

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  $13^{th}$  2019 and September  $19^{th}$ , 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 (NO<sub>3</sub> + NO<sub>2</sub>), ammonia (NH<sub>3</sub>), 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 15<sup>th</sup>, 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  $(NO_3 + NO_2)$ , 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 <sup>th</sup>	June 27 <sup>th</sup>
June 26 <sup>th</sup>	July 19th
July 11 <sup>th</sup>	July 24 <sup>th</sup>
July 24 <sup>th</sup>	August 7th
August 7th	August 21st
August 29th	September 9 <sup>th</sup>
September 19th	October 19 <sup>th</sup>
Limited Parameter Sampling	
July 17 <sup>th</sup>	
August 1st	
August 14 <sup>th</sup>	
August 21st	

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)<sup>1</sup> as well as the Canadian Council for Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life (PAL)<sup>2</sup> 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.

<sup>&</sup>lt;sup>1</sup> (Manitoba Water Stewardship, 2011)

<sup>&</sup>lt;sup>2</sup> (CCME, 2011).



#### Table 2. Summary of Parameters

Parameter Name	Analysis Method	Units	MB Objectives /Guidelines	Type of Objective or Guideline	Description
рН	Portable Meter	units	6.5-9	Guideline for PAL <sup>3</sup>	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 (NO3 + NO2)	Lab Analysis	mg/L	10	Objective for Drinking Water <sup>4</sup>	Nutrient
Nitrate (NO₃)	Lab Analysis	mg/L	2.935	Guideline for PAL	Nutrient
Nitrite (NO <sub>2</sub> )	Lab Analysis	mg/L	0.06	Guideline for PAL	Nutrient
Ammonia (NH3)	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 (TCl)	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 <sup>6</sup>
Fecal Bacteria	Lab Analysis	CFU/10 0 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

<sup>&</sup>lt;sup>3</sup> PAL = Protection of Aquatic Life

<sup>&</sup>lt;sup>4</sup> Drinking water objectives are not directly applicable, however used for perspective

<sup>&</sup>lt;sup>5</sup> MB water quality states guideline as 13mg/L as N; however, it was confirmed by Province to be "13 mg/L as NO<sub>3</sub>", which is equivalent to 2.93 mg/L as N.

<sup>&</sup>lt;sup>6</sup> (Ohrel, R. L., & Register, K. M, 2006).



#### рΗ

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 recreation<sup>7</sup>.

#### **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 matter<sup>8</sup>. 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 growth<sup>9</sup>. 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.<sup>10</sup> There have also been studies that suggest that goose fecal matter can contribute to nutrient loading as it contains nitrogen and phosphorous<sup>11</sup>. 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.

<sup>&</sup>lt;sup>7</sup> (Health Canada, 2012)

<sup>&</sup>lt;sup>8</sup> (Ohrel, R. L., & Register, K. M, 2006).

<sup>&</sup>lt;sup>9</sup> Ibid

<sup>10</sup> Ibid

<sup>&</sup>lt;sup>11</sup> (Dessborn, L., Hessel, R., & Elmberg, J., 2016)



,	
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

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

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 facilities<sup>13</sup>. 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.

<sup>&</sup>lt;sup>12</sup> (CCME, 2004)

<sup>&</sup>lt;sup>13</sup> (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 ecosystem<sup>14</sup>. Removal of SAV can result in overload of nutrients such as nitrogen and phosphorous, making the pond system susceptible to algal blooms<sup>15</sup>. Nutrients and suspended sediments that were tangled within the plant leaves and roots may be also released<sup>16</sup>. 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.

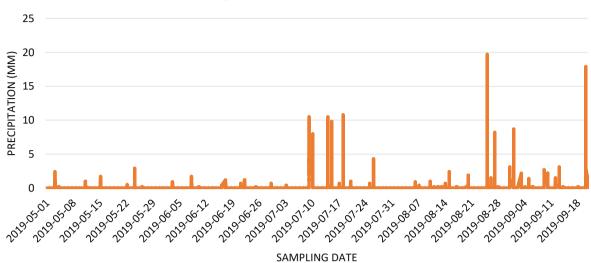
The months of May, June and the first week of July were relatively dry, with very few precipitation events, visible in Figure #1. This was reflected by lower water levels throughout the pond systems and low flow rates. In July there were numerous rain events, including significant rain events on July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

<sup>&</sup>lt;sup>14</sup> (Ohrel, R. L., & Register, K. M, 2006).

<sup>&</sup>lt;sup>15</sup> Ibid

<sup>16</sup> Ibid





### Precipitation in East St.Paul

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 4acre 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.



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,	

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

#### 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 17<sup>th</sup> 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 29<sup>th</sup>.

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 29<sup>th</sup> (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.

Parameter	Units	Guideline	By the Park (BTP 1)		
		Limit	Minimum	Maximum	Average
Water Temperature	°C		17.2	25.5	22.2
Conductivity	μS/cm		436	1089	797
рН	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

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

#### **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.<sup>17</sup> 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

<sup>&</sup>lt;sup>17</sup> (Dessborn, L., Hessel, R., & Elmberg, J., 2016)



construction activity in the neighborhood.<sup>18</sup> 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.<sup>19</sup>

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 19<sup>th</sup>) and twice in CS L (on July 10<sup>th</sup> and August 7<sup>th</sup>), 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 10<sup>th</sup> (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.

Parameter	Units	Guideline	Countryside l	Countryside Upper (CS U)		
		Limit	Minimum	Maximum	Average	
Water Temperature	°C		18.0	25.6	22.3	
Conductivity	μS/cm		297	1009	725	
рН	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	

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

<sup>&</sup>lt;sup>18</sup> (Ohrel, R. L., & Register, K. M, 2006).

<sup>&</sup>lt;sup>19</sup> (Wakelin, S., Elefsiniotis, P., & Wareham, D., 2003)



Parameter	Units	Guideline	Countryside Lower (CS L)		
		Limit	Minimum	Maximum	Average
Water Temperature	°C		16.8	25.4	21.5
Conductivity	μS/cm		409	990	734
рН	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
<b>Total Suspended Solids</b>	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

Table 7. Summary	of water	aualitv i	results ir	n Countrvside	Lower (CS L)
rubic ri continuity		90011091	00010011	1 country state	

#### 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 10<sup>th</sup>, 17<sup>th</sup> as well as August 28<sup>th</sup> (Appendix 2); pH in SL exceeded the upper pH limit on June 13<sup>th</sup>, July 17<sup>th</sup> and 24<sup>th</sup>, and August 14<sup>th</sup> (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 fellow below the PAL guideline (6.5 mg/L) on August 1<sup>st</sup> and September 19<sup>th</sup> (Appendix 2) in SU, and on August 1<sup>st</sup>, 29<sup>th</sup> and September 19<sup>th</sup> 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.

Parameter	Units	Guideline	Southlands Upper (S U)		
		Limit	Minimum	Maximum	Average
Water Temperature	°C		16.9	25.4	21.5
Conductivity	μS/cm		312	1089	691
рН	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
<b>Total Suspended Solids</b>	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 8. Summary of water quality results in Southlands Upper.

Table 9. Summ	ary of water a	quality results	in Southlands Lower	- (S L)
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Parameter	Units	Guideline	Southlands Low	Southlands Lower (S L)		
		Limit	Minimum	Maximum	Average	
Water Temperature	°C		16.5	26.6	22.0	
Conductivity	μS/cm		257	1095	654	
рН	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	
<b>Total Suspended Solids</b>	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).

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	

#### Table 10. Summary of Visual Observations in Eagle Creek



#### 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 10<sup>th</sup>, ranging from 9.08 to 9.74) and Pond 1 also exceeded the guideline on August 29<sup>th</sup> (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 14<sup>th</sup> (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.<sup>20</sup> 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 10<sup>th</sup> 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 9<sup>th</sup> and 10<sup>th</sup> 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 7<sup>th</sup> (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.

<sup>&</sup>lt;sup>20</sup> 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 #11<sup>21</sup>.

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).

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

Table 11. Pond Treatment Dates by Clean Water Pro

Parameter	Units	Guideline	Eagle Creek Por	nd 1 (P1 U)	
		Limit	Minimum	Maximum	Average
Water Temperature	°C		16.7	25.0	20.8
Conductivity	μS/cm		588	2200	1482
рН	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
<b>Total Suspended Solids</b>	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

<sup>&</sup>lt;sup>21</sup> Products reportedly used were Muck-Away, Pond Clear, Ecoboost and Pond Dye.



Parameter	Units	Guideline	Eagle Creek Pon	d 2 (P2 L)	
		Limit	Minimum	Maximum	Average
Water Temperature	°C		15.6	25.4	20.0
Conductivity	μS/cm		591	2040	1412
рН	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
<b>Total Suspended Solids</b>	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 13. Summary of water quality results in Eagle Creek Pond 2 (P2 L)

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

Parameter	Units	Guideline	Eagle Creek Pon	d 3 (P3 L)	
		Limit	Minimum	Maximum	Average
Water Temperature	°C		16.0	23.5	19.7
Conductivity	μS/cm		542	2100	1269
рН	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			

Parameter	Units	Guideline	Eagle Creek Pon	d 4 (P4 L)	
		Limit	Minimum	Maximum	Average
Water Temperature	°C		16.3	25.6	20.6
Conductivity	μS/cm		393	2070	1178
рН	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
<b>Total Suspended Solids</b>	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 15.
 Summary of water quality results in Eagle Creek Pond 4 (P4 L)

Table 16. Summary	∕ of water	aualitv	results in Eaale	Creek Pond 6 (	(P6 L)
		900101109	results in Eagle	oreen rona o j	102)

Parameter	Units	Guideline	Eagle Creek Pon	d 6 (P6 L)	
		Limit	Minimum	Maximum	Average
Water Temperature	°C		16.0	24.2	19.5
Conductivity	μS/cm		498	1706	1149
рН	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
<b>Total Suspended Solids</b>	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 into 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.<sup>22</sup> 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

<sup>&</sup>lt;sup>22</sup> 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.



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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	CONDUCTIVITY	pН	DO	Water	TSS	TURBIDITY	Nitrate in	Nitrate +	Nitrite	TOTAL	AMMONIA	TOTAL	DO	CHLORO-	FECAL
			TEMP			(field)	Temp			Water by IC	Nitrite as N	in Water by IC	PHOSPHOROUS	as N	CHLORINE	(lab)	PHYLL A	
			(°C)	(µS/cm)		(mg/L)	(°C)	(mg/L)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(ug/L)	(MPN/100ml)
By the Pa	rk																	
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	
Countrys	ide																	
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
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	-		-	-		-			-				2	-				

LEGEND cells = <indicated value

LOCATION	DATE	TIME	AIR	CONDUCTIVITY	рН	DO	Water	TSS	TURBIDITY	Nitrate in	Nitrate +	Nitrite	TOTAL	AMMONIA	TOTAL	DO	CHLORO-	FECAL
			TEMP			(field)	Temp			Water by IC	Nitrite as N	in Water by IC	PHOSPHOROUS	as N	CHLORINE	(lab)	PHYLL A	
			(°C)	(µS/cm)		(mg/L)	(°C)	(mg/L)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(ug/L)	(MPN/100ml)
Southlan	ds																	
SU	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	
SL	8/14/2019	n.d.	n.d.	1095	9.23	10.42	22.8											
SL	8/21/2019	11:15	16	942	8.95	8.40	20.1											
SL	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
SL	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	CONDUCTIVITY	pН	DO	Water	TSS	TURBIDITY	Nitrate in	Nitrate +	Nitrite	TOTAL	AMMONIA	TOTAL	DO	CHLORO-	FECAL
			TEMP			(field)	Temp			Water by IC	Nitrite as N	in Water by IC	PHOSPHOROUS	as N	CHLORINE	(lab)	PHYLL A	
			(°C)	(µS/cm)		(mg/L)	(°C)	(mg/L)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(ug/L)	(MPN/100ml)
Eagle Cre	ek																	
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				0.110	0.050	0.017	0.050			07.4	
P1 U 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 P1 U	8/14/2019 8/21/2019	11:38 10:37	n.d.	2200 1639	8.20 8.17	5.35 4.82	21.8 19.0											I
P1 U P1 U	8/21/2019 8/29/2019	9:05	15 14	1690	9.59	6.31	19.0	10.1	4.9	0.100	0.110	0.050	0.110	0.141			29.7	548
P1 U	9/19/2019	10:19	14	1640	7.71	3.87	18.6	11.1	7.7	0.100	0.110	0.050	0.110	0.141			15.2	172
MINIMUM	5/15/2015	10.15	13	588	7.71	1.82	16.7	10.1	3.7	0.100	0.110	0.050	0.127	0.202	0.010	3.30	2.7	172
MEDIAN			14	1581	8.25	4.45	19.7	15.7	6.1	0.100	0.110	0.050	0.150	0.049	0.010	3.30	27.1	548
MAXIMUM	1		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 MAXIMUM			19 25	1538 2040	7.98 8.97	2.97 8.22	19.4 25.4	25.1 40.0	4.5	0.100	0.110	0.050 0.079	0.278	0.108	0.015		55.9 70.6	
AVERAGE			19	1412	8.97	3.66	20.0	27.9	9.6	0.301	0.320	0.079	0.348	0.171	0.020		47.9	
AVERAGE	<u> </u>		19	1412	8.01	3.00	20.0	27.5	9.0	0.301	0.320	0.034	0.348	0.111	0.015		47.5	
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	1040	8.61	2.81	19.2	48.7	37.5	1.170	1.240	0.074	0.328	0.144	0.020	/120	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	<b>↓</b>		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																		

LEGEND cells = <indicated value

LOCATION	DATE	TIME	AIR	CONDUCTIVITY	pН	DO	Water	TSS	TURBIDITY	Nitrate in	Nitrate +	Nitrite	TOTAL	AMMONIA	TOTAL	DO	CHLORO-	FECAL
			TEMP			(field)	Temp			Water by IC	Nitrite as N	in Water by IC	PHOSPHOROUS	as N	CHLORINE	(lab)	PHYLL A	i
			(°C)	(µS/cm)		(mg/L)	(°C)	(mg/L)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(ug/L)	(MPN/100ml)
Eagle Cre	ek		-						-								-	
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											1
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	í – – – – – – – – – – – – – – – – – – –
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	í – – – – – – – – – – – – – – – – – – –
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											í – – – – – – – – – – – – – – – – – – –
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
P6 L	9/19/2019	10:55	15	1220	7.55	2.48	19.1	29.6	5.4	0.040	0.070	0.020	0.063	0.039			8.48	152
MINIMUM			15	498	7.55	1.16	16.0	6.0	2.0	0.040	0.070	0.020	0.063	0.024	0.010		4.8	114
MEDIAN			20.5	1266	8.58	3.06	19.1	32.1	14.0	0.100	0.110	0.050	0.262	0.072	0.015		21.4	133
MAXIMUM			25	1706	9.45	6.98	24.2	210.0	107.0	0.100	0.113	0.050	0.614	0.141	0.020		51.3	152
AVERAGE			20	1149	8.53	3.35	19.5	53.4	25.5	0.081	0.099	0.038	0.262	0.075	0.015		22.8	133
LEGEND			•	•				•	•				•					·

cells = <indicated value

## **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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L2291959 CONTD.... PAGE 2 of 7 Version: FINAL

## 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		0.020	mg/L		14-JUN-19	R4673753
Nitrate+Nitrite	0.070		0.070				
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	\$0.010		0.010				
Chlorophyll a by fluorometry							
Chlorophyll a	4.09		0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
Miscellaneous Parameters							
Ammonia, Total (as N)	0.072		0.010	mg/L		17-JUN-19	R4672883
Chlorine, Total	0.010	CLH	0.010	mg/L		15-JUN-19	R4672207
Phosphorus (P)-Total	0.0524		0.0030	mg/L		18-JUN-19	R4672439
Total Suspended Solids	7.7		2.0	mg/L		20-JUN-19	R4681118
Turbidity	4.00		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	0.000		0.000				D 4070750
Nitrate (as N) Nitrate+Nitrite	<0.020		0.020	mg/L		14-JUN-19	R4673753
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-JUN-19	
Nitrite in Water by IC	0.070		0.070				
Nitrite (as N)	<0.010		0.010	mg/L		14-JUN-19	R4673753
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	51.6		0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
Miscellaneous Parameters							D / 000000
Ammonia, Total (as N)	0.026		0.010	mg/L		21-JUN-19	R4682037
Chlorine, Total	< 0.010	CLH	0.010	mg/L		15-JUN-19	R4672207
Phosphorus (P)-Total	0.200		0.0030	mg/L		18-JUN-19	R4672439
Total Suspended Solids	44.8		2.0	mg/L		20-JUN-19	R4681118
Turbidity	53.8		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 in water by IC Nitrate (as N)	0.035		0.020	mg/L		14-JUN-19	R4673753
Nitrate+Nitrite	0.000		0.020				
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-JUN-19	
Nitrite in Water by IC							
Nitrite (as N)	0.013		0.010	mg/L		14-JUN-19	R4673753
Chlorophyll a							
Chlorophyll a by fluorometry	40.0		0.40			44 11 10 40	D 407550 4
Chlorophyll a Miscellaneous Parameters	19.2		0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
	0.66		0.10	ma/l		21-JUN-19	D4692027
Ammonia, Total (as N) Chlorine, Total	0.66	CLH	0.10	mg/L			R4682037
	0.010		0.010	mg/L		15-JUN-19	R4672207

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

L2291959 CONTD.... PAGE 3 of 7 Version: FINAL

## 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			0.075			40 11 11 40	
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	\$0.010		0.010	,			11-010100
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		0.010	mg/L		17-JUN-19	R4672883
Chlorine, Total	0.020	CLH	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	0.020		0.020				
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	100		0.20	ug/L		1- 3014-19	114070004
Ammonia, Total (as N)	0.024		0.010	mg/L		21-JUN-19	R4682037
Chlorine, Total	0.024	CLH	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						44 11 11 12	Diaman
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	\$0.070		0.070				
Nitrite (as N)	<0.020	DLM	0.020	mg/L		14-JUN-19	R4673753

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

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## 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	6.06		0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
Miscellaneous Parameters	0.00		0.10	ug/L	14-5011-15	14-3011-13	14073304
Ammonia, Total (as N)	0.017		0.010	mg/L		17-JUN-19	R4672883
Chlorine, Total	0.050	CLH	0.010	mg/L		15-JUN-19	R4672207
Oxygen, Dissolved	15.0	RWHS	0.10	mg/L		14-JUN-19	R4672730
Phosphorus (P)-Total	0.0456		0.0030	mg/L		18-JUN-19	R4672439
Total Suspended Solids	4.9		2.0	mg/L		20-JUN-19	R4681118
Turbidity	1.59		0.10	NTU		14-JUN-19	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)	<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	13.6		0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
Miscellaneous Parameters	10.0		0.10	ug/L		14 0011 10	114070004
Ammonia, Total (as N)	0.034		0.010	mg/L		17-JUN-19	R4672883
Chlorine, Total	0.060	CLH	0.010	mg/L		15-JUN-19	R4672207
Phosphorus (P)-Total	0.104		0.0030	mg/L		18-JUN-19	R4672439
Total Suspended Solids	17.6		2.0	mg/L		20-JUN-19	R4681118
Turbidity	4.53		0.10	NTU		14-JUN-19	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)	<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)	-0.000	DLM	0.020	ma/l		14-JUN-19	D4670750
Chlorophyll a	<0.020		0.020	mg/L		14-3011-19	R4673753
Chlorophyll a by fluorometry							
Chlorophyll a	23.6		0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
Miscellaneous Parameters				-			
Ammonia, Total (as N)	0.016		0.010	mg/L		17-JUN-19	R4672883
Chlorine, Total	0.050	CLH	0.010	mg/L		15-JUN-19	R4672207
Phosphorus (P)-Total	0.0565		0.0030	mg/L		18-JUN-19	R4672439
Total Suspended Solids	14.1		2.0	mg/L		20-JUN-19	R4681118
Turbidity	3.28		0.10	NTU		14-JUN-19	R4672328

