City of Portage la Prairie

2022 Residual Biosolids Land Application Program

As per Environment Licence 1907

Portage la Prairie
City of Possibilities

97 Saskatchewan Avenue East
Portage la Prairie, MB R1N 0L8
www.city-plap.com

2022 Residual Biosolids Land Application Program

City of Portage la Prairie, Water Pollution Control Facility

Report to Manitoba Sustainable Development

Introduction

The City of Portage la Prairie (the City) owns and operates a wastewater treatment system known as the Water Pollution Control Facility (WPCF). Flows from the McMillan Industrial Park as well as Poplar Bluff Industrial Park are received into and pre-treated in the Low-Rate Anaerobic Reactor (LRAR). This pre-treated wastewater is combined with municipal flows and conveyed to the Sequencing Batch Reactors (SBRs) that provide secondary treatment. Waste Activated sludge (WAS) is the residual solids that are generated through this process and required to be removed from the SBRs to ensure ongoing treatment. WAS is thickened through the addition of polymer and dewatered by gravity belt. The material is then stabilized in the anaerobic digester to produce Biosolids material that is suitable for land application as a fertilizer. Biosolids are stored throughout the year in the Bulk Volume Fermenter (BVF) or the Biosolids Storage Tanks (BSTs). Solids also accumulate within the LRAR and require removal to ensure adequate capacity and sludge depth within the Reactor. The process of removing the material to inject on agricultural land as a soil enhancement product begins once weather and harvest conditions allow. Injection of material helps to reduce runoff, prevent vector attraction, and minimize odours.

The removal, hauling, analyses and injection of this stored material constitutes the Biosolids Land Application program and is regulated under Environment Act License (EAL) #1907. During the fall of 2022, the City conducted its annual Residual Biosolids Land Application program and applied 630 dry tonnes of material to farmland.

Field Selection Process

After calculating how much land would be needed based on the quantity of biosolids to be removed, the City of Portage la Prairie administration contacted owners of land located in the

Rural Municipality of Portage la Prairie. Initial screening consisted of reviewing the proposed land application area and determining the subsurface geological formation. This was obtained from a map of the Rural Municipality of Portage la Prairie on which was superimposed areas that had met the requirements under EAL 1907. The criteria can be listed as follows:

i) Depth of clay or clay till of less than 1.5 metres between the soil surface and the water table;

ii) Within 100 metres of an identifiable boundary of an aquifer which is exposed to the ground surface;

iii) Where, prior to the application of biosolids, the soil pH is less than 6.0;

iv) Where the surface slope of the land is greater than 5 percent;

v) where, prior to application of biosolids, the level of nitrate-nitrogen exceeds 100 kilograms per hectare in the upper 60 cm of the soil; or

vi) Where, prior to the application of biosolids, the concentration of sodium bicarbonate extractable phosphorous, as P, exceeds 60 micrograms per gram in the upper 15 centimetres of the soil.

All sites that met the above criteria were considered for biosolids application. Potential fields for use were advertised in the local newspaper as well as on the City of Portage la Prairie website and in the Citizen's Info flyer that is distributed to homes. Letters of notification were also sent to Manitoba Conservation and Climate and the Rural Municipality of Portage la Prairie. Copies of the ad and letters are included in this report. Areas selected were then subject to soil testing processes and final selection.

Nutrient Testing

Soil testing was carried out on all usable fields to determine the pH, sodium bicarbonate extractable phosphorous, as P, and nitrate nitrogen according to the following criteria as specified in EAL #1907.

Parameter	**Depth of Analysis (cm)**
Phosphorous	15
pH	15
Potassium	15
Nitrate-Nitrite	60
Total Nitrogen	60

Core samples were obtained from the selected application sites, as per license requirements. One core sample was collected for each 2-hectare area and combined to form a composite sample for analysis. A sample for clay analyses and to verification of water table was also taken. The City of Portage la Prairie contracted an external laboratory to conduct all soils testing.

Heavy Metals

Soil samples were collected and analysed for background heavy metal concentrations. Heavy metal application was limited to one-third of the initial maximum addition of each heavy metal to be applied in any single application period as per environment license. All heavy metal analysis was conducted by an external laboratory. See Appendix B for background heavy metal concentration results. Back-ground heavy metal concentrations in the soil not exceeding the following:

Metal	**Background Concentration (kg/h)**
Cadmium	2.88
Copper	90
Nickel	90
Lead	90
Zinc	270
Mercury	0.9
Chromium	216

For 2022, land sections **NE 9-12-6, NW 9-12-6, SE 16-12-6**, owned by Allan Watson, were sampled, analyzed, and approved for use. Once a field had been tested and selected for application, prior to application, an agreement with the landowner was signed specifying the restrictions on future growing conditions. Copies of this agreement are also included in this report.

