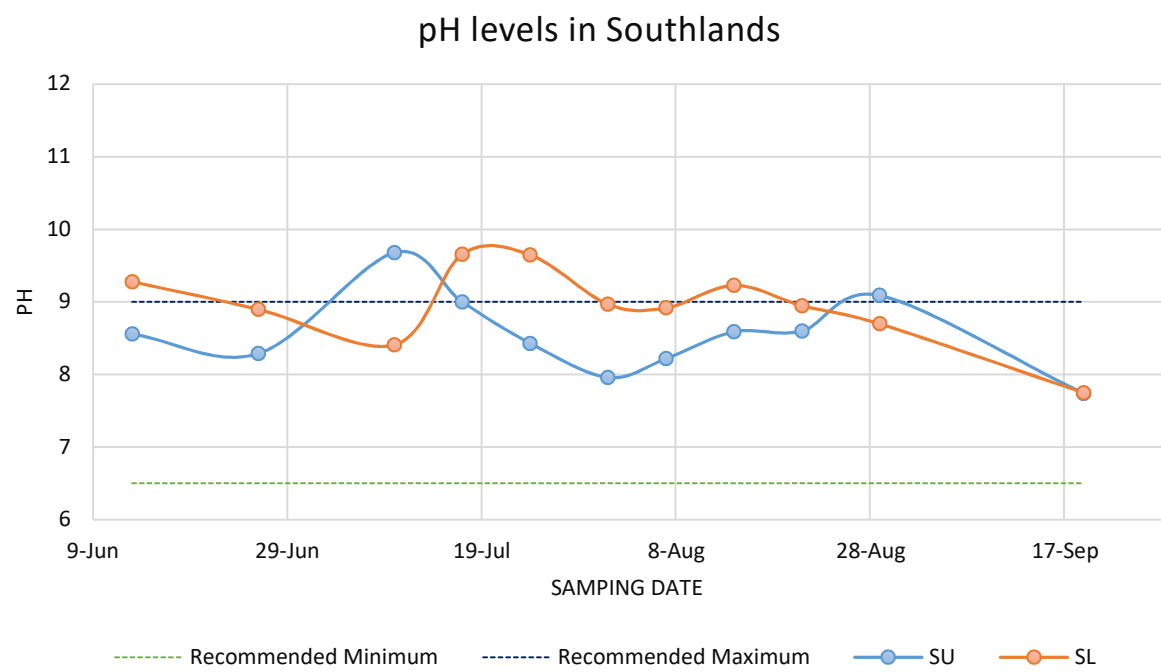
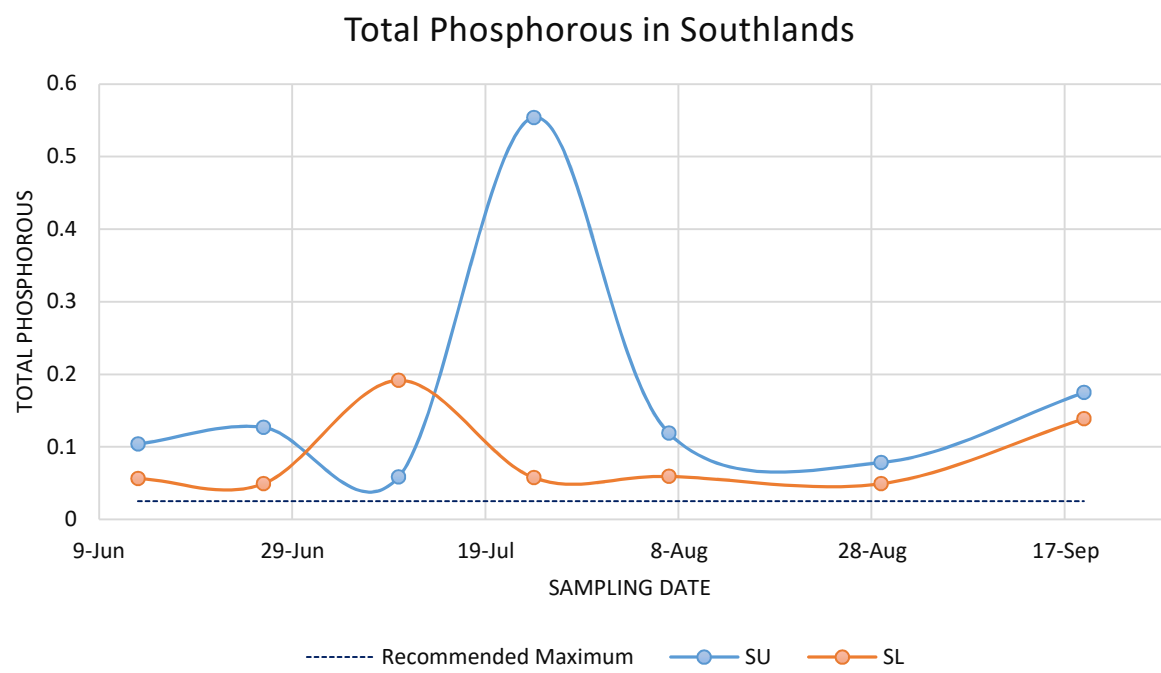
Conductivity in Countryside Crossing