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

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### ALS ENVIRONMENTAL ANALYTICAL REPORT

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	<0.070		0.070	iiig/ L		13 3011 13	
Nitrite (as N)	<0.020	DLM	0.020	mg/L		14-JUN-19	R4673753
Chlorophyll a							
Chlorophyll a by fluorometry	0.45		0.40				D 107550 1
Chlorophyll a Miscellaneous Parameters	8.15		0.10	ug/L	14-JUN-19	14-JUN-19	R4675504
Ammonia, Total (as N)	0.021		0.010	mg/L		21-JUN-19	R4682037
Chlorine, Total	0.021	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

## **Reference Information**

### Sample Parameter Qualifier Key:

Qualifier D	escription		
	ree/Total Chlorine s issipates rapidly int		orine tests is 15 minutes; field testing is recommended. Chlorine
DLM D	etection Limit Adju	sted due to sample matrix effects (e.g. ch	emical interference, colour, turbidity).
MS-B M	latrix Spike recover	ry could not be accurately calculated due	to high analyte background in sample.
RWHS S	amples Received V	With Headspace	
est Method Refe	erences:		
ALS Test Code	Matrix	Test Description	Method Reference**
CHL/A-ACET-FLUC WP	DRO- Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
			rophyll a is determined by a 90 % acetone extraction followed with ot subject to interferences from chlorophyll b.
CL2-TOTAL-WP	Water	Chlorine, Total	APHA 4500-CI Chlorine(Residual) G (mod)
			thod. The recommended hold time for these tests is 15 minutes; field organic matter, if present, and dissipates rapidly into headspace.
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only	y) APHA 2510
Qualitative analysis	of conductivity wh	ere required during preparation of other te	əst eg. IC, TDS, TSS, etc
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water s nitroprusside and m			nd phenol. The intensity is amplified by the addition of sodium
NO2+NO3-CALC-W	VP Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions ar	e 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 ar	e analyzed by Ion (	Chromatography with conductivity and/or	UV detection.
O2-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C
manganic hydroxide	e is formed. Addition to the other the second se	on of sulfuric acid dissolves the manganic original DO content. The iodide is then tit	precipitate of manganous hydroxide. In the presence of oxygen, brown hydroxide, yielding manganic sulfate which reacts with iodide, releasing rated with a standard solution of thiosulphate. Results for
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is car after persulphate di	ried out using proc	edures adapted from APHA METHOD 45	00-P "Phosphorus". Total Phosphorus is determined colourmetrically
SOLIDS-TOTSUS-\	WP Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended so	olids in aquesous m	natrices is determined gravimetrically after	r drying the residue at 103 105°C.
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueou	s matrices is deter	mined by the nephelometric method.	
* ALS test methods	may incorporate m	odifications from specified reference met	hods to improve performance.
The last two letters	of the above test c	code(s) indicate the laboratory that perform	ned analytical analysis for that test. Refer to the list below:
Laboratory Definit	ion Code Lab	oratory Location	
WP	ALS	ENVIRONMENTAL - WINNIPEG, MANIT	TOBA, 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 wwt - 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.



			Workorder:	L229195	9	Report Date: 2	24-JUN-19	Pa	ige 1 of 4
Oliciti.	3021 Bird	st St. Paul shill Road Paul MB R2E	1A7						
Contact:	Leanne S	hewchuk							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CHL/A-ACET-FLU	ORO-WP	Water							
Batch R4	4675504								
WG3082093-2 Chlorophyll a	LCS			101.2		%		80-120	19-JUN-19
WG3082093-1 Chlorophyll a	MB			<0.10		ug/L		0.1	14-JUN-19
CL2-TOTAL-WP		Water							
Batch R4 WG3080082-3	4672207 DUP		L2291959-1						
Chlorine, Total			0.010	0.010		mg/L	0.0	15	15-JUN-19
WG3080082-2 Chlorine, Total	LCS			100.0		%		75-125	15-JUN-19
WG3080082-1 Chlorine, Total	MB			<0.010		mg/L		0.01	15-JUN-19
NH3-COL-WP		Water							
Batch R4	4672883								
WG3080831-10 Ammonia, Tota				99.5		%		85-115	17-JUN-19
WG3080831-9 Ammonia, Tota	MB al (as N)			<0.010		mg/L		0.01	17-JUN-19
Batch R	4682037								
<b>WG3085326-14</b> Ammonia, Tota				100.0		%		85-115	21-JUN-19
<b>WG3085326-13</b> Ammonia, Tota				<0.010		mg/L		0.01	21-JUN-19
NO2-IC-N-WP		Water							
Batch R4	4673753								
WG3077957-10 Nitrite (as N)	) LCS			102.8		%		90-110	14-JUN-19
WG3077957-6 Nitrite (as N)	LCS			101.8		%		90-110	14-JUN-19
WG3077957-5 Nitrite (as N)	MB			<0.010		mg/L		0.01	14-JUN-19
WG3077957-9 Nitrite (as N)	MB			<0.010		mg/L		0.01	14-JUN-19
NO3-IC-N-WP		Water				2			

NO3-IC-N-WP



		Workorder:	L229195	9	Report Date: 24	4-JUN-19	Pa	ge 2 of 4
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

Workorder: L2291959

Report Date: 24-JUN-19

### 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 Calibration Verification Standard

CVS Calibration Verification Standard LCSD Laboratory Control Sample Duplicate

Workorder: L2291959

Report Date: 24-JUN-19

#### Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests		<b>5</b>					
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-FN
	2	13-JUN-19 10:40	15-JUN-19 14:00	0.25	51	hours	EHTR-FN
	3	13-JUN-19 11:15	15-JUN-19 14:00	0.25	51	hours	EHTR-FN
	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-FN

#### 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 predetermined 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.

Chain of Custody (COC) / Analytica/ Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com



COC Number: 17 -

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Contact:	Leanne Shewchuk		Quality Control	(QC) Report with R	eport 🗌 YES	NO .	2	4 da	y (P4	·20%]			NCY	1 Bu	sines	s đay	/ (E - 10	00%]					
Phone:	204-668-8112 x 4503		Compare Result	s to Criteria on Report -	provide details below	w if box checked	CORT Desid	3 da	y (P3	25%]			IERGI	Same	e Day,	Wee	kend c	or Star	tutory	holid	ay (E2 -2	200%	П
	Company address below will appear on the fir	nal report	Select Distributi	ion: 🗹 Email		FAX	5 <del>1</del> 2	2 da	y (P2	·50%]			N3	(Laboratory opening fees may apply) ]									
Street:	3021 Birdshill Road	-	Email 1 or Fax	learine.shewchuk(	@eaststpaul.com	<u>ו</u>		Date an	d Time	e Requi	red for	all E&	P TAT	2				dd-m/	mm-y	/ hhin	im		
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ALS Lab Wor	k Order # (lab use only):		ALS Contact:	Connor Cattani	Sampler:	ŤМ	NUMBER	SOLIDS-TOTSUS	TURBIDITY-WP	đ	P-T-COL-WP	NH3-COL-WP	CL2-TOTAL-WP (Monochloramina)	ANIONS-N2N3-IC-N-WP	CHL-FLUORO-WP							SAMP	SUSPECTED HAZARD [see Special Instructions]
ALS Sample #	Sample Identification	and/or Coordinates	. <b></b>	Date	Time	Comple Trees	13	S		dw-SiO-20	iS S	00	-10	SNO	Ъ,						_   ∢	A	Шщ
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ſ	SS A			13-06-2019	10:00	Water	4	R	R		R	R	R	R	R		T						
2	SSB			13-06-2019	10:40	Water	4	R	R		R	R	R	R	R			-	$\neg$				
2	SS C			13-06-2019	11:15	Water	4	R	R		R	R	R	R	R			$\neg$	$\neg$				
2	SS D			13-06-2019	11:31	Water	4	R	R		R	R	R	R	R			$\neg$	$\neg$				
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Drinking	Water (DW) Samples <sup>1</sup> (client use)	apecial instructions / a		stronic COC only)	sking on the drop	-down nat below	Froz	en							/ation:	-	Yes	È			No	Ľ	1
Are samples tak	en from a Regulated DW System?							acks		ice (	ubes		Custa	dy se	al inta	act	Yes		İ	•	No	· . /	Ē
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Are samples for	human consumption/ use?							<u> </u>			RTEM	PERA	TURES	°C			Fil	NAL CC	OLER	TEMPE	RATURES	5 °C	
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REFER TO BACK	PAGE FOR ALS LOCATIONS AND SAMPLIN	IG INFORMATION	•	WH	TE - LABORATO	RY COPY YEL	LOW -	- CLIEN	іт со	PY							Natural Line and Sole					NOV 20	DIE FRONT

Feilure to complete all partions 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-19Report 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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L2295004 CONTD.... PAGE 2 of 5 Version: FINAL

### ALS ENVIRONMENTAL ANALYTICAL REPORT

Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
<0.10	DLM	0.10	mg/L		20-JUN-19	R4684255
0.44		0.44				
<0.11		0.11	mg/L		25-JUN-19	
<0.050	DLM	0.050	ma/l		20-JUN-19	R4684255
		0.000				
43.6		0.10	ug/L	19-JUN-19	19-JUN-19	R4688383
0.064		0.010	mg/L		24-JUN-19	R4685446
0.010	CLH	0.010	mg/L		20-JUN-19	R4680488
0.144		0.0030	mg/L		21-JUN-19	R4682341
13.9		2.0	mg/L		25-JUN-19	R4687654
3.70		0.10	NTU		20-JUN-19	R4681974
-0.10		0.40	ma/l		20-1111-10	R4684255
<0.10		0.10	ilig/L		20-3011-19	174004200
<0.11		0.11	ma/L		25-JUN-19	
		2	···			
<0.050	DLM	0.050	mg/L		20-JUN-19	R4684255
04.5		0.00			40 1111 40	D (0000000
61.6		0.20	ug/L	19-JUN-19	19-JUN-19	R4688383
0.065		0.050	ma/l		25- ILINI 10	R4688367
	СШ		-			R4680488
			-			R4682341
			-			R4682341 R4687654
			-			R4681974
<u> </u>		0.10			20001110	1140101014
0.258		0.040	mg/L		20-JUN-19	R4684255
0.287		0.070	mg/L		25-JUN-19	
0.000		0.000			00 11 11 10	D 400 40
0.029		0.020	mg/L		20-JUN-19	R4684255
49.2		0.10	ua/L	19-JUN-19	19-JUN-19	R4688383
			- <del>.</del>			
					24 11 10 40	DACOFAAC
0.089		0.010	mg/L		24-JUN-19	R4685446
	<0.10 <0.11 <0.050 43.6 0.064 0.010 0.144 13.9 3.70 <0.10 <0.11 <0.050 61.6 0.065 0.020 0.480 24.3 2.47	<0.10	<0.10	<0.10	<0.10         DLM         0.10         mg/L $  < < <<<<<< <<<<<<<< <<<<<<<<<<<<<<<<<<< <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

L2295004 CONTD.... PAGE 3 of 5 Version: FINAL

### 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	0.193		0.0030	mg/L		21-JUN-19	R4682341
Total Suspended Solids	58.9		2.0	mg/L		25-JUN-19	R4687654
Turbidity	15.4		0.10	NTU		20-JUN-19	R4681974
L2295004-4 P4 L			0.1.0				
Sampled By: CLIENT on 19-JUN-19 @ 09:30							
Matrix:							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLM	0.10	mg/L		20-JUN-19	R4684255
Nitrate+Nitrite Nitrate and Nitrite as N	<0.11		0.11	mg/L		25-JUN-19	
Nitrite in Water by IC	<0.11		0.11	ing/L		23-3011-13	
Nitrite (as N)	<0.050	DLM	0.050	mg/L		20-JUN-19	R4684255
Chlorophyll a							
Chlorophyll a by fluorometry Chlorophyll a	69.3		0.20	ug/L	19-JUN-19	19-JUN-19	R4688383
Miscellaneous Parameters							
Ammonia, Total (as N)	0.038		0.010	mg/L		24-JUN-19	R4685446
Chlorine, Total	0.010	CLH	0.010	mg/L		20-JUN-19	R4680488
Phosphorus (P)-Total	0.238		0.0030	mg/L		21-JUN-19	R4682341
Total Suspended Solids	19.1		2.0	mg/L		25-JUN-19	R4687654
Turbidity	7.77		0.10	NTU		20-JUN-19	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)	<0.10	DLM	0.10	mg/L		20-JUN-19	R4684255
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.11		0.11	mg/L		25-JUN-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLM	0.050	mg/L		20-JUN-19	R4684255
Chlorophyll a							
Chlorophyll a by fluorometry Chlorophyll a	34.3		0.10	ug/L	19-JUN-19	19-JUN-19	R4688383
Miscellaneous Parameters			0110	~g, _			
Ammonia, Total (as N)	0.079		0.010	mg/L		25-JUN-19	R4685446
Chlorine, Total	0.020	CLH	0.010	mg/L		20-JUN-19	R4680488
Phosphorus (P)-Total	0.262		0.0030	mg/L		21-JUN-19	R4682341
Total Suspended Solids	32.1		2.0	mg/L		25-JUN-19	R4687654
Turbidity	24.4		0.10	NTU		20-JUN-19	R4681974
Turbidity	24.4		0.10	NTU		20-JUN-19	R46

## **Reference Information**

### Sample Parameter Qualifier Key:

Qualifier	Description		
	Free/Total Chlorin dissipates rapidly		orine tests is 15 minutes; field testing is recommended. Chlorine
DLM	Detection Limit Ad	justed due to sample matrix effects (e.g. ch	emical interference, colour, turbidity).
DUP-H	Duplicate results o	utside ALS DQO, due to sample heterogen	eity.
est Method Ref	ferences:		
ALS Test Code	Matrix	Test Description	Method Reference**
CHL/A-ACET-FLU WP	ORO- Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
			rophyll a is determined by a 90 % acetone extraction followed with ot subject to interferences from chlorophyll b.
CL2-TOTAL-WP	Water	Chlorine, Total	APHA 4500-CI Chlorine(Residual) G (mod)
			thod. The recommended hold time for these tests is 15 minutes; field organic matter, if present, and dissipates rapidly into headspace.
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only	/) APHA 2510
Qualitative analys	is of conductivity v	here required during preparation of other te	est eg. IC, TDS, TSS, etc
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water nitroprusside and			nd phenol. The intensity is amplified by the addition of sodium
NO2+NO3-CALC-	WP Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions a	are analyzed by lo	h Chromatography with conductivity and/or	UV detection.
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions a	are analyzed by lo	n Chromatography with conductivity and/or I	UV detection.
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is ca after persulphate of			00-P "Phosphorus". Total Phosphorus is determined colourmetrically
SOLIDS-TOTSUS	-WP Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended s	solids in aquesous	matrices is determined gravimetrically after	r drying the residue at 103 105°C.
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueo	us matrices is dete	ermined by the nephelometric method.	
* ALS test method	s may incorporate	modifications from specified reference met	hods to improve performance.
The last two letter	s of the above tes	code(s) indicate the laboratory that perform	ned analytical analysis for that test. Refer to the list below:
Laboratory Defini	ition Code La	boratory 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 wwt - 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.



			Workorder:	L2295004	. R	Report Date: 2	27-JUN-19	Pa	ige 1 of
Client:		shill Road 'aul MB R2E 1	A7						
Contact:	Leanne Sł		Defenses	Desself	0	11-16-		1 too te	A
ſest		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CHL/A-ACET-FLU Batch F	UORO-WP R4688383	Water							
WG3089010-4 Chlorophyll a			<b>L2295004-5</b> 34.3	18.1	DUP-H	ug/L	62	35	19-JUN-19
WG3089010-3 Chlorophyll a	LCS			104.8		%		80-120	26-JUN-19
WG3089010-1 Chlorophyll a	MB			<0.10		ug/L		0.1	19-JUN-19
WG3089010-2 Chlorophyll a	MB			<0.10		ug/L		0.1	18-JUN-19
CL2-TOTAL-WP		Water							
Batch F WG3083963-3 Chlorine, Tota			<b>L2295004-5</b> 0.020	0.020		mg/L	0.0	15	20-JUN-19
WG3083963-2 Chlorine, Tota				95.0		%		75-125	20-JUN-19
WG3083963-1 Chlorine, Tota				<0.010		mg/L		0.01	20-JUN-19
NH3-COL-WP		Water							
Batch F WG3087895-2 Ammonia, Toi				97.4		%		85-115	24-JUN-19
<b>WG3087895-6</b> Ammonia, Toi				97.2		%		85-115	24-JUN-19
<b>WG3087895-1</b> Ammonia, To				<0.010		mg/L		0.01	24-JUN-19
<b>WG3087895-5</b> Ammonia, To				<0.010		mg/L		0.01	24-JUN-19
Batch F WG3089044-6 Ammonia, Toi				99.6		%		85-115	25-JUN-19
<b>WG3089044-5</b> Ammonia, To				<0.010		mg/L		0.01	25-JUN-19
NO2-IC-N-WP		Water							
Batch F WG3083246-2 Nitrite (as N)	R4684255 LCS			101.1		%		90-110	20-JUN-19
WG3083246-1 Nitrite (as N)	MB			<0.010		mg/L		0.01	20-JUN-19
NO3-IC-N-WP		Water							



		Workorder:	L2295004	4	Report Date: 2	7-JUN-19	Pa	ge 2 of 4
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

Workorder: L2295004

Report Date: 27-JUN-19

### 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
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### Sample Parameter Qualifier Definitions:

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

### Workorder: L2295004

Report Date: 27-JUN-19

#### Hold Time Exceedances:

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

#### 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.

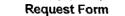
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where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



### Chain of Custody (COC) / Analytical



Canada Toll Free: 1 800 668 9878



COC Number: 17 -

Page of

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Phone:	204-668-8112 x 4503		Compare Result	s to Criteria on Report -	•			3 day	y (P3-	25%]			AE ROE	Sam	e Day,	Wee	kend (	or Sta	tutory	holida	y (E2 -2009	%			
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Street:	3021 Birdshill Road		Email 1 or Fax	leanne.shewchuk@	@eaststpaul.com	<u>،</u> ، ا		Date an	d Time	e Réqui	red for	rall E6	P TAT	5:				dd-m	mm-yy	hh:mr	n				
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ALS Lab Wor	k Order # (lab use only): L220	15004	ALS Contact:	Connor Cattani	Sampler:	тм		SOLIDS-TOTSI	ITY-WE	Ę	P-T-COL-WP	NH3-COL-WP	CL2-TOTAL-WP (Monochloramine)	ANIONS-N2N3-IC-N-WP	CHL-FLUORO-WP						AMP	SUSPECTED HAZARD (see Special Instructions)			
ALS Sample #	Sample Identificatio	n and/or Coordinates	•	Date	Time	Comela Tuno	NUM	Sal	TURBIDITY	02-DIS-WP	0 V	S.	P	SNO	린					·		, E			
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	P2L			19-06-2019	9:50	Water	4	R	R		R	R	R	R	R										
	P3 L			19-06-2019	10:20	Water	4	R	R		R	R	R	R	R						· ·	·			
· · · · · · · · · · · · · · · · · · ·	P4 L			19-06-2019	10:50	Water	4	R	R	<b>-</b>	R	R	R	R	R		$ \rightarrow $	-							
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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 while - 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-19Report 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