Biosolids Sampling and Testing

It is also necessary to sample and analyze the residual solids material to determine nutrient and metals levels. This is used to firstly- confirm the material contains levels lower than the maximum allowable concentration before applying and secondly- to determine the application rate that the material can be applied to ensure the cumulative amounts are below license limits.

Once approval was received, the BSTs, BVF, and LRAR biosolids were sampled and analyzed in accordance with Clause 1, Appendix A of EAL 1907, for the following components:

a. conductivity

b. pH

c. total solids

d. volatile solids

e. nitrate nitrogen

f. total Kjeldahl nitrogen

g. ammonia nitrogen

h. organic nitrogen

i. total phosphorous

j. lead

k. mercury

I. nickel

m. potassium

n. cadmium

o. copper

p. zinc

q. chromium

Based on the reported results, the materials contained in the BVF, BSTs and LRAR met the required criteria and were available for land application.

Sludge Handling

Biosolids Storage Facility

The contents of the storage tank were thoroughly mixed using the Seepex progressive cavity pumps in the facility and pumped to tanker trucks through an overhead fill line. City staff continuously monitored the entire filling process and operation of the sludge pumps.

Any spillage observed was attributed to material dripping from the hose after a truck was filled. All material that drips from the overhead filling hose is collected on the concrete spill pad that is washed down into a pit that conveys all material back to the Biosolids Storage Tanks.

Low-Rate Anaerobic Reactor

Sludge was withdrawn from the LRAR by means of internal lateral sludge lines that are normally used for sludge recirculation within the LRAR. Sludge was pumped directly to the trucks through a sludge transfer port and an overhead fill pipe. City staff continuously monitored the entire filling

process and operation of the sludge pumps. Communication was maintained by means of two-way radios.

Any spillage observed was attributed to material dripping from the hose after a truck was filled. All spillage that occurred was contained on a concrete spill pad that was washed after each load hauled. The spilled material and wash water were conveyed to the headworks of the LRAR by a pumping station located at the fill site.

Bulk Volume Fermenter

For 2022, no biosolids were removed from the BVF. This material was sampled but due to the volume within the other two storage areas, it was not necessary to removal any from the BVF. It is not anticipated that this will have any consequences on the operations of the WPCF in 2023.

Biosolids Transportation and Transfer Station

The biosolids was hauled via tanker truck to the field. Transportation routes were determined prior to application and Manitoba Conservation and Climate, and the RM of Portage la Prairie were notified of the intended routes. Copies of these notification letters are included with this report.

Biosolids was transferred from the tanks via a sludge transfer pump to the nurse tank. The nurse tank can hold approximately four tank loads. Cam-lock connections were used for all hose connection mitigating any spillage, which may have occurred during the sludge transfer stage. The nurse tank directly feeds the Drag-Line injection system.

Injection

All biosolids injection was conducted by a Drag-Line injection system which had been modified to allow for injection and to allow for a furrow spacing of 0.50 metres (20 inches). A total of 6 furrows were created with each pass.

Injection rate was based on the ground speed of the Dragline and the solids and ammonia information of the sludge. Concentration of percent solids and ammonia data was transferred to the field by means of two-way radio. This data was used by the operator of the Drag-Line equipment to estimate the speed of the unit by means of an injection rate chart. Approximately 100 kg/ha of plant available nitrogen was applied to each application area as based on the following formula:

$$S = \frac{N_p}{(NO_3\text{–}N + NH_3\text{–}N + F \times \text{Org-}N)}$$

Where:

S= sludge application rate (dry kg/ha)

N_p= plant available nitrogen requirement (kg/ha) = 100 kg/ha

NO_3-N= nitrate nitrogen content of sludge (kg/kg sludge)

NH_3-N= ammonia nitrogen content of sludge (kg/kg sludge)

F= organic nitrogen mineralization factor (0.2 dimensionless)

Org-N= organic nitrogen content of sludge (kg/kg sludge)

Biosolids Testing During Land Application

During the land application program, ongoing testing of samples from the BSTs, BVF and LRAR are conducted. One grab sample is collected from every tanker to form a composite sample of five tankers. Each composite is analyzed for solids and ammonia content.