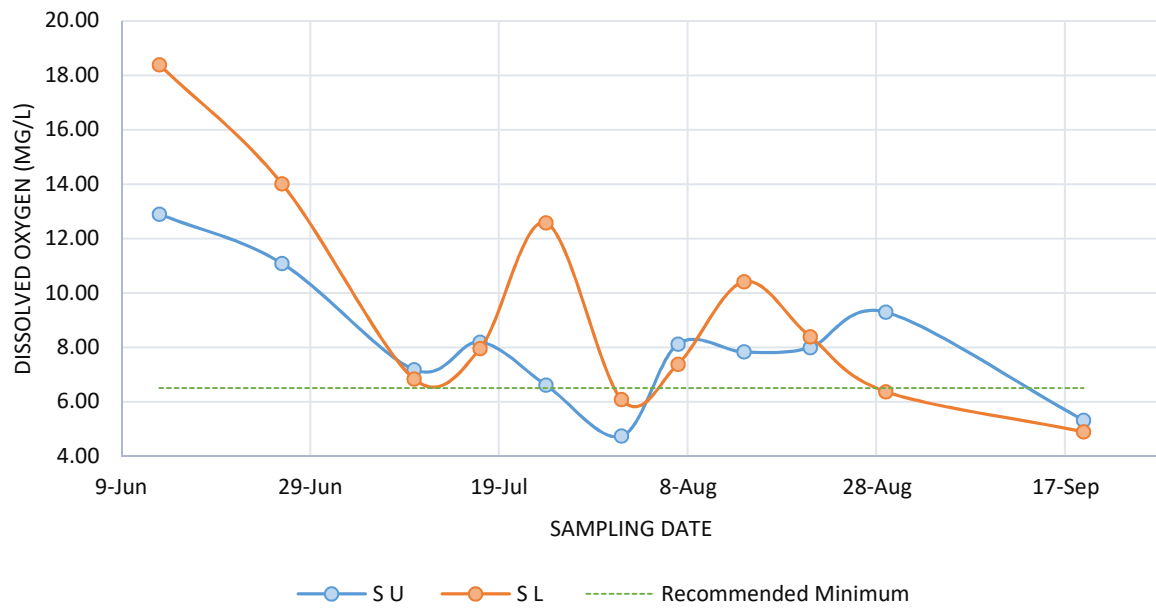
Water Temperature in Countryside



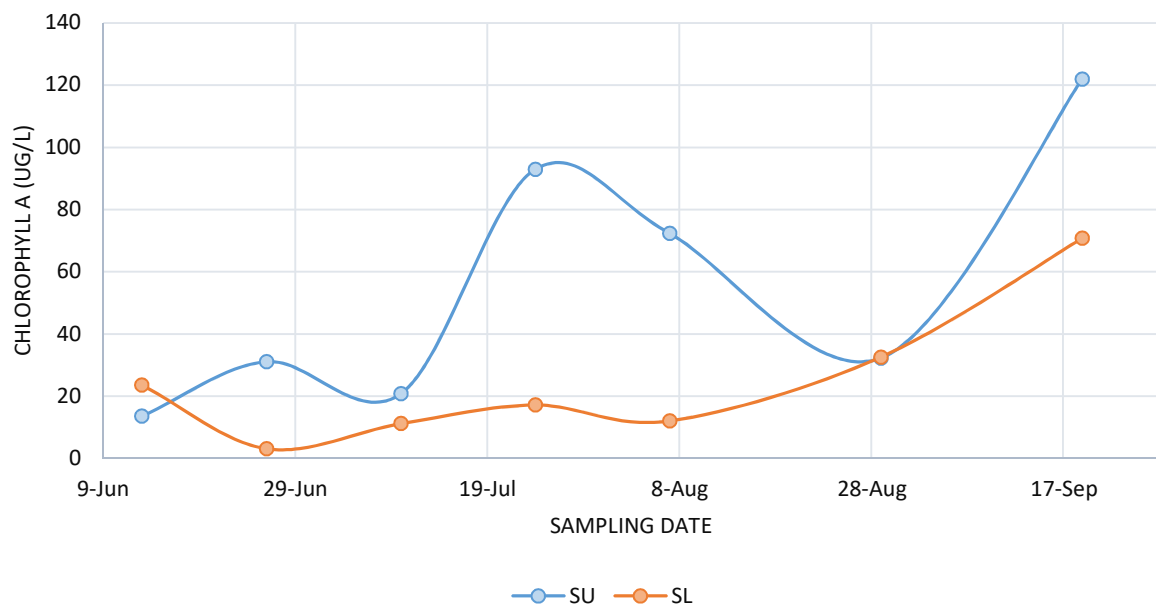
Southlands