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L2300108 CONTD.... PAGE 2 of 9 Version: FINAL

### ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2300108-1 P1 U							
Sampled By: TM on 26-JUN-19 @ 08:50							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC	0.40		0.40				D 4000507
Nitrate (as N)	<0.10	DLM	0.10	mg/L		27-JUN-19	R4692567
Nitrate+Nitrite Nitrate and Nitrite as N	<0.11		0.11	mg/L		03-JUL-19	
Nitrite in Water by IC			5.11				
Nitrite (as N)	<0.050	DLM	0.050	mg/L		27-JUN-19	R4692567
Chlorophyll a							
Chlorophyll a by fluorometry							D / 000000
Chlorophyll a	10.3		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
<b>Miscellaneous Parameters</b> Ammonia, Total (as N)	0.049		0.010	mg/L		03-JUL-19	R4693823
Chlorine, Total	0.049	CLH	0.010	mg/L		27-JUN-19	R4693823 R4689878
Phosphorus (P)-Total	0.050		0.0030	mg/L		05-JUL-19	R4694643
Total Suspended Solids	15.7		2.0	mg/L		03-JUL-19 03-JUL-19	R4693447
Turbidity	6.06		2.0 0.10	NTU		27-JUN-19	R4689852
L2300108-2 P2 L	0.00		0.10			2. 0011-10	117000002
Sampled By: TM on 26-JUN-19 @ 09:10							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLM	0.10	mg/L		27-JUN-19	R4692567
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.11		0.11	mg/L		03-JUL-19	
Nitrite in Water by IC	-0.050	DLM	0.050	ma/l		27-JUN-19	D4600567
Nitrite (as N) Chlorophyll a	<0.050		0.050	mg/L		21-JUN-19	R4692567
Chlorophyll a by fluorometry							
Chlorophyll a	47.3		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters							
Ammonia, Total (as N)	0.171		0.010	mg/L		03-JUL-19	R4693823
Chlorine, Total	0.010	CLH	0.010	mg/L		27-JUN-19	R4689878
Phosphorus (P)-Total	0.458		0.0030	mg/L		05-JUL-19	R4694643
Total Suspended Solids	25.1		2.0	mg/L		03-JUL-19	R4693447
Turbidity	9.15		0.10	NTU		27-JUN-19	R4689852
L2300108-3 P3 L							
Sampled By: TM on 26-JUN-19 @ 09:40							
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	<0.040		0.040	iiig/L		21-0014-19	114032007
Nitrate and Nitrite as N	<0.070		0.070	mg/L		03-JUL-19	
Nitrite in Water by IC				Ű			
Nitrite (as N)	<0.020	DLM	0.020	mg/L		27-JUN-19	R4692567
Chlorophyll a							
Chlorophyll a by fluorometry	20.6		0.40	uc/l	27-JUN-19	27-JUN-19	P/606006
Chlorophyll a Miscellaneous Parameters	32.6		0.10	ug/L	21-3011-19	21-JUN-19	R4696236
Ammonia, Total (as N)	0.053		0.010	mg/L		03-JUL-19	R4693823
Chlorine, Total	0.020	CLH	0.010	mg/L		27-JUN-19	R4689878
	0.020		0.010			27 001119	

L2300108 CONTD.... PAGE 3 of 9 Version: FINAL

### 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	7.10		0.10	mg/L		27-JUN-19	R4690757
Phosphorus (P)-Total	0.113		0.0030	mg/L		05-JUL-19	R4694643
Total Suspended Solids	5.9		2.0	mg/L		03-JUL-19	R4693447
Turbidity	1.97		0.10	NTU		27-JUN-19	R4689852
_2300108-4 P4 L							
Sampled By: TM on 26-JUN-19 @ 10:15							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC		DIM					D /000000
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	20.5		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters Ammonia, Total (as N)	0.040		0.010			02 11 10	D 4000000
Chlorine, Total	0.042	CLH	0.010 0.010	mg/L		03-JUL-19 27-JUN-19	R4693823
Phosphorus (P)-Total	0.010	CLH	0.010	mg/L		05-JUL-19	R4689878 R4694643
Total Suspended Solids	20.9		2.0	mg/L mg/L		03-JUL-19	R4693447
Turbidity	5.85		0.10	NTU		27-JUN-19	R4689852
L2300108-5 P6 L	0.00		0.10			27 001110	114000002
Sampled By: TM on 26-JUN-19 @ 10:35							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLM	0.10	mg/L		27-JUN-19	R4692567
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.11		0.11	mg/L		03-JUL-19	
Nitrite in Water by IC	-0.050	DLM	0.050	mg/L		27-JUN-19	R4692567
Nitrite (as N) Chlorophyll a	<0.050	DLIVI	0.050	mg/L		27-3011-19	R4092007
Chlorophyll a by fluorometry							
Chlorophyll a	4.81		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters							
Ammonia, Total (as N)	0.072		0.010	mg/L		03-JUL-19	R4693823
Chlorine, Total	0.010	CLH	0.010	mg/L		27-JUN-19	R4689878
Phosphorus (P)-Total	0.614		0.0030	mg/L		05-JUL-19	R4694643
Total Suspended Solids	15.9		2.0	mg/L		03-JUL-19	R4693447
Turbidity	6.03		0.10	NTU		27-JUN-19	R4689852
_2300108-6 S U							
Sampled By: TM on 26-JUN-19 @ 10:55							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC	<0.040	DLM	0.040	ma/l		27 11 10 40	DAGODEGT
Nitrate (as N) Nitrate+Nitrite	<0.040		0.040	mg/L		27-JUN-19	R4692567
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		03-JUL-19	
	\$0.070		0.070				

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### 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	0.040		0.040			07 11 10 40	D 4000507
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	3.10		0.10	ug/L	27 001110	27 001110	114030230
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	7.40		0.40	110/		27-JUN-19	D 4600000
Miscellaneous Parameters	7.48		0.10	ug/L	27-JUN-19	21-JUN-19	R4696236
Ammonia, Total (as N)	0.030		0.010	mg/L		03-JUL-19	R4693823
Chlorine, Total	<0.020	CLH	0.010	mg/L		27-JUN-19	R4693823 R4689878
Phosphorus (P)-Total	<0.020			-		05-JUL-19	R4694643
Total Suspended Solids			0.0030	mg/L			
	4.8		2.0	mg/L NTU		03-JUL-19 27-JUN-19	R4693447
Turbidity	1.65		0.10	INTU		∠1-JUN-19	R4689852

L2300108 CONTD.... PAGE 5 of 9 Version: FINAL

### ALS ENVIRONMENTAL ANALYTICAL REPORT

Extracted	Analyzed	Batch
	27-JUN-19	R4692567
	03-JUL-19	
	27-JUN-19	R4692567
27-JUN-19	27-JUN-19	R4696236
27-3011-19	27-3011-19	14090230
	03-JUL-19	R4693823
	27-JUN-19	R4689878
	05-JUL-19	R4694643
	03-JUL-19	R4693447
	27-JUN-19	R4689852
		111000002
	27-JUN-19	R4692567
	03-JUL-19	
	27-JUN-19	R4692567
27-JUN-19	27-JUN-19	R4696236
27 001110	27 001110	1030230
	03-JUL-19	R4693823
	27-JUN-19	R4689878
	05-JUL-19	R4694643
	03-JUL-19	R4693447
	27-JUN-19	R4689852
	27-JUN-19	R4692567
	03-JUL-19	
	27- II IN 40	D4602567
	21-JUN-19	R4692567
27-JUN-19	27-JUN-19	R4696236
	03-JUL-19	R4693823
	05-JUL-19	R4694643
27-JL	JN-19	03-JUL-19

L2300108 CONTD.... PAGE 6 of 9 Version: FINAL

### 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	3.7		2.0	mg/L		03-JUL-19	R4693447
Turbidity	2.36		0.10	NTU		27-JUN-19	R4689852
L2300108-12 SS B	2.50		0.10	NIO		27 3011 13	114009032
Sampled By: TM on 26-JUN-19 @ 10:15							
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	05.0		0.40				D 4000000
Chlorophyll a	35.9		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters	0.044		0.040	m~//		04 11 10	D4604040
Ammonia, Total (as N)	0.041		0.010	mg/L		04-JUL-19 05-JUL-19	R4694849
Phosphorus (P)-Total	0.217		0.0030	mg/L			R4694643
Total Suspended Solids	37.9		2.0	mg/L		03-JUL-19	R4693447
Turbidity	47.4		0.10	NTU		27-JUN-19	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)	0.028		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)	0.017		0.010	mg/L		27-JUN-19	R4692567
Chlorophyll a							
Chlorophyll a by fluorometry Chlorophyll a	5.62		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters	5.02		0.10	uy/L	21 0011-19	21-0011-13	114030230
Ammonia, Total (as N)	0.474		0.010	mg/L		03-JUL-19	R4693823
Oxygen, Dissolved	9.40		0.010	mg/L		27-JUN-19	R4690757
Phosphorus (P)-Total	0.0894		0.0030	mg/L		05-JUL-19	R4694643
Total Suspended Solids	2.3		2.0	mg/L		03-JUL-19	R4693447
Turbidity	3.99		0.10	NTU		27-JUN-19	R4689852
L2300108-14 SS D	0.00		0.10				11-000002
Sampled By: TM on 26-JUN-19 @ 11:10 Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		27-JUN-19	R4692567
Nitrate+Nitrite				5			
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							

L2300108 CONTD.... PAGE 7 of 9 Version: FINAL

### ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2300108-14 SS D							
Matrix: WATER							
Chlorophyll a by fluorometry Chlorophyll a	7.59		0.10	ug/L	27-JUN-19	27-JUN-19	R4696236
Miscellaneous Parameters	7.59		0.10	ug/L	27-3011-19	27-3011-19	R4090230
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			2.0 0.10	NTU		28-JUN-19	
lublaity	4.98		0.10	NIU		20-JUN-19	R4692344

## **Reference Information**

### Sample Parameter Qualifier Key:

CLH			tests is 15 minutes; field testing is recommended. Chlorine
DLM	dissipates rapidly Detection Limit A	into neadspace. Jjusted due to sample matrix effects (e.g. chemic	al interference, colour, turbidity).
ЛS-B		very could not be accurately calculated due to hig	
est Method F	References		
LS Test Code		Test Description	Method Reference**
CHL/A-ACET-F	LUORO- Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
		rres modified from EPA method 445.0. Chlorophy on-acidification procedure. This method is not sul	Il a is determined by a 90 % acetone extraction followed with oject to interferences from chlorophyll b.
CL2-TOTAL-W	P Water	Chlorine, Total	APHA 4500-Cl Chlorine(Residual) G (mod)
			The recommended hold time for these tests is 15 minutes; field nic matter, if present, and dissipates rapidly into headspace.
C-SCREEN-V	VP Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative ana	lysis of conductivity	where required during preparation of other test eq	. IC, TDS, TSS, etc
IH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
	ater samples forms ir nd measured colourr		enol. The intensity is amplified by the addition of sodium
IO2+NO3-CAL	-C-WP Water	Nitrate+Nitrite	CALCULATION
IO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
norganic anion	ns are analyzed by lo	n Chromatography with conductivity and/or UV d	etection.
IO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
norganic anion	ns are analyzed by lo	n Chromatography with conductivity and/or UV d	etection.
02-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C
nanganic hydro odide in an am	oxide is formed. Add	ition of sulfuric acid dissolves the manganic hydr e original DO content. The iodide is then titrated	ipitate of manganous hydroxide. In the presence of oxygen, brown oxide, yielding manganic sulfate which reacts with iodide, releasing with a standard solution of thiosulphate. Results for
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
,	s carried out using pr te digestion of the sa	•	"Phosphorus". Total Phosphorus is determined colourmetrically
OLIDS-TOTS	US-WP Water	Total Suspended Solids	APHA 2540 D (modified)
otal suspende	ed solids in aquesous	matrices is determined gravimetrically after dryi	ng the residue at 103 105°C.
URBIDITY-WI	P Water	Turbidity	APHA 2130B (modified)
urbidity in aqu	leous matrices is def	ermined by the nephelometric method.	
ALS test meth	ods may incorporate	modifications from specified reference methods	to improve performance.
⁻he last two let	tters of the above tes	t code(s) indicate the laboratory that performed a	nalytical analysis for that test. Refer to the list below:
aboratory De	finition Code La	aboratory Location	
VP	A	_S ENVIRONMENTAL - WINNIPEG, MANITOBA	, CANADA
	ody 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 wwt - 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.

Chain of Custody (COC) / Analytical Request Form



COC Number: 17 -

Page | of 2

Canada Toll Free: 1 800 668 9878

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City/Province:	East St. Paul, MB		Email 2	operations@easts	stpaul.com		For te	sts that	can not	be per	ormed a	ccordir	ng to the	service	level s	elected,	you will	be cont	tacted.				
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ALS Sample #	Sample Identification	n and/or Coordinate	s	Date	Time		13	ŝ		02-DIS-WP	õ	9	P	SNO	FL						<	<b>۲</b>	E E
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3	P3 L	•		26-06-2019	9:40	Water	5	R	R	R	R	R	R	R	R						-		
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5	P6 L		18184	26-06-2019	10:35	Water	4	R	R		R	R	R	R	R						-		
6	នប			26-06-2019	10:55	Water	4	R	R	<b> </b>	R	R	R	R	R								
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12	SS B			27-06-2019	10:15	Water	3	R	R		R	R		R	R						1		
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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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Failure to complete all pontions 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.



### Chain of Custody (COC) / Analytical Request Form



COC Number: 17 -

Page 2 of 2

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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:10-JUL-19Report 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

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L2307649 CONTD.... PAGE 2 of 10 Version: FINAL

### 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	1.40		0.44			13-JUL-19	
Nitrate and Nitrite as N Nitrite in Water by IC	1.18		0.11	mg/L		13-JUL-19	
Nitrite (as N)	0.073		0.050	mg/L		11-JUL-19	R4709040
Chlorophyll a				5			
Chlorophyll a by fluorometry Chlorophyll a	2.71		0.10	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters				Ū			
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	1.50		0.11	ing/∟		13-302-13	
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	0.400		0.040			15 11 10	D 4740700
Ammonia, Total (as N) Phosphorus (P)-Total	0.108		0.010 0.0030	mg/L mg/L		15-JUL-19 15-JUL-19	R4712722 R4711474
Total Suspended Solids	40.0		2.0	mg/L		17-JUL-19	R4711474 R4714220
Turbidity	31.2		0.10	NTU		11-JUL-19	R4708479
L2307649-3 P3 L	01.2		0.10			1100210	
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			0.070			40 11 11 40	
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				5-			
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

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### ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2307649-3 P3 L Sampled By: TM on 10, IIII, 10, @ 00:50							
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							
Matrix: WATER Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	0.824		0.040	mg/L		11-JUL-19	R4709040
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.851		0.070	mg/L		13-JUL-19	
Nitrite in Water by IC	0.007					44 11 40	D (7000 (0
Nitrite (as N) Chlorophyll a	0.027		0.020	mg/L		11-JUL-19	R4709040
Chlorophyll a by fluorometry							
Chlorophyll a	14.9		0.10	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters	_		-				
Ammonia, Total (as N)	0.091		0.010	mg/L		15-JUL-19	R4712722
Chlorine, Total	0.020	CLH	0.010	mg/L		11-JUL-19	R4708486
Oxygen, Dissolved	4.30		0.10	mg/L		11-JUL-19	R4714825
Phosphorus (P)-Total	0.273		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	17.9		2.0	mg/L		17-JUL-19	R4714220
Turbidity	13.6		0.10	NTU		11-JUL-19	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)	0.090		0.020	mg/L		11-JUL-19	R4709040
Nitrate+Nitrite Nitrate and Nitrite as N	0.113		0.070	mg/L		13-JUL-19	
Nitrite in Water by IC	0.110		0.070	iiig/L		10 002 10	
Nitrite (as N)	0.023		0.010	mg/L		11-JUL-19	R4709040
Chlorophyll a				_			
Chlorophyll a by fluorometry							
Chlorophyll a	15.0		0.10	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters			0.010				D 4740700
Ammonia, Total (as N)	0.141		0.010	mg/L		15-JUL-19	R4712722
Phosphorus (P)-Total	0.294		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	37.1		2.0	mg/L		17-JUL-19	R4714220
Turbidity	14.0		0.10	NTU		11-JUL-19	R4708479
L2307649-6 SL U							
Sampled By: TM on 10-JUL-19 @ 10:35							
Matrix: WATER Nitrate + Nitrite							
Nitrate + Nitrite Nitrate in Water by IC							
Nitrate (as N)	0.043		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	20.8		0.10	ug/L	11-JUL-19	11-JUL-19	R4720596
	20.0		0.10	uy/L		11301-19	114720390

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### 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)	0.013		0.010	mg/L		15-JUL-19	R4712722
Phosphorus (P)-Total	0.0589		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	5.6		2.0	mg/L		17-JUL-19	R4714220
Turbidity	4.41		0.10	NTU		11-JUL-19	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)	0.600		0.020	mg/L		11-JUL-19	R4709040
Nitrate+Nitrite	0.000		0.070			40 11 40	
Nitrate and Nitrite as N	0.626		0.070	mg/L		13-JUL-19	
Nitrite in Water by IC Nitrite (as N)	0.026		0.010	mg/L		11-JUL-19	R4709040
Chlorophyll a	0.020		0.010			11001-19	117103040
Chlorophyll a by fluorometry							
Chlorophyll a	11.2		0.10	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters							
Ammonia, Total (as N)	0.089		0.010	mg/L		15-JUL-19	R4712722
Phosphorus (P)-Total	0.192		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	20.1		2.0	mg/L		17-JUL-19	R4714220
Turbidity	13.8		0.10	NTU		11-JUL-19	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)	0.109		0.020	mg/L		11-JUL-19	R4709040
Nitrate+Nitrite Nitrate and Nitrite as N	0.100		0.070	ma/l		13-JUL-19	
Nitrite in Water by IC	0.109		0.070	mg/L		13-301-19	
Nitrite (as N)	<0.010		0.010	mg/L		11-JUL-19	R4709040
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	64.2		0.20	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
Phosphorus (P)-Total	0.193		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	22.3		2.0	mg/L		17-JUL-19	R4714220
Turbidity	16.7		0.10	NTU		11-JUL-19	R4708479
L2307649-9 CS L							
Sampled By: TM on 10-JUL-19 @ 11:20							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC	0.500		0.000	m ~/l		11 11 10	D 4700040
Nitrate (as N)	0.598		0.020	mg/L		11-JUL-19	R4709040
Nitrate+Nitrite Nitrate and Nitrite as N	0.628		0.070	mg/L		13-JUL-19	
Nitrite in Water by IC	0.020		0.070	g/ L		10000-19	
Nitrite (as N)	0.030		0.010	mg/L		11-JUL-19	R4709040