The ammonia and solids testing that occurs during the biosolids hauling process are analyzed in-house by City of Portage lab techs. Solids are determined using a moisture balance and ammonia is determined via Flow Injection Analysis in accordance with APHA Standard Methods for the Examination of Water and Wastewater 20th Ed, 1998 Method 4500-NH_3 H. Flow Injection Analysis.

The ongoing testing of ammonia and solids for each composite sample ensures that the application rate is being adjusted accordingly as the program proceeds. The spreadsheets used to determine rates, also calculates the applied quantity of metals, Phosphorous, and Nitrogen along with the background soil composition to ensure the cumulative values do not exceed license requirements. This information is documented in the Biosolids Application Recording sheets which are included in this report. A copy of this report is also given to each landowner.

There were delays and complications at the external lab when completing the testing on the Biosolids and samples had to be resubmitted to confirm and verify. The City began the land injection process based on the information that was available plus using historical data. Once the final results were available, it was noted that the organic Nitrogen in the LRAR was higher than previous years. Adjustments were made to the land application rate to account for the higher concentration and the overall average of the half section was slightly above the limit of 100 kg/ha at 106.5kg/ha.

Summary

Residual solids were removed and transported for land application between September 29, 2022 and October 13, 2022. In total, 630 dry tonnes were removed and injected including 349 tonnes from the LRAR and 281 dry tonnes from the Biosolids Storage Tanks. There were initially some overapplication of Nitrogen from the material from the LRAR, however, the overall average for the field was only slightly above the PA-N application limit. There were no incidents or spills that occurred during the land application process. Follow up with the landowner indicated they were content with the application process and are willing to have residual solids applied in future years.

APPENDIX A
LAND SOLICITATION AND ADVERTISING

Portage la Prairie
City of Possibilities

97 Saskatchewan Avenue East
Portage la Prairie, MB R1N 0L8
www.city-plap.com

February 18, 2022

Mr. Tyler Kneeshaw
Regional Supervisor
Manitoba Environment, Climate and Parks
25 Tupper Street North
Portage la Prairie, MB R1N 3K1

Re: 2022 Residual Biosolids Application Program

Dear Mr. Kneeshaw,

The City of Portage la Prairie intends to conduct land application of residual biosolids in the fall of 2022. The following land areas that have been identified as potential application sites and pending soil analysis, biosolids **may** be applied to the following agricultural lands:

LEGAL LAND DESCRIPTIONS

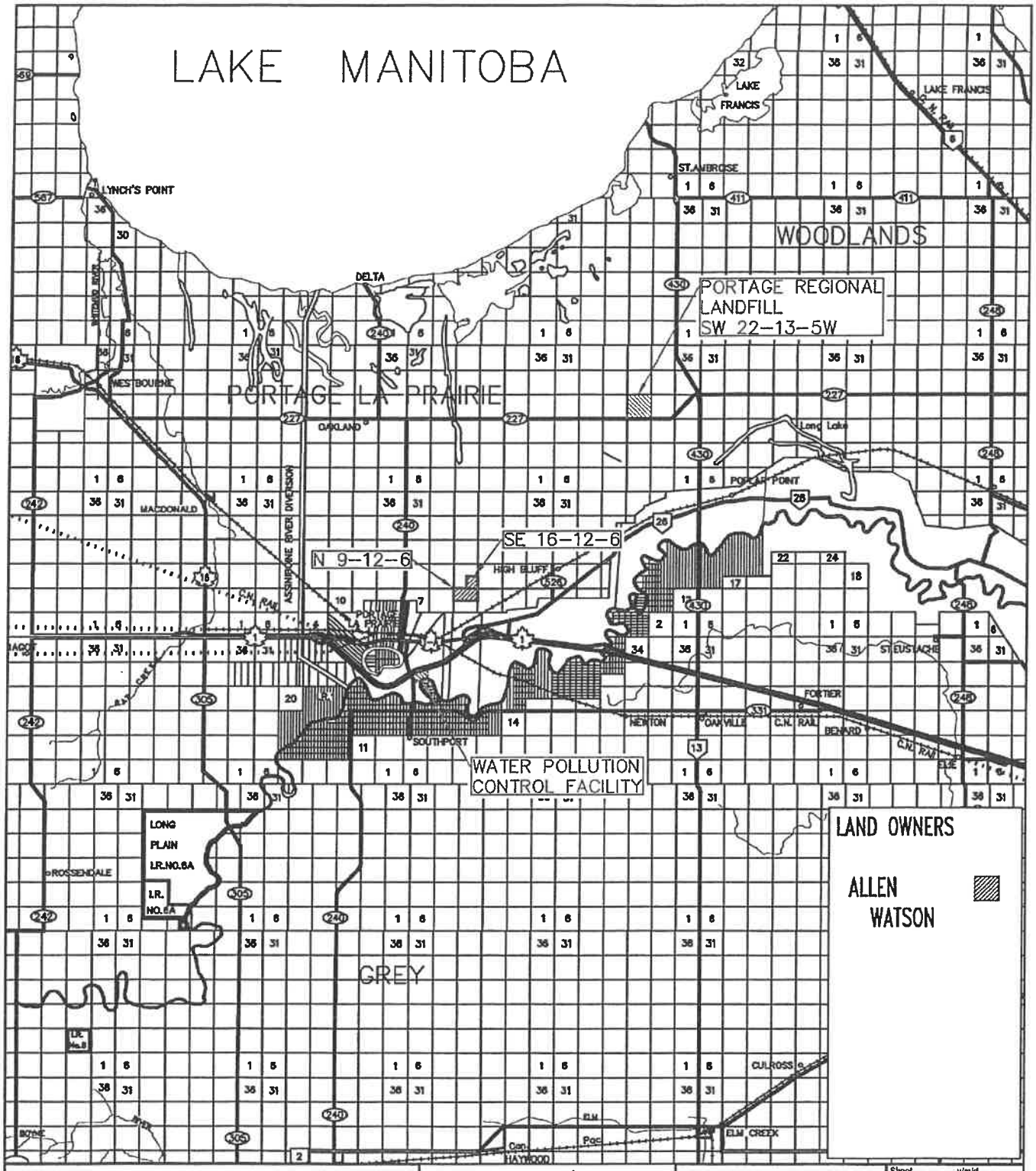
Owner: Allan Watson- N 9-12-6
SE 16-12-6