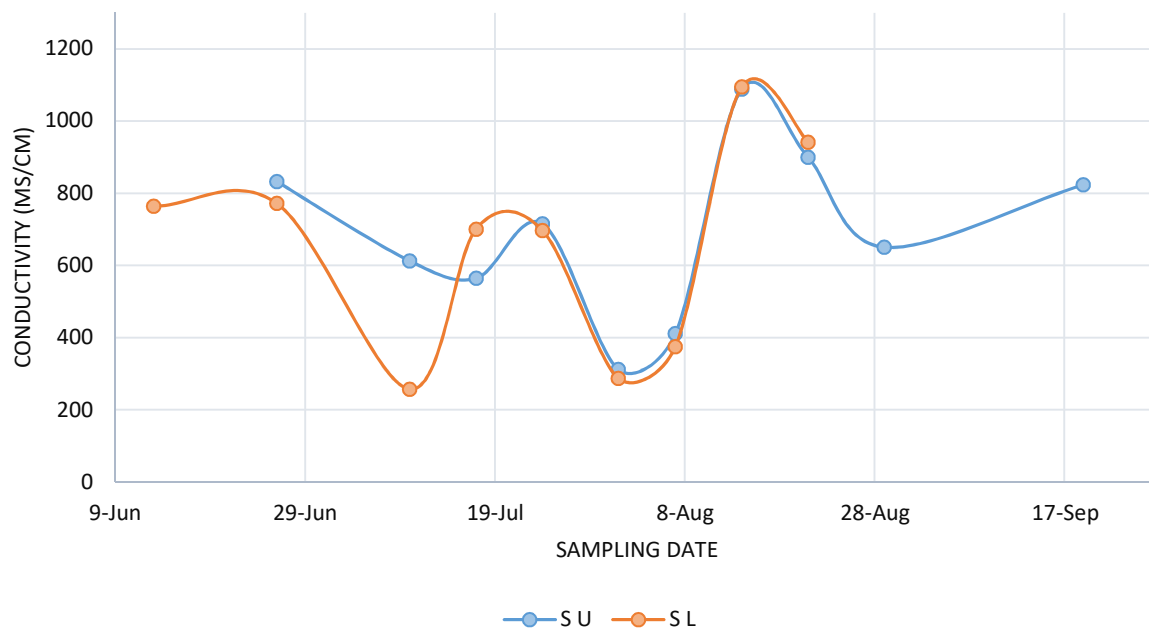
Dissolved Oxygen in Southlands



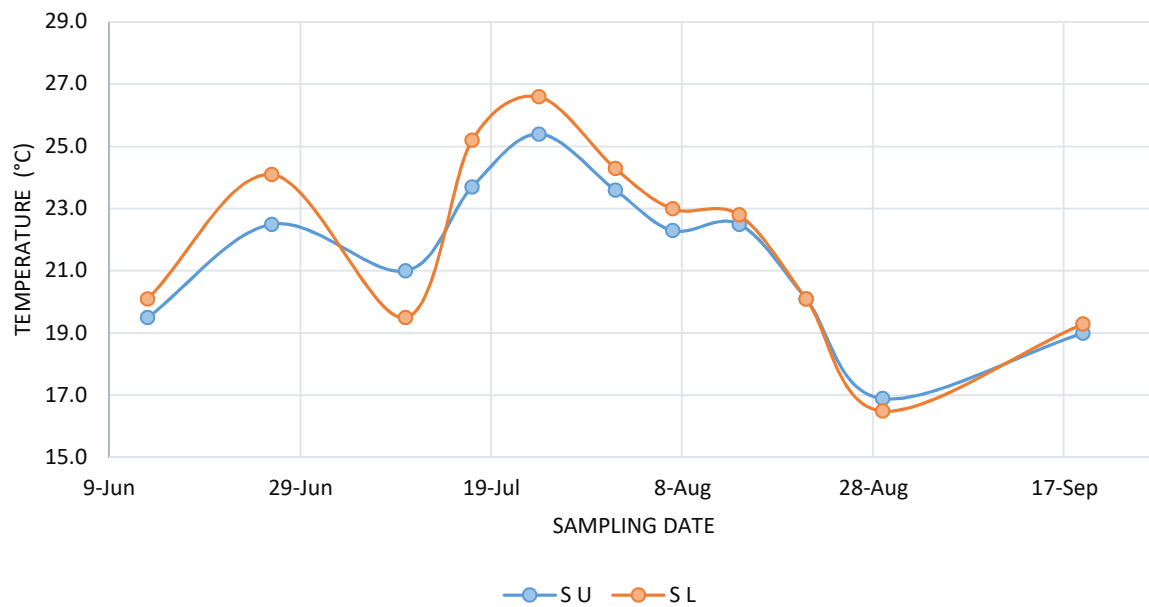
Chlorophyll A in Southlands



Conductivity in Southlands