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## 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	74.7		0.10	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters				U U			
Ammonia, Total (as N)	0.362		0.010	mg/L		15-JUL-19	R4712722
Phosphorus (P)-Total	0.0990		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	62.3		2.0	mg/L		17-JUL-19	R4714220
Turbidity	51.4		0.10	NTU		11-JUL-19	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)	0.638		0.020	mg/L		11-JUL-19	R4709040
Nitrate+Nitrite	0.004		0.070			12 11 10	
Nitrate and Nitrite as N Nitrite in Water by IC	0.684		0.070	mg/L		13-JUL-19	
Nitrite (as N)	0.046		0.010	mg/L		11-JUL-19	R4709040
Chlorophyll a				5			
Chlorophyll a by fluorometry							
Chlorophyll a	5.52		0.10	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters							
Ammonia, Total (as N)	0.048		0.010	mg/L		15-JUL-19	R4712722
Phosphorus (P)-Total	0.152		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	12.9		2.0	mg/L		17-JUL-19	R4714220
Turbidity	8.07		0.10	NTU		11-JUL-19	R4708479
L2307649-11 SS A							
Sampled By: TM on 10-JUL-19 @ 12:20							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC	.0.000		0.000	~~~/l		11 11 10	D 4700040
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	<0.070		0.070	iiig/E		10 002 10	
Nitrite (as N)	<0.010		0.010	mg/L		11-JUL-19	R4709040
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	50.3		0.10	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters							DITIOTO
Ammonia, Total (as N)	0.315		0.010	mg/L		15-JUL-19	R4712722
Biochemical Oxygen Demand	15.7		6.0	mg/L		11-JUL-19	R4714331
Fecal Coliforms	1410		1	MPN/100mL		10-JUL-19	R4707712
Phosphorus (P)-Total	0.275		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	35.8		2.7	mg/L		11-JUL-19	R4710308
Turbidity	36.4		0.10	NTU		11-JUL-19	R4708479
Algae Identification Gomphonema (Bacillariophyceae)	Small amount		1.0			24-JUL-19	R4724019
Scenedesmus (Chlorophyceae)	Small amount		1.0 1.0			24-JUL-19 24-JUL-19	R4724019 R4724019
Cryptomonas (Cryptophyceae)	Large amount		1.0			24-JUL-19 24-JUL-19	R4724019 R4724019
Euglena (Euglenophyceae)	Small amount		1.0			24-JUL-19	R4724019

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## 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)	Small amount		1.0			24-JUL-19	R4724019
Aphanocapsa (Cyanophyceae)	Small amount		1.0			24-JUL-19	R4724019
Merismopedia (Cyanophyceae)	Massive amount		1.0			24-JUL-19	R4724019
Microcystis (Cyanophyceae)	Small amount		1.0			24-JUL-19	R4724019
Pseudanabaena (Cyanophyceae)	Massive amount		1.0			24-JUL-19	R4724019
Limnothrix (Cyanophyceae)	Large amount		1.0			24-JUL-19	R4724019
Planktothrix (Cyanophyceae)	Massive amount		1.0			24-JUL-19	R4724019
Unidentified	Large amount		1.0			24-JUL-19	R4724019
Note: Unidentified: dispersed rod shaped single cells of an unidentified cyanobacteria							
Enumeration of blue green algae cells Total cyanobacterial cell count	2230000		1	cells/mL		24-JUL-19	R4724029
Aphanocapsa (Cyanophyceae)	300		1	cells/mL		24-JUL-19	R4724029
Limnothrix (Cyanophyceae)	162000		1	cells/mL		24-JUL-19	R4724029
Merismopedia (Cyanophyceae)	611000		1	cells/mL		24-JUL-19	R4724029
Planktothrix (Cyanophyceae)	505000		1	cells/mL		24-JUL-19	R4724029
Pseudanabaena (Cyanophyceae)	715000		1	cells/mL		24-JUL-19	R4724029
Unidentified blue-green	235000		1	cells/mL		24-JUL-19	R4724029
Note: Unidentified: dispersed rod shaped single cells of an unidentified cyanobacteria							
L2307649-12 SS B							
Sampled By: TM on 10-JUL-19 @ 12:10							
Matrix: WATER							
Nitrate + Nitrite							
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	0.010		0.010			11 11 10	D 4700040
Nitrite (as N) Chlorophyll a	<0.010		0.010	mg/L		11-JUL-19	R4709040
Chlorophyll a by fluorometry							
Chlorophyll a	15.6		0.10	ug/L	11-JUL-19	11-JUL-19	R4720596
Miscellaneous Parameters							
Ammonia, Total (as N)	0.020		0.010	mg/L		15-JUL-19	R4712722
Biochemical Oxygen Demand	4.3		2.0	mg/L		11-JUL-19	R4714331
Fecal Coliforms	1050		1	MPN/100mL		10-JUL-19	R4707712
Phosphorus (P)-Total	0.0658		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids	10.1		2.0	mg/L		17-JUL-19	R4714220
Turbidity	7.82		0.10	NTU		11-JUL-19	R4708479
L2307649-13 SS C				-			
Sampled By: TM on 10-JUL-19 @ 12:40							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC Nitrate (as N)	<0.020		0.020	mg/L		11-JUL-19	R4709040
Nitrate+Nitrite			0.020				
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							

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## 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	00.4		0.20	ag/ E	11 002 10	1100210	114720000
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		2.0 0.10	NTU		11-JUL-19	
-	15.9		0.10	NIU		11-302-19	R4708479
Algae Identification Fragilaria (Fragilariophyceae)	Small amount		1.0			24-JUL-19	R4724019
Melosira (Coscinodiscophyceae)	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) Unidentified	Moderate amount		1.0 1.0			24-JUL-19 24-JUL-19	R4724019 R4724019
Other	Large amount Moderate amount		1.0 1.0			24-JUL-19 24-JUL-19	R4724019 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			1.0				
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) Pseudanabaena (Cyanophyceae)	990		1	cells/mL		24-JUL-19 24-JUL-19	R4724029
	8910		1	cells/mL			R4724029
Unidentified blue-green Other blue-green	129000 44600		1 1	cells/mL cells/mL		24-JUL-19 24-JUL-19	R4724029 R4724029
Note: Unidentified: dispersed coccoid shaped single cells of an unidentified cyanobacteria. Other: Cyanodictyon (Cyanophyceae).	44600		I	Cens/IIIL		24-JOE-19	R4724029
L2307649-14 SS D							
Sampled By: TM on 10-JUL-19 @ 12:55							
Matrix: WATER Nitrate + Nitrite							

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### ALS ENVIRONMENTAL ANALYTICAL REPORT

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	0.010		0.010				
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			MPN/100mL		10-JUL-19	R4707712
Phosphorus (P)-Total	0.113		0.0030	mg/L		15-JUL-19	R4711474
Total Suspended Solids Turbidity	34.3 12.8		2.0 0.10	mg/L NTU		17-JUL-19 11-JUL-19	R4714220 R4708479

#### **Reference Information**

#### Sample Parameter Qualifier Key:

Qualifier	Descrip	tion		
CLH	dissipat	es rapidly int	o headspace.	e tests is 15 minutes; field testing is recommended. Chlorine
MS-B	Matrix S	pike recover	ry could not be accurately calculated due to his	gh analyte background in sample.
est Method I	Reference	es:		
ALS Test Code	•	Matrix	Test Description	Method Reference**
ALGAE-CYANG WP	D-BACT-	Water	Enumeration of blue green algae cells	APHA 10200 C & F
			on/settling and examined using a compound p us and the cells are enumerated. The total cy	hase contrast inverted microscope. Cyanobacteria (also known as anobacteria count is also reported.
ALGAE-ID-WP		Water	Algae Identification	Microscopic Examination
Standard Meth	ods 10200,	, 2005		
	are then e	xamined usi	ng a compound phase contrast inverted micro	es of fresh water. Samples are prepared using a sedimentation oscope. This test is a general screen of dominant types of algae.
BOD-WP		Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
				days. Dissolved oxygen is measured initially and after incubation,
CHL/A-ACET-F		Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
This analysis is			s modified from EPA method 445.0. Chloroph acidification procedure. This method is not su	yll a is determined by a 90 % acetone extraction followed with bject to interferences from chlorophyll b.
CL2-TOTAL-W	Р	Water	Chlorine, Total	APHA 4500-CI Chlorine(Residual) G (mod)
				. The recommended hold time for these tests is 15 minutes; field unic matter, if present, and dissipates rapidly into headspace.
EC-SCREEN-V	VP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative ana	lysis of cor	nductivity wh	ere required during preparation of other test e	g. IC, TDS, TSS, etc
-C-QT97-WP		Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
mixture of hydr	olyzable su	ubstrates and	d then sealed in a 97-well packet. The packet	nzyme Substrate Coliform Test". The sample is mixed with a is incubated at $44.5 - 0.2^{\circ}$ C for 18 hours and then the number of paring the number of positive responses to a probability table.
NH3-COL-WP		Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in wa hitroprusside a				nenol. The intensity is amplified by the addition of sodium
NO2+NO3-CAL	-C-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP		Water	Nitrite in Water by IC	EPA 300.1 (mod)
norganic anior	ns are analy	yzed by Ion (	Chromatography with conductivity and/or UV c	detection.
103-IC-N-WP		Water	Nitrate in Water by IC	EPA 300.1 (mod)
norganic anior	ns are analy	yzed by Ion (	Chromatography with conductivity and/or UV c	detection.
D2-DIS-WP		Water	Dissolved Oxygen	APHA 4500-O-C
Manganous su manganic hydr	oxide is for ount equiv	ets with potas med. Additic ralent to the	ssium or sodium hydroxide to give a white prea on of sulfuric acid dissolves the manganic hydr original DO content. The iodide is then titrated	cipitate of manganous hydroxide. In the presence of oxygen, brown roxide, yielding manganic sulfate which reacts with iodide, releasing d with a standard solution of thiosulphate. Results for
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.

#### **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	aquesous n	natrices is determined gravimetrically a	ter drying the residue at 103 105°C.	
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)	
Turbidity in aqueous mate	rices is deter	mined 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 wwt - 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.



		Workorder:	L230764	9	Report Date: 24-	JUL-19	Pa	ge 1 of 5
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
BOD-WP	Water							
WG3101856-1	<b>R4714331</b> I <b>2 LCS</b> Oxygen Demand		102.2		%		85-115	11-JUL-19
WG3101856-1 Biochemical (	I <b>1 MB</b> Oxygen Demand		<2.0		mg/L		2	11-JUL-19
CHL/A-ACET-FL	UORO-WP Water							
Batch I	R4720596							
WG3111940-3 Chlorophyll a		<b>L2307649-1</b> 2.71	3.67		ug/L	30	35	11-JUL-19
WG3111940-2 Chlorophyll a			106.4		%		80-120	22-JUL-19
WG3111940-1 Chlorophyll a			<0.10		ug/L		0.1	11-JUL-19
CL2-TOTAL-WP	Water							
Batch I WG3103154-3 Chlorine, Tota		<b>L2307649-4</b> 0.020	0.020		mg/L	0.0	15	11-JUL-19
WG3103154-2 Chlorine, Tota			105.0		%		75-125	11-JUL-19
WG3103154-1 Chlorine, Tota			<0.010		mg/L		0.01	11-JUL-19
FC-QT97-WP	Water							
Batch I	R4707712							
WG3101488-2 Fecal Coliforr	-	<b>L2307649-12</b> 1050	866		MPN/100mL	19	65	10-JUL-19
WG3101488-1 Fecal Coliforr			<1		MPN/100mL		1	10-JUL-19
NH3-COL-WP	Water							
	R4712722							
<b>WG3106545-2</b> Ammonia, To			100.2		%		85-115	15-JUL-19
<b>WG3106545-</b> 1 Ammonia, To			<0.010		mg/L		0.01	15-JUL-19
NO2-IC-N-WP	Water							
Batch I WG3102280-2 Nitrite (as N)	R4709040 2 LCS		100.8		%		90-110	11-JUL-19
WG3102280-6	6 LCS						-	



				-	-			
		Workorder: L	230764	9	Report Date: 24	-JUL-19	Pa	ge 2 of 5
est	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
D2-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								



		Workorder	: L230764	9	Report Date: 2	4-JUL-19	Pa	ge 3 of 5
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-WP	Water							
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	Water							
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

Workorder: L2307649

Report Date: 24-JUL-19

#### 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

Certified Reference Material Continuing Calibration Verification CRM CCV

CVS Calibration Verification Standard LCSD Laboratory Control Sample Duplicate

Workorder: L2307649

Report Date: 24-JUL-19

#### 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 predetermined 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.

# Chain of Custody (COC) / Analytical Request Form



COC Number: 17 -

Page of Z

www.alsglobal.com

#### Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report	report Report Form				· · · · ·					۰ wò،	Conta	ct you	r AM t	o con	firm a	III E&P	TATs	s (surcharges may apply)									
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Contact:	Leanne Shewchuk	Quality Control	(QC) Report with R	eport 🔲 YES			4 da	y (P4-	20%]			мст	t Bi	isines	ss day	y [E -	100%]	]				Ē						
Phone:	204-668-8112 x 4503	Compare Result	s to Criteria on Report -	provide details belo	w if box checked		3 da	y [P3-	25%]			ERGE	Sam	e Dav	. Wee	akend	1 or St	atutor	ry holi	iday [i	E2 -200%	,  –						
	Company address below will appear on the final report	Select Distributi	on: 🔽 Email,		FAX	PH Buck	2 da	y [P2-	50%]			ĒN	(Lab	orato	ry op	ening	g fees i	may a	(pply)	1		L						
Street:	3021 Birdshill Road	Email 1 or Fax	leanne.shewchuk@	@eaststpaul.con	ກ	1	Date ar	nd Time	e Requ	ired fo	all E&	P TAT	6:				dd-r	որա-չ	yy hh:	mm								
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ALS Sample #	Sample Identification and/or Coordina	ates	Date	Time	Coursel a Truns	13	Sar	E E	02-DIS-WP	- S	5	10	ONS	ન		FECALS			i I		4	) E						
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	P3 L		10-Jul-19	9:50	Water	3	R	R		R	R		R	R								1						
	P4 L		10-Jui-19	10:00	Water	5	R	R	R	R	R	R	R	R		$\vdash$	1		$\square$			1						
	P6 L	· · · ·	· 10-Jul-19	10:21	Water	3	R	R	†	R	R		R	R		1-	+		t			+						
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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,

COC Number: 17 -

Page	2	of	2
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Chain of Custody (COC) / Analytical

Canada Toll Free: 1 800 668 9878

Request Form



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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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L2316302 CONTD.... PAGE 2 of 9 Version: FINAL

### 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			0.010			10 001 10	
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 + 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			0.010				D 4700550
Nitrite (as N) Chlorophyll a	<0.010		0.010	mg/L		25-JUL-19	R4730558
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	-0.020		0.020				
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	00.7		0.10	ug/L	20-001-13	20-001-13	117172123
Ammonia, Total (as N)	0.023		0.010	mg/L		25-JUL-19	R4727748

L2316302 CONTD.... PAGE 3 of 9 Version: FINAL

### 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		2.0	MPN/100mL		23-JUL-19	R4724888
Phosphorus (P)-Total	0.220		0.0030	mg/L		31-JUL-19	R4724000 R4731768
Total Suspended Solids	28.4		2.0	mg/L		31-JUL-19	R4734288
Turbidity	25.4		2.0 0.10	NTU		25-JUL-19	R4734200 R4727347
	25.4		0.10	NIO		23-301-19	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	\$0.020		0.020				117100000
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	<0.020		0.020	ma/l		25-JUL-19	D 4720559
Nitrate (as N) Nitrate+Nitrite	<0.020		0.020	mg/L		20-JUL-19	R4730558
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUL-19	
Nitrite in Water by IC			5.070				
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			_	<i></i>			
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				i.			
Nitrate (as N)	<0.020		0.020	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite	-0.070		0.070	ma/l		20 11 1 10	
Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUL-19	

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### 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	10.0		0.10	~g/ =			
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	0.070		0.070			20 11 10	
Nitrate and Nitrite as N Nitrite in Water by IC	<0.070		0.070	mg/L		30-JUL-19	
Nitrite (as N)	<0.020	DLM	0.020	mg/L		25-JUL-19	R4730558
Chlorophyll a	101020		0.020				
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	<u>\0.020</u>		0.020	ing/L		20 000-19	117130330
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	02.0		0.00	u~/!	25-JUL-19	25 11 40	D 47 40700
Miscellaneous Parameters	93.0		0.20	ug/L	20-JUL-19	25-JUL-19	R4742723
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			5.10				
Sampled By: TM on 24-JUL-19 @ 11:40							
Matrix: WATER							
Nitrate + Nitrite							

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### 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		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	0.040		0.040			05 11 10	D (700550
Nitrite (as N) Chlorophyll a	<0.010		0.010	mg/L		25-JUL-19	R4730558
Chlorophyll a by fluorometry							
Chlorophyll a	17.2		0.10	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters							
Ammonia, Total (as N)	0.020		0.010	mg/L		25-JUL-19	R4727748
Phosphorus (P)-Total	0.0577		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids	21.7		2.0	mg/L		31-JUL-19	R4734288
Turbidity	7.49		0.10	NTU		25-JUL-19	R4727347
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	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	<0.11		0.11	ing/L		30-301-13	
Nitrite (as N)	<0.050	DLM	0.050	mg/L		25-JUL-19	R4730558
Chlorophyll a				-			
Chlorophyll a by fluorometry							
Chlorophyll a	62.4		0.20	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters							
Ammonia, Total (as N)	0.071		0.010	mg/L		25-JUL-19	R4727748
Oxygen, Dissolved	3.30		0.10	mg/L		24-JUL-19	R4728608
Phosphorus (P)-Total	0.189		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids	82.7		2.0	mg/L		31-JUL-19	R4734288
Turbidity	22.4		0.10	NTU		25-JUL-19	R4727347
L2316302-11 P2 L							
Sampled By: TM on 24-JUL-19 @ 12:50							
Matrix: WATER Nitrate + Nitrite							
Nitrate + Nitrite Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLM	0.10	mg/L		25-JUL-19	R4730558
Nitrate+Nitrite				5-			
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	55.9		0.20	ug/L	25-JUL-19	25-JUL-19	R4742723
Miscellaneous Parameters	50.3		0.20	ug/L	20000-13	20 000-13	117172123
Ammonia, Total (as N)	0.126		0.010	mg/L		25-JUL-19	R4727748
Phosphorus (P)-Total	0.197		0.0030	mg/L		31-JUL-19	R4731768
Total Suspended Solids	11.9		2.0	mg/L		31-JUL-19	R4734288
Turbidity	4.31		0.10	NTU		25-JUL-19	R4727347
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L2316302 CONTD.... PAGE 6 of 9 Version: FINAL

### ALS ENVIRONMENTAL ANALYTICAL REPORT

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	.0.44		0.44			20 11 10	
Nitrite in Water by IC	<0.11		0.11	mg/L		30-JUL-19	
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				5			
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	<0.10	DLM	0.10	ma/l		25-JUL-19	D4720559
Nitrate (as N)	<0.10		0.10	mg/L		20-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				Ŭ			
				mg/L	1	26-JUL-19	1

L2316302 CONTD.... PAGE 7 of 9 Version: FINAL

### ALS ENVIRONMENTAL ANALYTICAL REPORT

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	0.000		0.0000			21 11 10	D4704700
	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

### **Reference Information**

#### Sample Parameter Qualifier Key:

	Description		
		sted due to sample matrix effects (e.g. chemi	
DUP-H	Duplicate results out	side ALS DQO, due to sample heterogeneity	
est Method Re	ferences:		
ALS Test Code	Matrix	Test Description	Method Reference**
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
		hen incubated in airtight bottles at 20°C for 5 erence between initial and final DO.	days. Dissolved oxygen is measured initially and after incubation,
CHL/A-ACET-FLL WP	JORO- Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
		s modified from EPA method 445.0. Chloroph acidification procedure. This method is not su	nyll a is determined by a 90 % acetone extraction followed with ubject to interferences from chlorophyll b.
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analys	sis of conductivity who	ere required during preparation of other test e	eg. IC, TDS, TSS, etc
FC-QT97-WP	Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
mixture of hydroly	zable substrates and	then sealed in a 97-well packet. The packet	Enzyme Substrate Coliform Test". The sample is mixed with a is incubated at 44.5 – 0.2°C for 18 hours and then the number of paring the number of positive responses to a probability table.
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
	r samples forms indo measured colourme	1 21 1	henol. The intensity is amplified by the addition of sodium
NO2+NO3-CALC-	-WP Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions a	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 a	are analyzed by Ion (	Chromatography with conductivity and/or UV	detection.
02-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C
manganic hydroxi iodide in an amou	ide is formed. Additio	n of sulfuric acid dissolves the manganic hyc original DO content. The iodide is then titrate	ecipitate of manganous hydroxide. In the presence of oxygen, brown Iroxide, yielding manganic sulfate which reacts with iodide, releasing d with a standard solution of thiosulphate. Results for
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
	arried out using proce digestion of the sam		P "Phosphorus". Total Phosphorus is determined colourmetrically
SOLIDS-TOTSUS	S-WP Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended	solids in aquesous m	atrices is determined gravimetrically after dry	ving the residue at 103 105°C.
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueo	ous matrices is deterr	nined by the nephelometric method.	
ALS test method	ls may incorporate m	odifications from specified reference method	s to improve performance.