As required in Environment Act License 1907, Clause 17, notice of intent to land apply to the above noted sites will be printed in the Portage Daily Graphic March 3rd edition. The notice will also be posted to the City website. A copy of the intended routes of transport as well as a confirmation of start date will be sent once they are confirmed by the contractor. Please contact me at 204-239-8359 if you have or receive any concerns regarding the above sites.

A map of the Portage la Prairie region with fields identified has been included with this letter.

Sincerely,

Karly Friesen
Director of Utility



Portage la Prairie
City of Possibilities

Project
2022
BIOSOLIDS
APPLICATION
LAND DESCRIPTION

Sheet 1 | y/m/d 22/02/10
Scale N.T.S
Drawing No. M-214 | Rev. 0

Portage la Prairie
City of Possibilities

97 Saskatchewan Avenue East
Portage la Prairie, MB R1N 0L8
www.city-plap.com

February 18, 2022

Ms. Nettie Neudorf, CPA, CGA, CMMA
Chief Administrative Officer
Rural Municipality of Portage la Prairie
35 Tupper Street South
Portage la Prairie, MB R1N 1W7

Re: 2022 Residual Biosolids Application Program

Dear Ms. Neudorf,

The City of Portage la Prairie intends to conduct land application of residual biosolids in the fall of 2022. Below you will find the land areas that have been selected. A copy of the land map has been included as well. Pending soil analysis, biosolids **may** be applied to the following agricultural lands:

LEGAL LAND DESCRIPTIONS
Owner: Allan Watson- N 9-12-6
SE 16-12-6

As required in Environment Act License 1907, Clause 17, notice of intent to land apply to the above noted sites will be printed in the Portage Daily Graphic March 3rd edition. The notice will also be posted on the City's website. A copy of the intended routes of transport as well as a confirmation of start date will be sent once they are confirmed by the contractor. Please contact me at 204-239-8359 if you have or receive any concerns regarding the above sites.