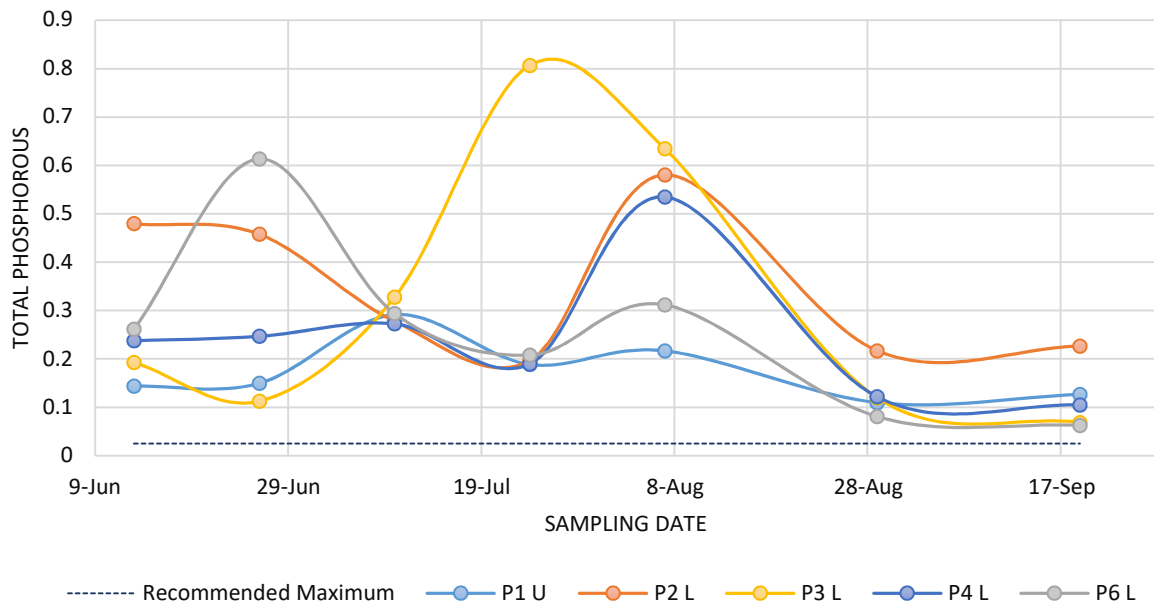


Water Temperature in Southlands

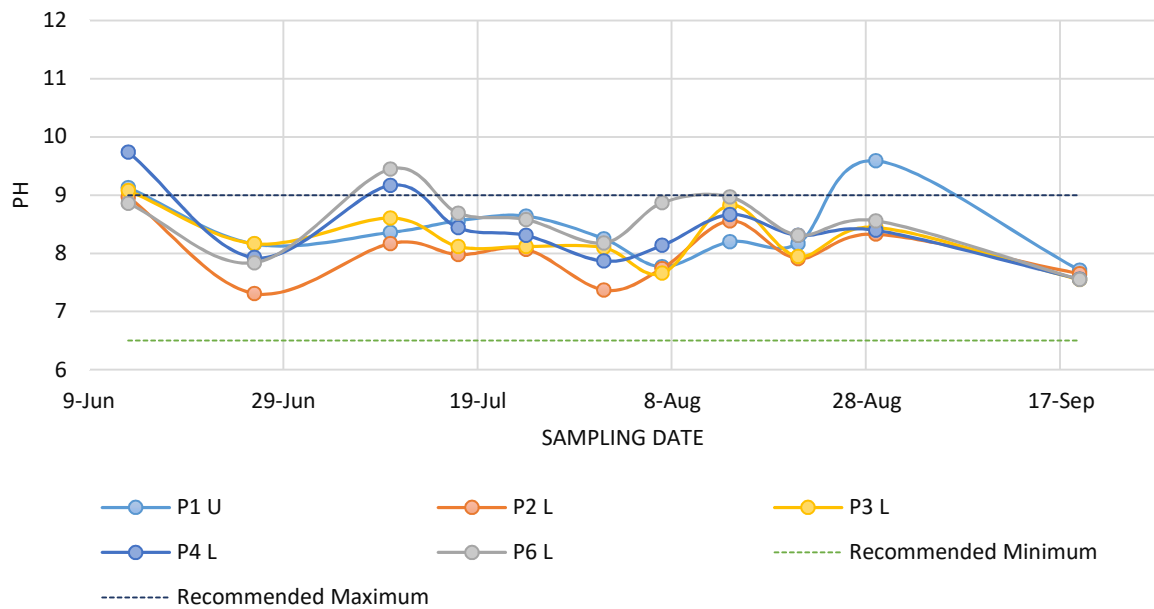


Eagle Creek