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 wwt - 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.



				.,				
		Workorder:	L231630	2	Report Date: 07-	AUG-19	Pa	age 1 of 3
3021 E	East St. Paul Birdshill Road t. Paul MB R2E	1A7						
Contact: Leanne	e Shewchuk							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-WP	Water							
Batch R473162	28							
WG3114845-12 LCS	5							
Biochemical Oxygen	Demand		103.0		%		85-115	25-JUL-19
WG3114845-11 MB								
Biochemical Oxygen	Demand		<2.0		mg/L		2	25-JUL-19
CHL/A-ACET-FLUORO-V	VP Water							
Batch R474272	23							
WG3124934-2 LCS								
Chlorophyll a	-		107.5		%		80-120	06-AUG-19
WG3124934-1 MB								
Chlorophyll a			<0.10		ug/L		0.1	25-JUL-19
					- 5		011	20 002 10
FC-QT97-WP	Water							
Batch R472488	38							
WG3114541-2 DUF	<b>b</b>	L2316302-1						
Fecal Coliforms		45	30		MPN/100mL	41	65	24-JUL-19
WG3114541-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	24-JUL-19
NH3-COL-WP	Water							
Batch R472774	18							
WG3116506-10 LCS	5							
Ammonia, Total (as N	1)		101.4		%		85-115	25-JUL-19
WG3116506-9 MB								
Ammonia, Total (as N	1)		<0.010		mg/L		0.01	25-JUL-19
					-			
Batch R472934								
WG3118122-2 LCS Ammonia, Total (as N			104.0		%		85-115	26 11 10
	•)		104.0		70		60-115	26-JUL-19
WG3118122-1 MB	I)		0.040					
Ammonia, Total (as N	1)		<0.010		mg/L		0.01	26-JUL-19
NO2-IC-N-WP	Water							
Batch R473055	58							
WG3115270-10 LCS	5							
Nitrite (as N)			98.3		%		90-110	25-JUL-19
WG3115270-9 MB								
Nitrite (as N)			<0.010		mg/L		0.01	25-JUL-19
	Water							
NO3-IC-N-WP	Water							



		Workorder:	L2316302	2	Report Date: 07-	AUG-19	Pa	ge 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)         Nitrate			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

Workorder: L2316302

Report Date: 07-AUG-19

#### 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 predetermined 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.

(ALS)	www.alsglobat.com



COC Number:	1	7
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Page of 2

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Street:	3021 Birdshill Road	· · · · · · · · · · · · · · · · · · ·	Email 1 or Fax	leanne.shewchuk(	2eaststpaul.com		Ť	Date en		_		eli E&	Ρ ΤΑΤΙ					dd-m	mm-y	y hhu	mm.		
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	\$\$ B			24-Jul-19	9:17	Water	4	R	R	1	R	R		R	R		R				-†		<u>†</u> –
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	P3 L			24-Jul-19	12:25	Water	3	R	R		R	R		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.



#### Chain of Custody (COC) / Analytical **Request Form**

Canada Toll Free: 1 800 668 9878



COC Number: 17 -

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Page 2 of 2

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Contact:	Leanne Shewchuk			_	Quality Control	(QC) Report with R	leport 🔲 YES		2	4 da	y [P4	20%]			NCY	1 Bu	sines	s day	/ [E - 1	[%00					
Phone:	204-668-8112 x 4503				Compare Result	ts to Criteria on Report -	provide details belo	w if box checked	LINON ST	3 da	y [P3-	25%]			IERGI	Same	Day,	Wee	kend (	or Sta	tutory	holid	ay (E2	-200%	
_	Company address below will ap	pear on the fir	nal report		Select Distribut	tion: 🗹 Email		FAX		2 da	y [P2-	50%]							ening (						Ц
Street:	3021 Birdshill Road				Email 1 or Fax	leanne.shewchuk(	@eaststpaul.com	n		Date an	d Time	e Regul	red for	all E&A	P TATs	:				dd-m	mm-yy	/ hh:n	ากก		
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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.



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

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L2324295 CONTD.... PAGE 2 of 10 Version: FINAL

### ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2324295-1 SS A							
Sampled By: TM on 07-AUG-19 @ 09:30							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		09-AUG-19	R4750115
Nitrate+Nitrite				5			
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	109		0.20	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters							
Ammonia, Total (as N)	0.065		0.010	mg/L		12-AUG-19	R4751433
Fecal Coliforms	84		1	MPN/100mL		07-AUG-19	R4744466
Phosphorus (P)-Total	0.218		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	29.2		2.0	mg/L		14-AUG-19	R4754769
Turbidity	30.9		0.10	NTU		08-AUG-19	R4744903
Algae Identification	00.0		0.10				
Scenedesmus (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Cryptomonas (Cryptophyceae)	Moderate amount		1.0			09-AUG-19	R4746767
Small Chrysophytes (Chrysophyceae)	Moderate 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
Merismopedia (Cyanophyceae)	Large amount		1.0			09-AUG-19	R4746767
Microcystis (Cyanophyceae)	Moderate amount		1.0			09-AUG-19	R4746767
Pseudanabaena (Cyanophyceae)	Massive amount		1.0			09-AUG-19	R4746767
Limnothrix (Cyanophyceae)	Moderate amount		1.0			09-AUG-19	R4746767
Planktothrix (Cyanophyceae)	Large amount		1.0			09-AUG-19	R4746767
Other	Small amount		1.0			09-AUG-19	R4746767
Note: Other: Rhopalodia (Bacillariophyceae)							
_2324295-2 SS B							
Sampled By: TM on 07-AUG-19 @ 09:20							
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	31.3		0.50	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters							
Ammonia, Total (as N)	0.024		0.010	mg/L		12-AUG-19	R4751433
Fecal Coliforms	<1		1	MPN/100mL		07-AUG-19	R4744466
Phosphorus (P)-Total	0.102		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	21.3		2.0	mg/L		14-AUG-19	R4754769
Turbidity	10.8		0.10	NTU		08-AUG-19	R4744903
Algae Identification			50				
Nitzschia (Bacillariophyceae)	Small amount		1.0			09-AUG-19	R4746767
	Small amount		1.0	1		09-AUG-19	R4746767

L2324295 CONTD.... PAGE 3 of 10 Version: FINAL

### 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	0.070		0.070			40 4110 40	
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	<0.010		0.010	ing/∟		09-AUG-19	R4750115
Chlorophyll a by fluorometry							
Chlorophyll a	82.3		0.50	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters	02.0		0.00				
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		2.0 0.10	NTU		08-AUG-19	R4744903
Algae Identification	00.0		0.10			007.00-19	000
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

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### ALS ENVIRONMENTAL ANALYTICAL REPORT

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	F0.4		0.50	//	00 4110 40	00 4110 40	D 4700005
Chlorophyll a Miscellaneous Parameters	50.1		0.50	ug/L	08-AUG-19	08-AUG-19	R4762235
	0.007		0.010			12-AUG-19	R4751433
Ammonia, Total (as N)	0.027		0.010	mg/L			
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						00 4110 40	D /7 /0707
Cosmarium (Chlorophyceae)	Small amount		1.0			09-AUG-19	R4746767
Monoraphidium (Chlorophyceae)	Small amount		1.0			09-AUG-19 09-AUG-19	R4746767
Oocystis (Chlorophyceae) Pediastrum (Chlorophyceae)	Small amount Small amount		1.0 1.0			09-AUG-19 09-AUG-19	R4746767 R4746767
Scenedesmus (Chlorophyceae)	Moderate amount		1.0			09-AUG-19 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

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### 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	5.60		0.10	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters							
Ammonia, Total (as N)	0.028		0.010	mg/L		12-AUG-19	R4751433
Phosphorus (P)-Total	0.191		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	3.7		2.0	mg/L		14-AUG-19	R4754769
Turbidity	2.37		0.10	NTU		08-AUG-19	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)	<0.040	DLM	0.040	mg/L		09-AUG-19	R4752545
Nitrate+Nitrite	<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	2	0.040			30 / 00-19	1171 02040
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
Chlorophyll a							
Chlorophyll a by fluorometry Chlorophyll a	24.8		0.10	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters	24.0		0.10	ug/L	00-A0G-19	08-AUG-19	R4702235
Ammonia, Total (as N)	0.081		0.010	mg/L		12-AUG-19	R4751433
Phosphorus (P)-Total	0.148		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	19.9		2.0	mg/L		14-AUG-19	R4754769
Turbidity	26.4		0.10	NTU		08-AUG-19	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)	<0.040	DLM	0.040	mg/L		09-AUG-19	R4752545
Nitrate+Nitrite	0.070		0.070	~~/!			
Nitrate and Nitrite as N Nitrite in Water by IC	<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
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	18.9		0.10	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters							
Ammonia, Total (as N)	0.050		0.010	mg/L		12-AUG-19	R4751433
Phosphorus (P)-Total	0.0710		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	8.8		2.0	mg/L		14-AUG-19	R4754769
Turbidity	6.11		0.10	NTU		08-AUG-19	R4744903
L2324295-8 S U							
Sampled By: TM on 07-AUG-19 @ 12:05							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC	<0.040	DLM	0.040	mg/L		09-AUG-19	R4752545
Nitrate (as N)							

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### ALS ENVIRONMENTAL ANALYTICAL REPORT

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	<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
Chlorophyll a							
Chlorophyll a by fluorometry							D /
Chlorophyll a	72.4		0.20	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters	0.004		0.040				D 4754 400
Ammonia, Total (as N)	0.021		0.010	mg/L		12-AUG-19	R4751433
Phosphorus (P)-Total	0.119		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	20.9		2.0	mg/L		14-AUG-19	R4754769
Turbidity	11.6		0.10	NTU		08-AUG-19	R4744903
L2324295-9 S L							
Sampled By: TM on 07-AUG-19 @ 12:20							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC	<0.020		0.020	ma/l		09-AUG-19	D 4750545
Nitrate (as N) Nitrate+Nitrite	<0.020		0.020	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	\$0.070		0.070				
Nitrite (as N)	<0.010		0.010	mg/L		09-AUG-19	R4752545
Chlorophyll a				0			
Chlorophyll a by fluorometry							
Chlorophyll a	12.1		0.10	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters							
Ammonia, Total (as N)	0.026		0.010	mg/L		12-AUG-19	R4751433
Phosphorus (P)-Total	0.0595		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	35.3		2.0	mg/L		14-AUG-19	R4754769
Turbidity	15.4		0.10	NTU		08-AUG-19	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)	<0.10	DLM	0.10	mg/L		09-AUG-19	R4752545
Nitrate+Nitrite	0.44		0.44			14 410 40	
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	<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>		0.000	mg/∟		00 400-19	1171 02040
Chlorophyll a by fluorometry							
Chlorophyll a	27.1		0.10	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters							
Ammonia, Total (as N)	0.068		0.010	mg/L		12-AUG-19	R4751433
Fecal Coliforms	687		1	MPN/100mL		07-AUG-19	R4744466
Phosphorus (P)-Total	0.217		0.0030	mg/L		09-AUG-19	R4745230
Total Supported Calida	17.7		2.0	mg/L		14-AUG-19	R4754769
Total Suspended Solids							

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### ALS ENVIRONMENTAL ANALYTICAL REPORT

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)	<0.10	DLM	0.10	mg/L		09-AUG-19	R4752545
Nitrate+Nitrite Nitrate and Nitrite as N	0.44		0.44			44 4110 40	
	<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	0.000		0.000	iiig/L		00710010	114102040
Chlorophyll a by fluorometry							
Chlorophyll a	57.2		0.20	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters							
Ammonia, Total (as N)	0.073		0.010	mg/L		12-AUG-19	R4751433
Phosphorus (P)-Total	0.581		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	23.2		2.0	mg/L		14-AUG-19	R4754769
Turbidity	4.43		0.10	NTU		08-AUG-19	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)	<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			09-AUG-19	D 4750545
Chlorophyll a	<0.050	DLIVI	0.050	mg/L		09-AUG-19	R4752545
Chlorophyll a by fluorometry							
Chlorophyll a	477		1.0	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters				Ŭ			
Ammonia, Total (as N)	0.060		0.020	mg/L		13-AUG-19	R4753069
Phosphorus (P)-Total	0.635		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	56.0		2.0	mg/L		14-AUG-19	R4754769
Turbidity	15.9		0.10	NTU		08-AUG-19	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)	<0.10	DLM	0.10	mg/L		09-AUG-19	R4752545
Nitrate+Nitrite			<u> </u>				
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	<u> </u>		0.000	ing/L		00 700-19	1171 02040
Chlorophyll a by fluorometry							
Chlorophyll a	138		0.20	ug/L	08-AUG-19	08-AUG-19	R4762235
Miscellaneous Parameters							
Ammonia, Total (as N)	0.042		0.010	mg/L		12-AUG-19	R4751433
Phosphorus (P)-Total	0.535		0.0030	mg/L		09-AUG-19	R4745230
Total Suspended Solids	60.0		2.0	mg/L		14-AUG-19	R4754769
Turbidity	25.5		0.10	NTU		08-AUG-19	R4744903

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### ALS ENVIRONMENTAL ANALYTICAL REPORT

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 in Water by IC            Nitrate and Nitrite as N         <0.11           Nitrate in Water by IC         0.11           Nitrate in Water by IC            Nitrate and Nitrite as N         <0.11           Nitrate and Nitrite as N         <0.11           Nitrate in Water by IC            Nitrate and Nitrite as N         <0.11           Nitrate and Nitrite as N         <0.050           DLM         0.050           Miscellaneous Parameters            Ammonia, Total (as N)         0.107           Phosphorus (P)-Total         0.312           Total Suspended Solids         210           3.3         mg/L           14-AUG-19         R47527	Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
Sampled By:TM on 07-AUG-19 @ 11:06Image: Constraint of the second								
Matrix:WATERImage: Chlorophyll aWATERImage: Chlorophyll aImage: Chlorophyll aImage: Chlorophyll aP6 LImage: Chlorophyll aImage: Chlorophyll aI								
L2324295-14       P6 L         Sampled By:       TM on 07-AUG-19 @ 11:35         Matrix:       WATER         Nitrate + Nitrite         Nitrate in Water by IC         Nitrate and Nitrite as N         Nitrate and Nitrite as N         Vitrate in Water by IC         Nitrate and Nitrite as N         Vitrate and Nitrite as N         Vitrate (as N)         Nitrate and Nitrite as N         Vitrate (as N)         Vitrate (as N)         Nitrate and Nitrite as N         Vitrate (as N)         Chlorophyll a         Chlorophyll a         Miscellaneous Parameters         Ammonia, Total (as N)         Phosphorus (P)-Total         Dispended Solids         210         3.3         mg/L         U         U         U         U         Nitrite         U         U         U         U         U         U         U         U         U         Nitrite (as N)         U         U         U      <								
Sampled By: Matrix: WATER Nitrate + Nitrite Nitrate in Water by IC Nitrate and Nitrite as N <0.10 DLM0.10mg/L09-AUG-19R47525Nitrate ANitrite Nitrate (as N)<0.10								
Matrix:WATER Nitrate + NitriteWATERImage: Sector Sect								
Nitrate + NitriteNitrate in Water by ICOP-AUG-19R47525Nitrate + Nitrite<0.10								
Nitrate (as N)<0.10DLM0.10mg/L09-AUG-19R475254Nitrate+Nitrite Nitrate and Nitrite as N<0.11								
Nitrate+Nitrite Nitrate and Nitrite as N<0.11o.11mg/L14-AUG-19Nitrite in Water by IC Nitrite (as N)<0.050		0.40	DIM	0.40			00 0110 40	D 1750515
Nitrate and Nitrite as N<0.11mg/L14-AUG-19Nitrite in Water by IC Nitrite (as N)<0.050		<0.10	DLIM	0.10	mg/∟		09-AUG-19	R4752545
Nitrite in Water by IC Nitrite (as N)<0.050DLM0.050mg/L09-AUG-19R47525-Chlorophyll a Chlorophyll a Chlorophyll a Miscellaneous Parameters51.30.50ug/L08-AUG-19R47622-Miscellaneous Parameters0.1070.010mg/L0.010mg/L12-AUG-19R47614-Phosphorus (P)-Total0.3120.0030mg/L0.0030mg/L14-AUG-19R476474-		<0.11		0.11	ma/L		14-AUG-19	
Chlorophyll a Chlorophyll a by fluorometry Chlorophyll a51.30.50ug/L08-AUG-19R476223Miscellaneous Parameters0.1070.010mg/L12-AUG-19R475143Phosphorus (P)-Total0.3120.0030mg/L09-AUG-19R474523Total Suspended Solids2103.3mg/L14-AUG-19R475474					5			
Chlorophyll a by fluorometry Chlorophyll a51.30.50ug/L08-AUG-1908-AUG-19R47622Miscellaneous Parameters0.1070.010mg/L12-AUG-19R475142Ammonia, Total (as N)0.1070.0030mg/L09-AUG-19R475142Phosphorus (P)-Total0.3120.0030mg/L09-AUG-19R475472Total Suspended Solids2103.3mg/L14-AUG-19R475474		<0.050	DLM	0.050	mg/L		09-AUG-19	R4752545
Chlorophyll a         51.3         0.50         ug/L         08-AUG-19         R476223           Miscellaneous Parameters         0.107         0.010         mg/L         12-AUG-19         R476143           Ammonia, Total (as N)         0.107         0.0030         mg/L         09-AUG-19         R476523           Phosphorus (P)-Total         0.312         0.0030         mg/L         09-AUG-19         R476523           Total Suspended Solids         210         3.3         mg/L         14-AUG-19         R476547								
Miscellaneous Parameters         0.107         0.010         mg/L         12-AUG-19         R475143           Ammonia, Total (as N)         0.312         0.0030         mg/L         09-AUG-19         R475143           Phosphorus (P)-Total         0.312         0.0030         mg/L         09-AUG-19         R475474           Total Suspended Solids         210         3.3         mg/L         14-AUG-19         R475474	Chlorophyll a by fluorometry Chlorophyll a	51 3		0.50	μα/l	08-AUG-19	08-AUG-19	R4762235
Ammonia, Total (as N)         0.107         0.010         mg/L         12-AUG-19         R47514           Phosphorus (P)-Total         0.312         0.0030         mg/L         09-AUG-19         R47652           Total Suspended Solids         210         3.3         mg/L         14-AUG-19         R47547		01.0		0.00	~~g/ L		30,00,10	117102200
Phosphorus (P)-Total         0.312         0.0030         mg/L         09-AUG-19         R47452           Total Suspended Solids         210         3.3         mg/L         14-AUG-19         R47547		0.107		0.010	mg/L		12-AUG-19	R4751433
Total Suspended Solids         210         3.3         mg/L         14-AUG-19         R475470	Phosphorus (P)-Total							R4745230
Turbidity         107         0.10         NTU         08-AUG-19         R47449		210		3.3				R4754769
	Turbidity	107		0.10	NTU		08-AUG-19	R4744903

#### **Reference Information**

Qualifier	Descrip			
DLM	Detectio	n Limit Adju	sted due to sample matrix effects (e.g. chen	nical interference, colour, turbidity).
MS-B	Matrix S	pike recover	y could not be accurately calculated due to	high analyte background in sample.
est Method	Reference	s:		
ALS Test Cod	e	Matrix	Test Description	Method Reference**
ALGAE-ID-WF	0	Water	Algae Identification	Microscopic Examination
Standard Meth	nods 10200,	2005		
	d are then ex	amined usi	ng a compound phase contrast inverted mic	ples of fresh water. Samples are prepared using a sedimentation croscope. This test is a general screen of dominant types of algae.
CHL/A-ACET-I WP	FLUORO-	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
			s modified from EPA method 445.0. Chlorop acidification procedure. This method is not s	ohyll a is determined by a 90 % acetone extraction followed with subject to interferences from chlorophyll b.
EC-SCREEN-	WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative and	alysis of con	ductivity wh	ere required during preparation of other test	eg. IC, TDS, TSS, etc
C-QT97-WP		Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
mixture of hyd	rolyzable su	bstrates and	then sealed in a 97-well packet. The packe	Enzyme Substrate Coliform Test". The sample is mixed with a et is incubated at 44.5 – 0.2°C for 18 hours and then the number of mparing the number of positive responses to a probability table.
NH3-COL-WP		Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in w nitroprusside a	ater sample and measure	s forms indo ed colourme	phenol when reacted with hypochlorite and trically.	phenol. The intensity is amplified by the addition of sodium
NO2+NO3-CA	LC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP		Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anio	ns are analy	zed by lon (	Chromatography with conductivity and/or UV	/ detection.
NO3-IC-N-WP		Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anio	ns are analy	zed by lon (	Chromatography with conductivity and/or UV	/ detection.
02-DIS-WP		Water	Dissolved Oxygen	APHA 4500-O-C
manganic hyd	roxide is form	ned. Additic	n of sulfuric acid dissolves the manganic hy priginal DO content. The iodide is then titrat	recipitate of manganous hydroxide. In the presence of oxygen, brown droxide, yielding manganic sulfate which reacts with iodide, releasing ed with a standard solution of thiosulphate. Results for
P-T-COL-WP		Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis i after persulpha				-P "Phosphorus". Total Phosphorus is determined colourmetrically
SOLIDS-TOTS	SUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspend	ed solids in	aquesous m	natrices is determined gravimetrically after d	rying the residue at 103 105°C.
URBIDITY-W	/P	Water	Turbidity	APHA 2130B (modified)
		ces is deter	nined by the nephelometric method.	· ·
	hode may in	corporate	odifications from specified reference metho	de to improvo porformance

 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 wwt - 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.



			Workorder:	L2324295	5	Repor	t Date: 21-A	UG-19	Pa	ge 1 of 5
Chont.		shill Road 'aul MB R2E 1A	7							
Oomact.	Leanne Sl						•			<u> </u>
Test		Matrix	Reference	Result	Qualifier	Ur	nits	RPD	Limit	Analyzed
CHL/A-ACET-FLU	IORO-WP	Water								
Batch R WG3138205-3 Chlorophyll a	4762235 DUP		<b>L2324295-5</b> 5.60	6.16		uç	g/L	9.5	35	08-AUG-19
WG3138205-2 Chlorophyll a	LCS			105.9		%			80-120	20-AUG-19
WG3138205-1 Chlorophyll a	MB			<0.10		uç	g/L		0.1	08-AUG-19
FC-QT97-WP		Water								
Batch R	4744466									
WG3126316-2 Fecal Coliform			<b>L2324295-1</b> 84	54		М	PN/100mL	43	65	07-AUG-19
WG3126316-1 Fecal Coliform	MB IS			<1		М	PN/100mL		1	07-AUG-19
NH3-COL-WP		Water								
	4751433									
<b>WG3131497-2</b> Ammonia, Tota	al (as N)			100.0		%			85-115	12-AUG-19
<b>WG3131497-22</b> Ammonia, Tota	al (as N)			100.6		%	1		85-115	12-AUG-19
<b>WG3131497-1</b> Ammonia, Tota				<0.010		m	g/L		0.01	12-AUG-19
WG3131497-2 <sup>4</sup> Ammonia, Tota				<0.010		m	g/L		0.01	12-AUG-19
	4753069									
<b>WG3132727-2</b> Ammonia, Tota				95.6		%	1		85-115	13-AUG-19
<b>WG3132727-1</b> Ammonia, Tota	MB al (as N)			<0.010		m	g/L		0.01	13-AUG-19
NO2-IC-N-WP		Water								
Batch R WG3128328-2 Nitrite (as N)	4750115 LCS			99.4		%			90-110	09-AUG-19
WG3128328-1 Nitrite (as N)	MB			<0.010			g/L		0.01	09-AUG-19
Batch R	4752545									
WG3128319-2 Nitrite (as N)	LCS			102.2		%			90-110	09-AUG-19
WG3128319-1 Nitrite (as N)	MB			<0.010		m	g/L		0.01	09-AUG-19



						-			
			Workorder:	L232429	5	Report Date: 2	1-AUG-19	Pa	ge 2 of 5
lest .		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP		Water							
Batch R4	750115								
WG3128328-2	LCS								
Nitrate (as N)				98.2		%		90-110	09-AUG-19
WG3128328-1	МВ								
Nitrate (as N)				<0.020		mg/L		0.02	09-AUG-19
						0			
	752545								
WG3128319-2	LCS								
Nitrate (as N)				98.6		%		90-110	09-AUG-19
WG3128319-1	MB								
Nitrate (as N)				<0.020		mg/L		0.02	09-AUG-19
02-DIS-WP		Water							
Batch R4	744914								
WG3127931-2	LCS								
Oxygen, Dissolv	ved			101.3		%		85-115	08-AUG-19
WG3127931-1	МВ								
Oxygen, Dissolv	ved			<0.10		mg/L		0.1	08-AUG-19
P-T-COL-WP		Water							
Batch R4	745230								
WG3127329-27	DUP		L2324295-14						
Phosphorus (P)	-Total		0.312	0.326		mg/L	4.3	20	09-AUG-19
WG3127329-22	LCS								
Phosphorus (P)				103.7		%		80-120	09-AUG-19
WG3127329-26								00 120	
Phosphorus (P)				98.2		%		80-120	09-AUG-19
				50.2		70		00-120	09-AUG-19
WG3127329-21				-0.0020				0.000	
Phosphorus (P)				<0.0030		mg/L		0.003	09-AUG-19
WG3127329-25									
Phosphorus (P)	- I otal			<0.0030		mg/L		0.003	09-AUG-19
SOLIDS-TOTSUS-V	WP	Water							
Batch R4	754769								
WG3131146-2	LCS								
Total Suspende				104.9		%		85-115	14-AUG-19
									-
WG3131146-1	MR								
WG3131146-1 Total Suspende	MB ed Solids			<2.0		mg/L		2	14-AUG-19
WG3131146-1 Total Suspende		Water		<2.0		mg/L		2	14-AUG-19



		Workorder:	L232429	95	Report Date: 21	AUG-19	Pa	ge 3 of 5
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-WP	Water							
	44903 LCS		104.5		%		85-115	08-AUG-19
WG3127403-1 Turbidity	МВ		<0.10		NTU		0.1	08-AUG-19

Workorder: L2324295

Report Date: 21-AUG-19

#### 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

CVV Continuing Calibration Verification CVS Calibration Verification Standard LCSD Laboratory Control Sample Duplicate

Workorder: L2324295

Report Date: 21-AUG-19

#### Hold Time Exceedances:

	Sample						
ALS Product Description	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 Definitio	ns:						

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 predetermined 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.



#### Chain of Custody (COC) / Analytical

**Request Form** 



OC Number: 17 -

Canada Toll Free: 1 800 668 9878

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Report To	Contact and company name below will a	opear on the final report	T	Report Format			_			<u>.</u>			/nte	ict you	Ir AM	to con	firm al	I E&P	TATs (	surcharg	jes maj	y apply)	ī
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ALS Sample #	Sample Identification	on and/or Coordinates		Date	Time	Sample Type	15	ŝ	E	02-DIS-WP	Ş	ğ	P.	N N	Ę	FECALS	ALGAE		, 1			ا ک	Ĭ,
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	SS B			7-Aug-19	9:20	Water	4	R	R		R	R	<b></b>	R	R	R	R				1		
	SS C			7-Aug-19	9:52	Water	4	R	R		R	R		R	R	R	R				-		F
	SS D			7-Aug-19	10:05	Water	5	R	R	R	R	R		R	R	R	R				+		i—
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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 CQC form.

		Chain of Cust Re	ody (COC) ( quest Form			 			bel	her	· e_		co	C Nur	nber:	•••							
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Drinking	Water (DW) Samples <sup>1</sup> (client use)	Special Instructions / Special Instructions /			king on the drop	-down list below	L				SAI	APLE		_				(lab	use or	nly)			
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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: 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. #: Job Reference: C of C Numbers: Legal Site Desc:

NOT SUBMITTED WATER

Hua Wo Chemistry Laboratory Manager

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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	0.445		0.070				
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	10.010		0.010	ing/L			11102100
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	<0.010		0.010	IIIg/L		30-AUG-19	R4102400
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			<u> </u>			04.055.10	
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	<0.000		0.030	ing/L		30 700-19	114102400
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

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	548		1	MPN/100mL		29-AUG-19	R4778222
Phosphorus (P)-Total	0.110		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	10.1		2.0	mg/L		05-SEP-19	R4784577
Turbidity	4.90		0.10	NTU		30-AUG-19	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)	0.33		0.10	mg/L		30-AUG-19	R4782488
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.33		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	39.0		0.10	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters	00.0		0.10	ug/L	20710010	20 / 100 10	1(4/025/5
Ammonia, Total (as N)	0.126		0.010	mg/L		06-SEP-19	R4786151
Phosphorus (P)-Total	0.217		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	36.1		2.0	mg/L		05-SEP-19	R4784577
Turbidity	11.1		0.10	NTU		30-AUG-19	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)	<0.040	DLM	0.040	mg/L		30-AUG-19	R4782488
Nitrate+Nitrite	0.070		0.070				
Nitrate and Nitrite as N	<0.070		0.070	mg/L		04-SEP-19	
Nitrite in Water by IC Nitrite (as N)	<0.020	DLM	0.020	mg/L		30-AUG-19	R4782488
Chlorophyll a			0.020				
Chlorophyll a by fluorometry							
Chlorophyll a	33.2		0.10	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters							
Ammonia, Total (as N)	0.140		0.010	mg/L		06-SEP-19	R4786151
Phosphorus (P)-Total	0.120		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	4.7		2.0	mg/L		05-SEP-19	R4784577
Turbidity	2.80		0.10	NTU		30-AUG-19	R4778918
L2338601-6 P4 L							
Sampled By: TM on 29-AUG-19 @ 11:10							
Matrix:							
Nitrate + Nitrite							
Nitrate in Water by IC	-0.040	DLM	0.040	ma/l		20 4110 40	D4700400
Nitrate (as N) Nitrate+Nitrite	<0.040		0.040	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	\$0.070		0.070				
Nitrite (as N)	<0.020	DLM	0.020	mg/L		30-AUG-19	R4782488
Chlorophyll a							

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	23.0		0.10	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters							
Ammonia, Total (as N)	0.201		0.010	mg/L		06-SEP-19	R4786151
Conductivity	1220		1.0	umhos/cm		30-AUG-19	R4780896
Phosphorus (P)-Total	0.122		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	6.1		2.0	mg/L		05-SEP-19	R4784577
Turbidity	3.60		0.10	NTU		30-AUG-19	R4778918
_2338601-7 P6 L							
Sampled By: TM on 29-AUG-19 @ 11:10							
Matrix:							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLM	0.040	mg/L		30-AUG-19	R4782488
Nitrate+Nitrite	0.070		0.070				
Nitrate and Nitrite as N	<0.070		0.070	mg/L		04-SEP-19	
Nitrite in Water by IC Nitrite (as N)	<0.020	DLM	0.020	mg/L		30-AUG-19	R4782488
Chlorophyll a	<0.020	DEM	0.020	ing/E		30 400 13	114702400
Chlorophyll a by fluorometry							
Chlorophyll a	21.4		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
Fecal Coliforms	114		1	MPN/100mL		29-AUG-19	R4778222
Phosphorus (P)-Total	0.0810		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	6.0		2.0	mg/L		05-SEP-19	R4784577
Turbidity	2.02		0.10	NTU		30-AUG-19	R4778918
_2338601-8 SS A							
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	0.070		0.070				
Nitrate and Nitrite as N Nitrite in Water by IC	<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	<0.010		0.010	ing/ E		0070010	114702400
Chlorophyll a by fluorometry							
Chlorophyll a	187		0.40	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters							
Ammonia, Total (as N)	0.037		0.010	mg/L		06-SEP-19	R4786151
Conductivity	455		1.0	umhos/cm		30-AUG-19	R4780896
Fecal Coliforms	411		1	MPN/100mL		29-AUG-19	R4778222
Phosphorus (P)-Total	0.207		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	37.9		2.0	mg/L		05-SEP-19	R4784577
Turbidity	31.1		0.10	NTU		30-AUG-19	R4778918
_2338601-9 SS B							
Sampled By: TM on 29-AUG-19 @ 11:10							
Matrix:							

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)	<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	<0.010		0.010	ing/E		30 400 13	114702400
Chlorophyll a by fluorometry							
Chlorophyll a	86.3		0.70	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters							
Ammonia, Total (as N)	0.194		0.010	mg/L		06-SEP-19	R4786151
Fecal Coliforms	4		1	MPN/100mL		29-AUG-19	R4778222
Phosphorus (P)-Total	0.131		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	44.7		2.0	mg/L		05-SEP-19	R4784577
Turbidity	24.3		0.10	NTU		30-AUG-19	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)	<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	<0.070		0.070	ing/L		04-021-19	
Nitrite (as N)	<0.010		0.010	mg/L		30-AUG-19	R4782488
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	97.6		0.70	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters							
Ammonia, Total (as N)	0.037		0.010	mg/L		06-SEP-19	R4786151
Fecal Coliforms	308		1	MPN/100mL		29-AUG-19	R4778222
Phosphorus (P)-Total	0.198		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	46.1		2.0	mg/L		05-SEP-19	R4784577
Turbidity	32.8		0.10	NTU		30-AUG-19	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)	<0.020		0.020	mg/L		30-AUG-19	R4782488
Nitrate+Nitrite	<0.020		0.020	iiig/L		00700-19	114/02400
Nitrate and Nitrite as N	<0.070		0.070	mg/L		04-SEP-19	
Nitrite in Water by IC				Ŭ			
Nitrite (as N)	<0.010		0.010	mg/L		30-AUG-19	R4782488
Chlorophyll a							
Chlorophyll a by fluorometry							DITECT
Chlorophyll a	74.3		1.0	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters	0.400		0.040				DATOCALL
Ammonia, Total (as N)	0.103		0.010	mg/L		06-SEP-19	R4786151
Fecal Coliforms	25		1	MPN/100mL		29-AUG-19	R4778222

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	0.249		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	134		7.5	mg/L		05-SEP-19	R4784577
Turbidity	59.9		0.10	NTU		30-AUG-19	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)	<0.020		0.020	mg/L		30-AUG-19	R4782488
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	ma/l		04-SEP-19	
Nitrite in Water by IC	<0.070		0.070	mg/L		04-966-19	
Nitrite (as N)	<0.010		0.010	mg/L		30-AUG-19	R4782488
Chlorophyll a							
Chlorophyll a by fluorometry							
Chlorophyll a	43.2		0.10	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters	0.405		0.040				D4700454
Ammonia, Total (as N)	0.105		0.010	mg/L		06-SEP-19	R4786151
Conductivity	907		1.0	umhos/cm		30-AUG-19	R4780896
Phosphorus (P)-Total	0.198		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids Turbidity	44.3 18.1		2.0 0.10	mg/L NTU		05-SEP-19 30-AUG-19	R4784577 R4778918
	10.1		0.10	NIU		30-AUG-19	K4//0910
L2338601-13 CS L Sampled By: TM on 29-AUG-19 @ 11:10							
Matrix:							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	0.051		0.040	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		DLM	0.000	ma//		20 410 40	D 4700 400
Nitrite (as N) Chlorophyll a	<0.020	DLIVI	0.020	mg/L		30-AUG-19	R4782488
Chlorophyll a by fluorometry							
Chlorophyll a	39.6		0.10	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters				-			
Ammonia, Total (as N)	0.120		0.010	mg/L		06-SEP-19	R4786151
Phosphorus (P)-Total	0.140		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	12.5		2.0	mg/L		05-SEP-19	R4784577
Turbidity	14.8		0.10	NTU		30-AUG-19	R4778918
L2338601-14 BTP 1							
Sampled By: TM on 29-AUG-19 @ 11:10							
Matrix:							
Nitrate + Nitrite							
Nitrate in Water by IC	0.049		0.040	ma/l		30-AUG-19	D4702400
Nitrate (as N) Nitrate+Nitrite	0.048		0.040	mg/L		30-AUG-19	R4782488
Nitrate and Nitrite as N	<0.070		0.070	mg/L		05-SEP-19	
Nitrite in Water by IC			0.070				
Nitrite (as N)	<0.020	DLM	0.020	mg/L		30-AUG-19	R4782488
Chlorophyll a							

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	30.1		0.10	ug/L	29-AUG-19	29-AUG-19	R4782973
Miscellaneous Parameters	0011		0.10	~g/ _	207.0010		
Ammonia, Total (as N)	0.521		0.020	mg/L		06-SEP-19	R4790690
Phosphorus (P)-Total	0.136		0.0030	mg/L		03-SEP-19	R4781470
Total Suspended Solids	12.5		2.0	mg/L		05-SEP-19	R4784577
Turbidity	11.3		0.10	NTU		30-AUG-19	R4778918
			0.10				