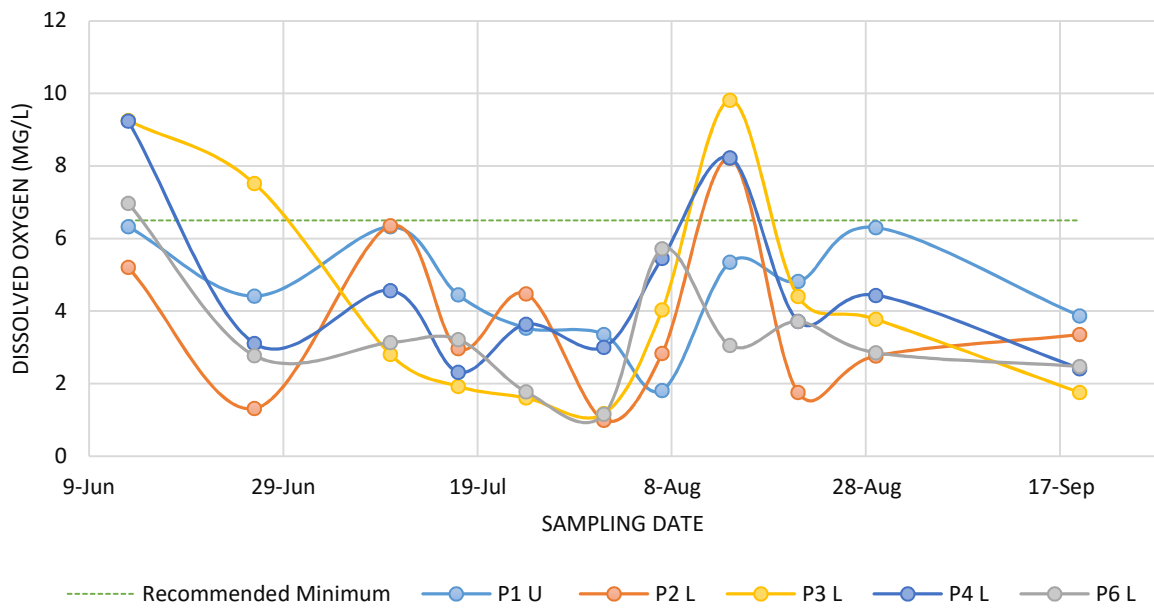
Total Phosphorous in Eagle Creek



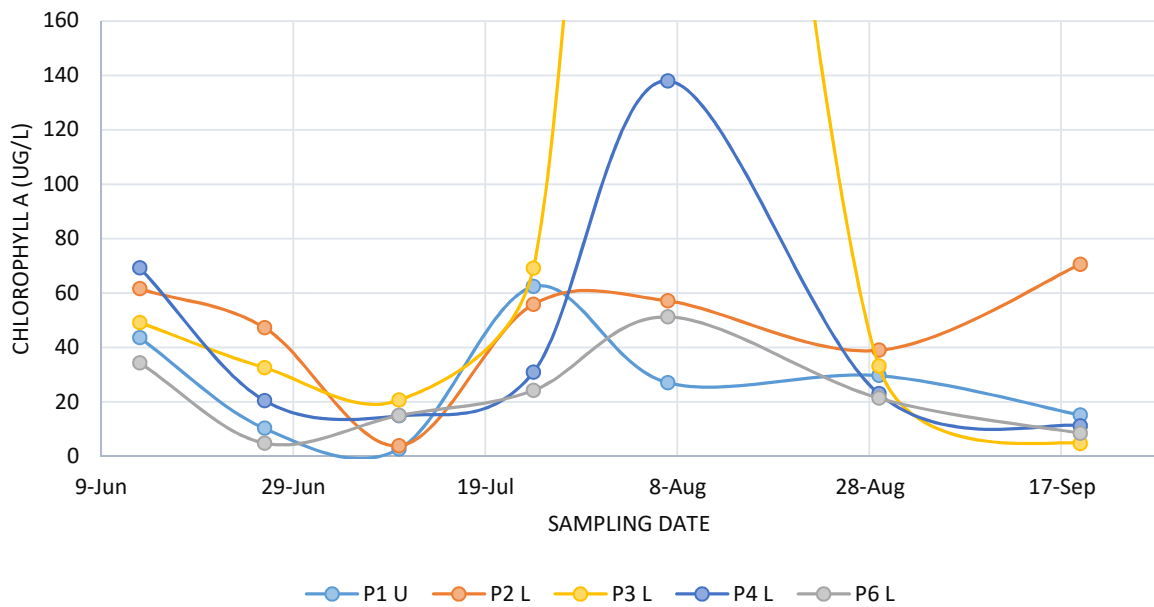
pH Levels in Eagle Creek



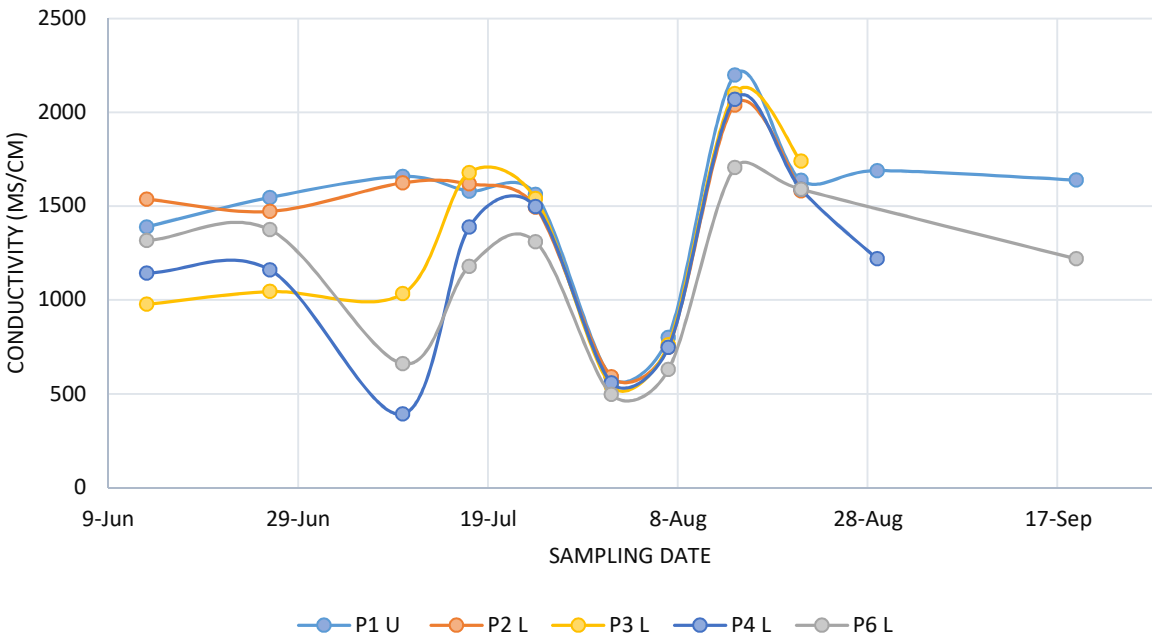
Dissolved Oxygen in Eagle Creek



Chlorophyll A in Eagle Creek



Conductivity in Eagle Creek



Water Temperature in Eagle Creek