## **Reference Information**

#### Sample Parameter Qualifier Key:

	Descrip	tion		
DLM	Detectio	on Limit Adju	sted due to sample matrix effects (e.g. chemica	al interference, colour, turbidity).
MS-B	Matrix S	pike recover	ry could not be accurately calculated due to hig	h analyte background in sample.
est Method	d Reference	es:		
ALS Test Co	de	Matrix	Test Description	Method Reference**
CHL/A-ACET WP	-FLUORO-	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET
			s modified from EPA method 445.0. Chlorophy acidification procedure. This method is not sub	II a is determined by a 90 % acetone extraction followed with ject to interferences from chlorophyll b.
EC-SCREEN	-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative ar	nalysis of con	nductivity wh	ere required during preparation of other test eg	. IC, TDS, TSS, etc
EC-WP		Water	Conductivity	APHA 2510B
Conductivity and chemical			efers to its ability to carry an electric current. Co	onductance of a solution is measured between two spatially fixed
FC-QT97-WF	5	Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
mixture of hy	drolyzable su	ubstrates and	d then sealed in a 97-well packet. The packet is	zyme Substrate Coliform Test". The sample is mixed with a sincubated at $44.5 - 0.2^{\circ}$ C for 18 hours and then the number of aring the number of positive responses to a probability table.
NH3-COL-WF	Р	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in v nitroprusside				enol. The intensity is amplified by the addition of sodium
	and measure			enol. The intensity is amplified by the addition of sodium CALCULATION
nitroprusside NO2+NO3-C/	and measure	ed colourme	trically.	
nitroprusside NO2+NO3-C/ NO2-IC-N-WI	and measure ALC-WP P	ed colourme Water Water	virically. Nitrate+Nitrite	CALCULATION EPA 300.1 (mod)
nitroprusside NO2+NO3-C/ NO2-IC-N-WI	and measure ALC-WP P ons are analy	ed colourme Water Water	Nitrate+Nitrite Nitrite in Water by IC	CALCULATION EPA 300.1 (mod)
nitroprusside NO2+NO3-C/ NO2-IC-N-WI Inorganic ani NO3-IC-N-WI	and measure ALC-WP P ons are analy P	ed colourme Water Water yzed by Ion ( Water	trically. Nitrate+Nitrite Nitrite in Water by IC Chromatography with conductivity and/or UV de	CALCULATION EPA 300.1 (mod) etection. EPA 300.1 (mod)
nitroprusside NO2+NO3-C/ NO2-IC-N-WI Inorganic anio NO3-IC-N-WI Inorganic anio	and measure ALC-WP P ons are analy P ons are analy	ed colourme Water Water yzed by Ion ( Water	trically. Nitrate+Nitrite Nitrite in Water by IC Chromatography with conductivity and/or UV de Nitrate in Water by IC	CALCULATION EPA 300.1 (mod) etection. EPA 300.1 (mod)
nitroprusside NO2+NO3-C/ NO2-IC-N-WI Inorganic anio NO3-IC-N-WI Inorganic anio P-T-COL-WP This analysis	and measure ALC-WP P ons are analy P ons are analy s is carried ou	ed colourme Water Water yzed by Ion ( Water yzed by Ion ( Water it using proc	trically. Nitrate+Nitrite Nitrite in Water by IC Chromatography with conductivity and/or UV de Nitrate in Water by IC Chromatography with conductivity and/or UV de Phosphorus, Total edures adapted from APHA METHOD 4500-P	CALCULATION EPA 300.1 (mod) etection. EPA 300.1 (mod) etection.
nitroprusside NO2+NO3-C/ NO2-IC-N-WI Inorganic ani NO3-IC-N-WI Inorganic ani P-T-COL-WP This analysis after persulph	and measure ALC-WP P ons are analy ons are analy is carried ou hate digestion	ed colourme Water Water yzed by Ion ( Water yzed by Ion ( Water it using proc	trically. Nitrate+Nitrite Nitrite in Water by IC Chromatography with conductivity and/or UV de Nitrate in Water by IC Chromatography with conductivity and/or UV de Phosphorus, Total edures adapted from APHA METHOD 4500-P	CALCULATION EPA 300.1 (mod) etection. EPA 300.1 (mod) etection. APHA 4500 P PHOSPHORUS-L
nitroprusside NO2+NO3-C/ NO2-IC-N-WI Inorganic anio NO3-IC-N-WI Inorganic anio P-T-COL-WP This analysis after persulph SOLIDS-TOT	and measure ALC-WP P ons are analy ons are analy a is carried ou hate digestion	ed colourme Water Water yzed by lon ( Water yzed by lon ( Water tu using proc n of the sam Water	trically. Nitrate+Nitrite Nitrite in Water by IC Chromatography with conductivity and/or UV de Nitrate in Water by IC Chromatography with conductivity and/or UV de Phosphorus, Total edures adapted from APHA METHOD 4500-P	CALCULATION EPA 300.1 (mod) etection. EPA 300.1 (mod) etection. APHA 4500 P PHOSPHORUS-L "Phosphorus". Total Phosphorus is determined colourmetrically APHA 2540 D (modified)
nitroprusside NO2+NO3-C/ NO2-IC-N-WI Inorganic anio NO3-IC-N-WI Inorganic anio P-T-COL-WP This analysis after persulph SOLIDS-TOT	and measure ALC-WP P ons are analy ons are analy is carried ou hate digestion SUS-WP ded solids in	ed colourme Water Water yzed by lon ( Water yzed by lon ( Water tu using proc n of the sam Water	trically. Nitrate+Nitrite Nitrite in Water by IC Chromatography with conductivity and/or UV de Nitrate in Water by IC Chromatography with conductivity and/or UV de Phosphorus, Total edures adapted from APHA METHOD 4500-P ple. Total Suspended Solids	CALCULATION EPA 300.1 (mod) etection. EPA 300.1 (mod) etection. APHA 4500 P PHOSPHORUS-L "Phosphorus". Total Phosphorus is determined colourmetrically APHA 2540 D (modified)

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	<b>Test Description</b>	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 wwt - 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.



			Workorder:	L233860 <sup>2</sup>	1	Report Date: 10-8	SEP-19	Pa	ige 1 of 3
30 E		hill Road aul MB R2E 1A	7						
Contact: Le	eanne Sh								
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CHL/A-ACET-FLUO	RO-WP	Water							
Batch R47	782973								
WG3151694-2 Chlorophyll a	LCS			109.7		%		80-120	04-SEP-19
WG3151694-1 Chlorophyll a	MB			<0.10		ug/L		0.1	29-AUG-19
EC-WP		Water							
Batch R47	780896								
WG3150168-13	LCS								
Conductivity				98.9		%		90-110	30-AUG-19
WG3150168-8 Conductivity	LCS			99.1		%		90-110	30-AUG-19
WG3150168-11 Conductivity	MB			<1.0		umhos/cm		1	30-AUG-19
WG3150168-6 Conductivity	MB			<1.0		umhos/cm		1	30-AUG-19
FC-QT97-WP		Water							
	778222								
WG3147776-2 Fecal Coliforms	DUP		<b>L2338601-2</b> 37	37		MPN/100mL	1.1	65	29-AUG-19
WG3147776-1 Fecal Coliforms	MB			<1		MPN/100mL		1	29-AUG-19
NH3-COL-WP		Water							
Batch R47	786151								
WG3154633-6 Ammonia, Total	LCS (as N)			100.4		%		85-115	05-SEP-19
WG3154633-5 Ammonia, Total	<b>MB</b> (as N)			<0.010		mg/L		0.01	05-SEP-19
Batch R47	790690								
WG3156239-2 Ammonia, Total	LCS			100.2		%		85-115	06-SEP-19
WG3156239-1 Ammonia, Total	<b>MB</b> (as N)			<0.010		mg/L		0.01	06-SEP-19
NO2-IC-N-WP		Water				-			-
Batch R47	782488								
	LCS			99.99		%		90-110	30-AUG-19
Nitrite (as N)				33.33		70		30-110	30 A00 13



		Workorder:	L233860 <sup>-</sup>	1	Report Date: 10	-SEP-19	Pa	ge 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 Turbidity		<b>L2338601-1</b> 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

Workorder: L2338601

Report Date: 10-SEP-19

#### 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 predetermined 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** 

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2	SL		-	29-Aug-19	11:20	Water	4	R	R		R	R		R	R	R					-		
3	P1 U			29-Aug-19	10:16	Water	4	R	R		R	R		R	R	R	R		• • • • •		+		
4	P2 L			29-Aug-19	10:25	Water	3	R	R		R	R		R	R			$\vdash$				-+	
ζ	P3 L			29-Aug-19	10:35	Water	3	R	R		R	R		R	R			┝──┤			4	-+	
(	P4 L	·•• ·		29-Aug-19	10:45	Water	3	R	R		R	R		R	R		R	⊢╡	-+	+	╋		
5	P6 L			29-Aug-19	10:55	Water	4	R	R		R	R		R	R	R		┟╼╍╍╉		+	+	-+	
¢	SS A			29-Aug-19	9:05	Water	4	R	R		R	 R		R	R	R	R	┟──╁					
q	SS B			29-Aug-19	9:00	Water	4	R	R		R	R		R	R	R		┢──╂					
(0	SS C		n	29-Aug-19	9:37	Water	4	R	R		R	R		R	R	R		i			<u> </u>		
([]	\$\$ D			29-Aug-19	9:50	Water	4	R	R		R	R		R	R	R		r+			+		
- 12	CSU			29-Aug-19	11:30	Water	3	R	R		R	R		R	R		R	-+				-+	
Drinking	Water (DW) Samples <sup>1</sup> (client use)	Special Instructions / Sp			king on the drop	-down list below					SAN	IPLE	CON	οιτιο	N AS	RECE	IVED	(lab ı	use oni	ly)		£. ·	
			(elect	tronic COC only)			Froze	en					SIF O				Yes.		]	No	> ···	Ē	Γ
-	n from a Regulated DW System?						lce P	acks		Ice C	ubes		Custo	dy se	al inta	ect	Yes		]	No	<b>)</b> .		]
	—						Cooli	ng Ini								-					,		
	iuman consumption/ use?						-				R TEM	PERAT	URES	°C			FI	INAL CO	OLER T	TEMPERA	TURES	*C	
YES		<u> </u>							10	.5											8		
Released by:	SHIPMENT RELEASE (client L Date:	use) Time:	Received by:	NITIAL SHIPMENT	······································		Time		Der			F	INAL		_				b use o				
· · · · · · · · · · · · · · · · · · ·	Date.	l'ime:	Received by:	Cm	Date: 29-1	3-17	Time 3:5	59	Rece	eived	зу:	$\square$		P	Date	:	n.	111	2	9	Time	" 44	n
REFER TO BACK	PAGE FOR ALS LOCATIONS AND SAMPI				F - LABORATOR		OW.		TCOP	<del>.</del>			4			{	<u>L</u> L	4		<u> </u>	<u> </u>	<u>_ ( 70</u>	<u>~</u>

Failure to complete all parties 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-SEP-19Report 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

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L2351375 CONTD.... PAGE 2 of 10 Version: FINAL

## 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	0.007		0.000			24 850 40	D4044040
Nitrate (as N) Nitrate+Nitrite	0.097		0.020	mg/L		21-SEP-19	R4841049
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	122		0.50	ug/L	21-021-19	21-021-19	114039709
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	<0.020		0.020	iiig/L		21-021-13	114041043
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				J.			
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				I			

L2351375 CONTD.... PAGE 3 of 10 Version: FINAL

## 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	~0.000		0.000			21 021 -13	11-0-10-0-0
Chlorophyll a by fluorometry Chlorophyll a	70.6		0.20	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters	10.0		0.20	ug/L	21-061-19	21-061-19	114009109
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						25-SEP-19	
	0.227		0.0030	mg/L			R4839654
Total Suspended Solids Turbidity	34.9		2.0	mg/L NTU		26-SEP-19 20-SEP-19	R4848528
	4.49		0.10	NIU		20-327-19	R4838752
L2351375-5 P3 L Sampled By: TM on 10 SEP 10 @ 10:27							
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							

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## 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	4.68		0.10	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters							
Ammonia, Total (as N)	0.100		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.050	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	0.0689		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	3.6		2.0	mg/L		26-SEP-19	R4848528
Turbidity	2.48		0.10	NTU		20-SEP-19	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)	0.183		0.040	mg/L		21-SEP-19	R4841049
Nitrate+Nitrite	01100		01010				
Nitrate and Nitrite as N Nitrite in Water by IC	0.183		0.070	mg/L		26-SEP-19	
Nitrite (as N) Chlorophyll a	<0.020	DLM	0.020	mg/L		21-SEP-19	R4841049
Chlorophyll a by fluorometry Chlorophyll a	11.2		0.10	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters				_			
Ammonia, Total (as N)	0.251		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	0.105		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	2.3		2.0	mg/L		26-SEP-19	R4848528
Turbidity	2.34		0.10	NTU		20-SEP-19	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)	<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	8.48		0.10	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters							
Ammonia, Total (as N)	0.039		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.060	RRR	0.010	mg/L		21-SEP-19	R4838770
Note: RRR: Sample received in improper sampling bottle. Method requires amber glass							

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

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		1.0	umhos/cm		22-SEP-19	R4835269
Fecal Coliforms	152	MBHT	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)	<0.020		0.020	mg/L		21-SEP-19	R4841049
Nitrate+Nitrite Nitrate and Nitrite as N	-0.070		0.070	ma/l		26-SEP-19	
Nitrate and Nitrite as N Nitrite in Water by IC	<0.070		0.070	mg/L		20-367-19	
Nitrite (as N)	<0.010		0.010	mg/L		21-SEP-19	R4841049
Chlorophyll a			01010				
Chlorophyll a by fluorometry Chlorophyll a	164		0.50	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters			0.00	ug/L	21 021 10	21 021 10	114033703
Ammonia, Total (as N)	0.033		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.		MDUT					
Fecal Coliforms	461	MBHT	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)	<0.020		0.020	mg/L		21-SEP-19	R4841049
Nitrate+Nitrite	<0.020		0.020	iiig/L		21 021 10	114041045
Nitrate and Nitrite as N	<0.070		0.070	mg/L		26-SEP-19	
Nitrite in Water by IC	-0.040		0.040			21 660 40	D4944040
Nitrite (as N) Chlorophyll a	<0.010		0.010	mg/L		21-SEP-19	R4841049
Chlorophyll a by fluorometry							
Chlorophyll a	31.3		0.10	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters				Ŭ	-	-	
Ammonia, Total (as N)	0.050		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.050	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.							
						22-SEP-19	R4835269

L2351375 CONTD.... PAGE 6 of 10 Version: FINAL

## 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	0.000		0.000			24 SED 40	D 40 44 0 40
Nitrate (as N) Nitrate+Nitrite	<0.020		0.020	mg/L		21-SEP-19	R4841049
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	uc/I	21-SEP-19	21-SEP-19	D 4050700
Miscellaneous Parameters	136		0.20	ug/L	21-3EP-19	21-3EP-19	R4859789
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 Turbidity	47.5 29.8		2.0 0.10	mg/L NTU		26-SEP-19 20-SEP-19	R4848528 R4838752
	29.0		0.10	NIU		20-3LF-19	R4030732
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			0.010				
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	МВНТ	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

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## 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							
1 ,							
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	-0.010		0.010			21-SEP-19	D4941040
Nitrite (as N) Chlorophyll a	<0.010		0.010	mg/L		21-569-19	R4841049
Chlorophyll a by fluorometry							
Chlorophyll a	7.71		0.10	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters			0.10	-9/-			
Ammonia, Total (as N)	0.038		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.050	RRR	0.010	mg/L		21-SEP-19	R4838770
Note: RRR: Sample received in improper	0.000		2.010				
sampling bottle. Method requires amber glass							
bottle with no headspace. Also, Total Chlorine							
sample had headspace.		MOUT					D (000000
Fecal Coliforms	1	MBHT	1	MPN/100mL		20-SEP-19	R4832299
Phosphorus (P)-Total	0.156		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	5.3		2.0	mg/L		26-SEP-19	R4848528
Turbidity	4.11		0.10	NTU		20-SEP-19	R4838752
L2351375-13 CS L							
Sampled By: TM on 19-SEP-19 @ 11:38							
Matrix: WATER							
Nitrate + Nitrite							
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLM	0.040	mg/L		21-SEP-19	R4841049
Nitrate+Nitrite	0.070		0.070				
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	<0.020	DEIW	0.020	ing/L		21-021-19	R4041049
Chlorophyll a by fluorometry							
Chlorophyll a	39.1		0.20	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters				0			
Ammonia, Total (as N)	0.027		0.010	mg/L		27-SEP-19	R4850813
Chlorine, Total	0.050	RRR	0.010	mg/L		21-SEP-19	R4838770
Note: RRR: Sample received in improper				3			
sampling bottle. Method requires amber glass							
bottle with no headspace. Also, Total Chlorine							
sample had headspace.	060		4.0	umhos/cm		22 CED 40	D4025000
Conductivity	960		1.0			22-SEP-19	R4835269
Phosphorus (P)-Total	0.116		0.0030	mg/L		25-SEP-19	R4839654
Total Suspended Solids	9.7		2.0	mg/L		26-SEP-19	R4848528
Turbidity	9.63		0.10	NTU		20-SEP-19	R4838752
L2351375-14 BTP 1							
Sampled By: TM on 19-SEP-19 @ 11:53							
Matrix: WATER							
Nitrate + Nitrite							

L2351375 CONTD.... PAGE 8 of 10 Version: FINAL

## ALS ENVIRONMENTAL ANALYTICAL REPORT

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	<0.020	DEM	0.020	ing/∟		21-021-19	114041049
Chlorophyll a by fluorometry Chlorophyll a	88.2		0.20	ug/L	21-SEP-19	21-SEP-19	R4859789
Miscellaneous Parameters	00.2		0.20	ug/L	21-021-19	21-021-19	14039709
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.	0.000		0.010	ing/ E			114030770
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

## **Reference Information**

#### Sample Parameter Qualifier Key:

Qualifier	Description									
DLM	Detection Limit Adj	usted due to sample matrix effects (e.g. chemica	al 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		marks for issues regarding this analysis								
est Method R	eferences:									
ALS Test Code	Matrix	Test Description	Method Reference**							
CHL/A-ACET-FL WP	UORO- Water	Chlorophyll a by fluorometry	EPA 445.0 ACET							
		es modified from EPA method 445.0. Chlorophy n-acidification procedure. This method is not sub	I a is determined by a 90 % acetone extraction followed with ject to interferences from chlorophyll b.							
CL2-TOTAL-WP	Water	Chlorine, Total	APHA 4500-CI Chlorine(Residual) G (mod)							
			The recommended hold time for these tests is 15 minutes; field ic matter, if present, and dissipates rapidly into headspace.							
EC-SCREEN-WI	P Water	Conductivity Screen (Internal Use Only)	APHA 2510							
Qualitative analy	sis of conductivity w	here required during preparation of other test eg	IC, TDS, TSS, etc							
EC-WP	Water	Conductivity	APHA 2510B							
Conductivity of a and chemically in		efers to its ability to carry an electric current. Co	onductance of a solution is measured between two spatially fixed							
FC-QT97-WP	Water	Fecal Coliform by MPN QT97	APHA 9223B QT97							
mixture of hydrol	lyzable substrates ar	nd then sealed in a 97-well packet. The packet is	zyme Substrate Coliform Test". The sample is mixed with a incubated at $44.5 - 0.2^{\circ}$ C for 18 hours and then the number of aring the number of positive responses to a probability table.							
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F							
	er samples forms inc d measured colourm		enol. The intensity is amplified by the addition of sodium							
NO2+NO3-CALC	C-WP Water	Nitrate+Nitrite	CALCULATION							
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)							
Inorganic anions	are analyzed by lon	Chromatography with conductivity and/or UV de	tection.							
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 de	tection.							
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L							
	carried out using pro- e digestion of the sar		Phosphorus". Total Phosphorus is determined colourmetrically							
SOLIDS-TOTSU	S-WP Water	Total Suspended Solids	APHA 2540 D (modified)							
Total suspended	solids in aquesous	matrices is determined gravimetrically after dryir	g the residue at 103 105°C.							
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)							
Turbidity in aque	ous matrices is dete	rmined by the nephelometric method.								

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 wwt - 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.



COC Number: 17 -

Page of

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LSD:			Location:				١ <u>٣</u>					ĺ	Ŵ)	2 V	d v								1
ALS Lab Wor	k Order # (lab.use only): L23	ALS Contact:	Connor Cattani	Sampler:	ampler: TM		SOLIDS-TOTSUS	rurbidity-WP	άŅ	-T-COL-WP	NH3-COL-WP	CL2-TOTAL-WP	ANIONS-N2N3-IC-N-WP	CHL-FLUORO-WP		CONDUCTIVITY				-	AMPI	SUSPECTED HAZARD (see Special Instructions)	
ALS Sample #	Sample Identification	n and/or Coordinates	-	Date	Time	Sample Type	NUMBE	S	BIC	02-DIS-WP	Q.	ပ္ရ	<u>P</u>	NO		FECAL <sup>5</sup>	ng					A	Ц.
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3	P1 U			19-Sep-19	10:19	Water	4	R	R		R	R	R	R	R	R	Ŕ						
u a	P2 L			19-Sep-19	10:25	Water	3	R	R		R	R	R	R	R								1
5	P3 L			19-Sep-19	10:37	Water	3	R	R		R	R	R	R	R								+
6	P4 L	- ·		19-Sep-19	10:42	Water	3	R	R		R	R	R	R	R	<u> </u>							1
Ĩ	P6 L ·			19-Sep-19	10:55	Water	4	R	R		R	R	R	R	R	R	R						1
8	SS A			19-Sep-19	9:20	Water	4	R	R		R	R	R	R	R	R			-				
4	SS <del>B</del>			19-Sep-19	9:13	Water	4	R	R		Ŕ	R	R	R	R	R	R						
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A.	CS U			19-Sep-19	11:30	Water	4	R	R		R	Ŕ	R	R	R	R							
Drinking	Water (DW) Samples <sup>1</sup> (client use)	Special Instructions / Sp			king on the drop	-down list below			·		SAN	IPLE						(lab u	se or	nly)			
			(elec	tronic COC only)				Frozen 🚺 Ice Packs 🔲 Ice Cubes 🔲							vations Yes					No			
Are samples taken from a Regulated DW System?								acks			ubes	_	Cust	ody se	al inta	ict	Yes	E	1		No	· 1	
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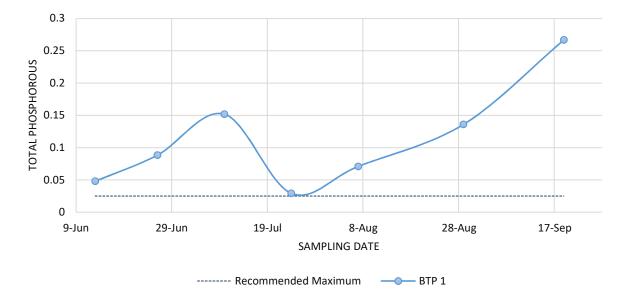
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy. 1, If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical OC Number: 17 -**Request Form** 351375-COFC of Canada Toll Free: 1 800 668 9878 www.alsglobal.com Select Service Lever Below - Contact your AM to confirm all E&P TATs (surcharges may apply) Report Format / Distribution Contact and company name below will appear on the final report Report To RM of East St. Paul Select Report Format: 🔽 PDF [ EXCEL 🔲 EDD (DIGITAL) Regular [R] [7] Standard TAT if received by 3 pm - business days - no surcharges apply Company: Quality Control (QC) Report with Report I YES INO 4 day [P4-20%] Business day [E - 100%] Leanne Shewchuk Contact Compare Results to Criteria on Report - provide details below if box checked 3 day (P3-25%) 204-668-8112 x 4503 Same Day, Weekend or Statutory holiday [E2 -200% Phone: Select Distribution: 📝 EMAIL 🔲 MAIL 🛄 FAX (Laboratory opening fees may apply) ] 2 day [P2-50%] Company address below will appear on the final report Date and Time Required for all E&P TATs: 3021 Birdshill Road mail 1 or Fax leanne.shewchuk@eaststpaul.com dd-mmm-yy hh:mm Street: operations@eaststpaul.com For tests that can not be performed according to the service level selected, you will be contacted. East St. Paul, MB Email 2 City/Province: Analysis Request R2E 1A7 Email 3 Postal Code: Invoice Distribution Indicate Filtered (F), Preserved (P) or Fittered and Preserved (F/P) below ON HOLD Same as Report To 「ア YES 🗌 NO Invoice To ŝ Special Instructions) Select Invoice Distribution: 🖓 EMAIL FAX Ë YES NO Copy of Invoice with Report Email 1 or Fax operations@eaststpaul.com AIN Company: mail 2 Contact: **UTNO** Oil and Gas Required Fields (client use) Project Information ê PO# ALS Account # / Quote #: Q74289 AFE/Cost Center: Routing Code: SUSPECTED HAZARD (see Maior/Minor Code: C Job #: SAMPLES (Monochla Р NIONS-NZN3-IC-N-WP PO / AFE: Requisitioner: OLIDS-TOTSUS-WP SD: Location: CHL-FLUORO-WP Ľ CL2-TOTAL-WP CONDUCTIVITY W-YTIDIBAU NUMBE 4H3-COL-WP ALS Lab Work Order # (lab use only): 12351375 ALS Contact: TM P-T-COL-WP Connor Cattani Sampler: D2-DIS-WP FCALS Sample Identification and/or Coordinates Date Time ALS Sample # Sample Type (lab use only) (This description will appear on the report) (dd-mmm-vv) (hh:mm) R R R R 19-Sep-19 11:38 3 R R R 13 CS L Water R R R R BTP 1 19-Sep-19 11:53 Water з Ř R 14 6 intari se kij 1400 ÷. <u>r</u> 16 1 4 11er - 497 SAMPLE CONDITION AS RECEIVED (lab use only) Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below Drinking Water (DW) Samples<sup>1</sup> (client use) (electronic COC only) SIF Observations П Yes 1 · ] No Frozen ice Packs 🔲 ice Cubes 🔲 Custody seal intact . •• Are samples taken from a Regulated DW System? Yes No YES NO 1217 وخير م Cooling Initiated FINAL COOLER TEMPERATURES \*C INITIAL COOLER TEMPERATURES \*C Are samples for human consumption/ use? 11.5 TYES NO FINAL SHIPMENT RECEPTION (lab use only) INITIAL SHIRMENT RECEPTION (lab use only) SHIPMENT RELEASE (client use) Released by: Time: Received by: Received by: Date Time: 22 Date:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY / I Failure to complete all partions 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 forms 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.

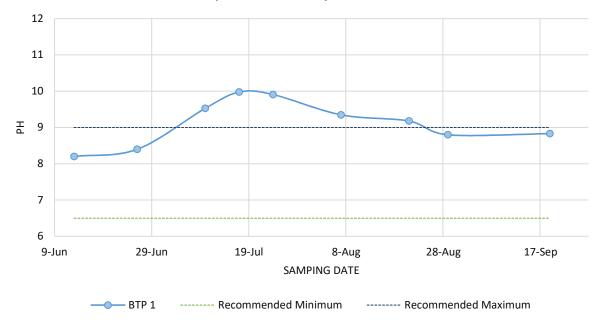
# **Appendix 4.** Graphical Representation of Water Quality Data

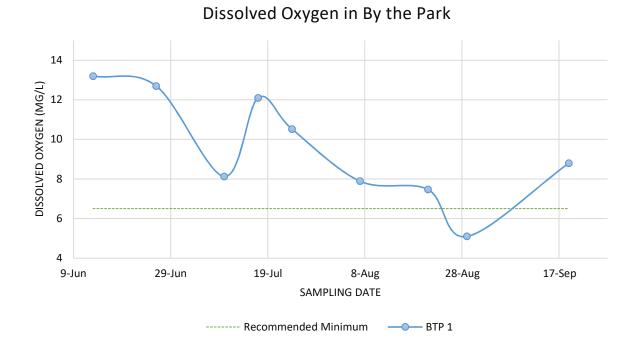
## By the Park

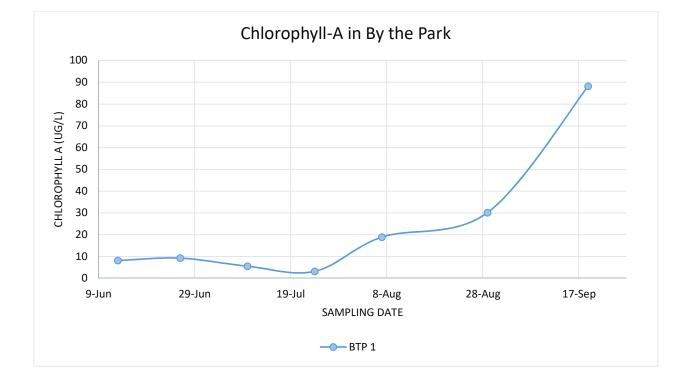


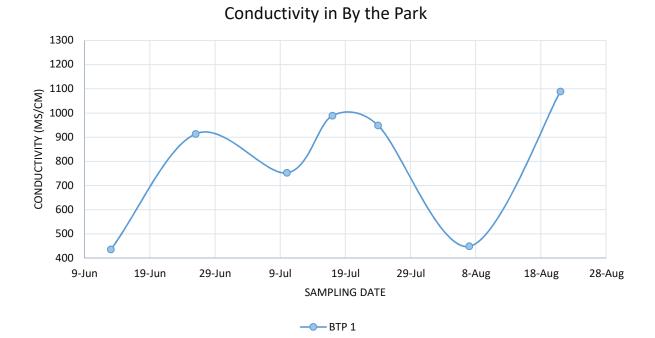
Total Phosphorous in By the Park

pH Levels in By the Park







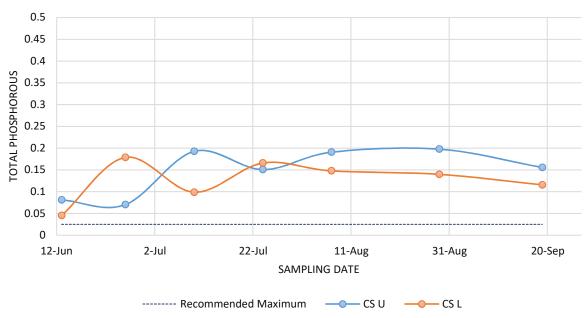


28.0 26.0 24.0 TEMPERATURE (°C) 22.0 20.0 • 18.0 16.0 14.0 9-Jun 29-Jun 19-Jul 8-Aug 28-Aug 17-Sep SAMPLING DATE

Water Temperature in By the Park

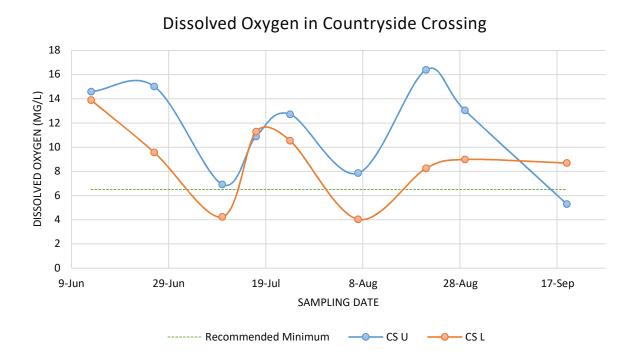
—**—** BTP 1

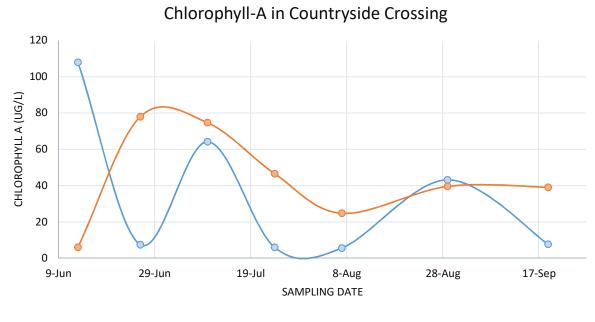
## Countryside Crossing

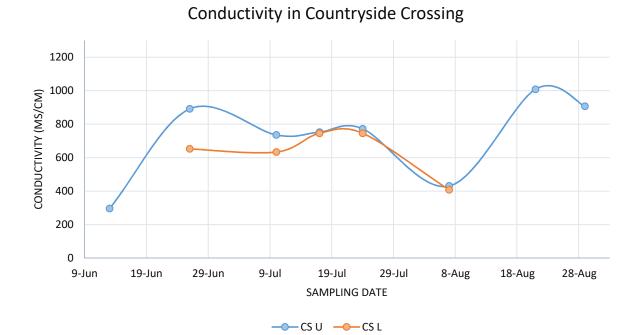


Total Phosphorous in Countryside Crossing

pH levels in Countryside Crossing 12 11 10 Н 9 8 7 6 12-Jun 2-Jul 22-Jul 11-Aug 31-Aug 20-Sep SAMPING DATE CS U - CS L ----- Recommended Minimum ----- Recommended Maximum

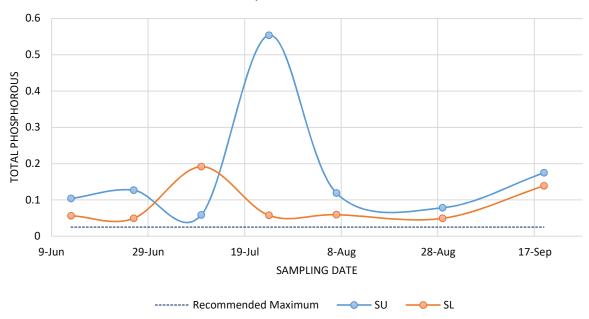






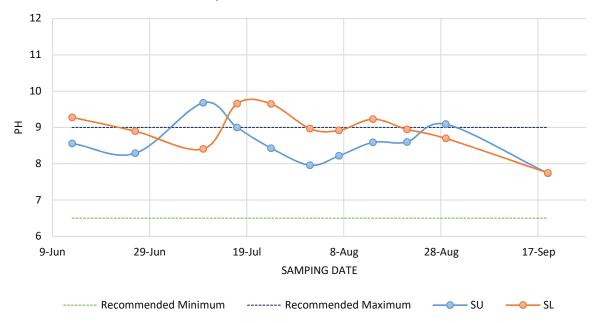
Water Temperature in Countryside 27.0 25.0 TEMPERATURE (°C) 23.0 21.0 19.0 17.0 15.0 9-Jun 29-Jun 19-Jul 8-Aug 28-Aug 17-Sep SAMPLING DATE

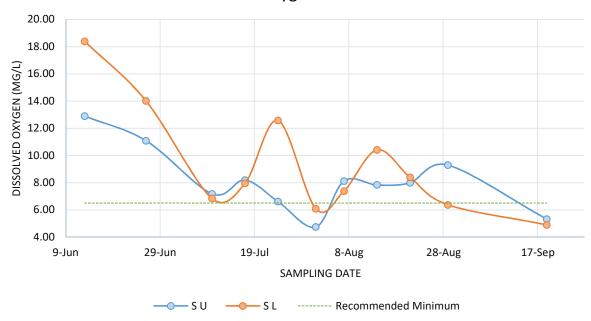
## Southlands



Total Phosphorous in Southlands

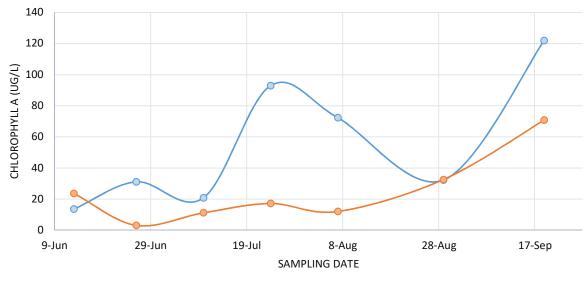
pH levels in Southlands

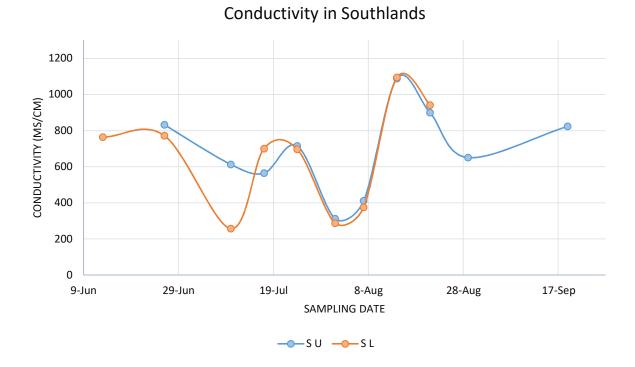




## Dissolved Oxygen in Southlands

Chlorophyll A in Southlands



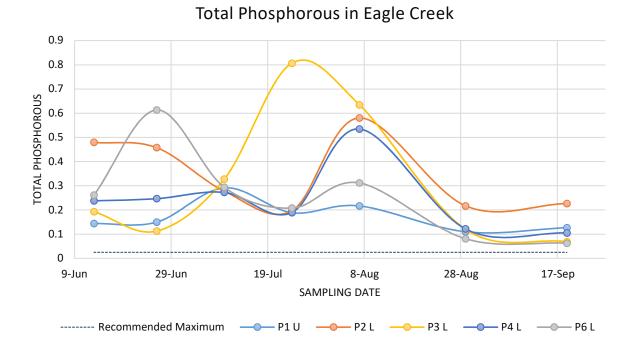


29.0 25.0 23.0 21.0 19.0 19.0 19.0 29.Jun 19-Jul 8-Aug 28-Aug 17-Sep SAMPLING DATE

Water Temperature in Southlands

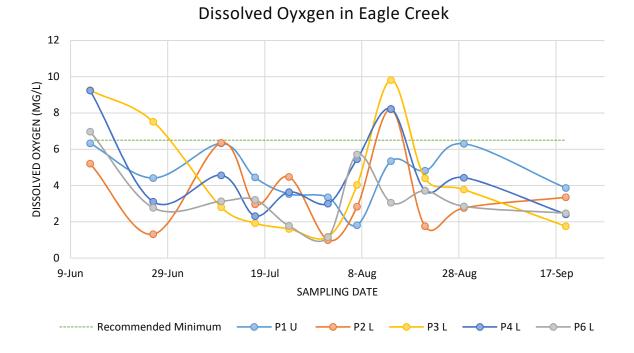
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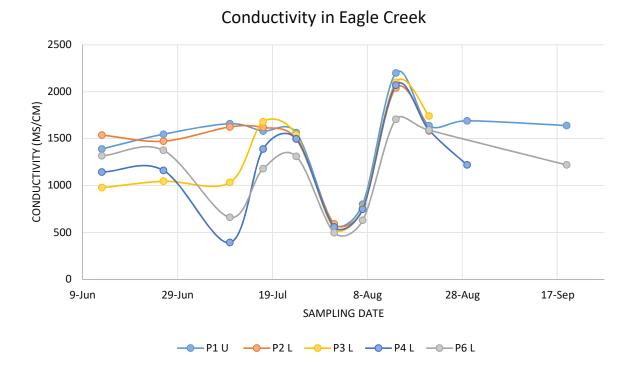


pH Levels in Eagle Creek 12 11 10 Ηd 9 8 7 6 9-Jun 29-Jun 19-Jul 8-Aug 28-Aug 17-Sep SAMPLING DATE – P1 U - P3 L 🔶 P2 L ------ P6 L ------ Recommended Minimum - P4 L

------ Recommended Maximum



Chlorophyll A in Eagle Creek



Water Temperature in Eagle Creek27.000</t