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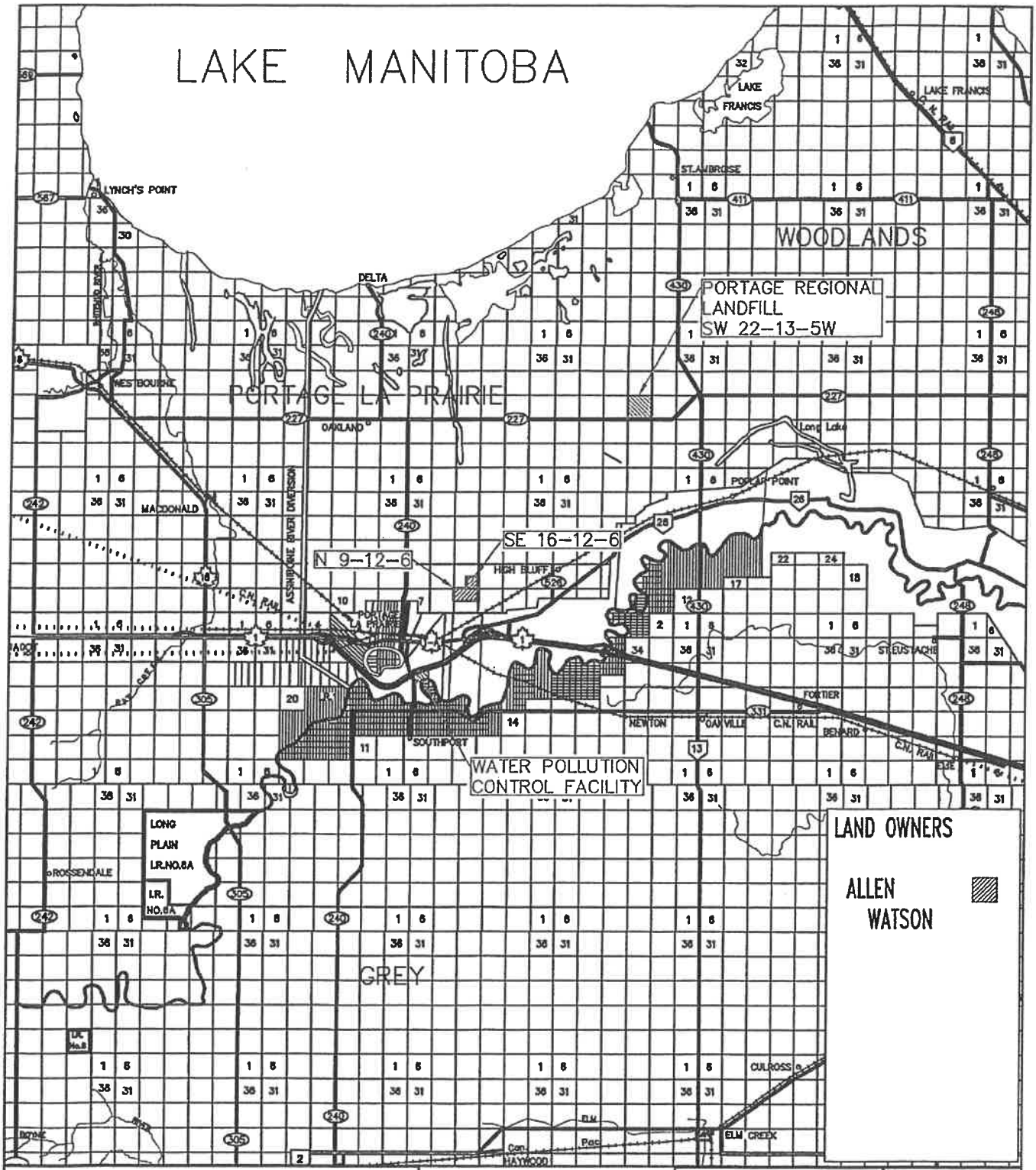


Portage la Prairie
City of Possibilities

Project
2022
BIOSOLIDS
APPLICATION
LAND DESCRIPTION

Sheet	y/m/d
1	22/02/10
Scale	N.T.S
Drawing No.	Rev.
M-214	0

The City of Portage la Prairie intends to conduct the Residual Biosolids Land Application Program commencing in the fall of 2022.

Pending soil analysis, biosolids **may** be applied to the following agricultural lands:

LEGAL DESCRIPTION
SE 16-12-6; N 9-12-6

A map of land locations can be found at www.city-plap.com

Please contact Karly Friesen, Manager, Director of Utility at
204-239-8359 if you have or receive any concerns regarding the above sites.

APPENDIX B

APPLICATION AREA SUMMARY, SOIL TESTING, BIOSOLIDS TESTING AND ANALYTICAL RESULTS

FALL

NW 9-12-6

NE 9-12-6

SE 16-12-6

Portage la Prairie
City of Possibilities

97 Saskatchewan Avenue East
Portage la Prairie, MB R1N 0L8
www.city-plap.com

September 29, 2022

Mr. Tyler Kneeshaw
Regional Supervisor – Environment Officer
Manitoba Conservation and Climate
309 – 25 Tupper Street North
Portage la Prairie, MB R1N 3K1

Re: Truck Routes for 2022 Residual Biosolids Application Program

Dear Mr. Kneeshaw:

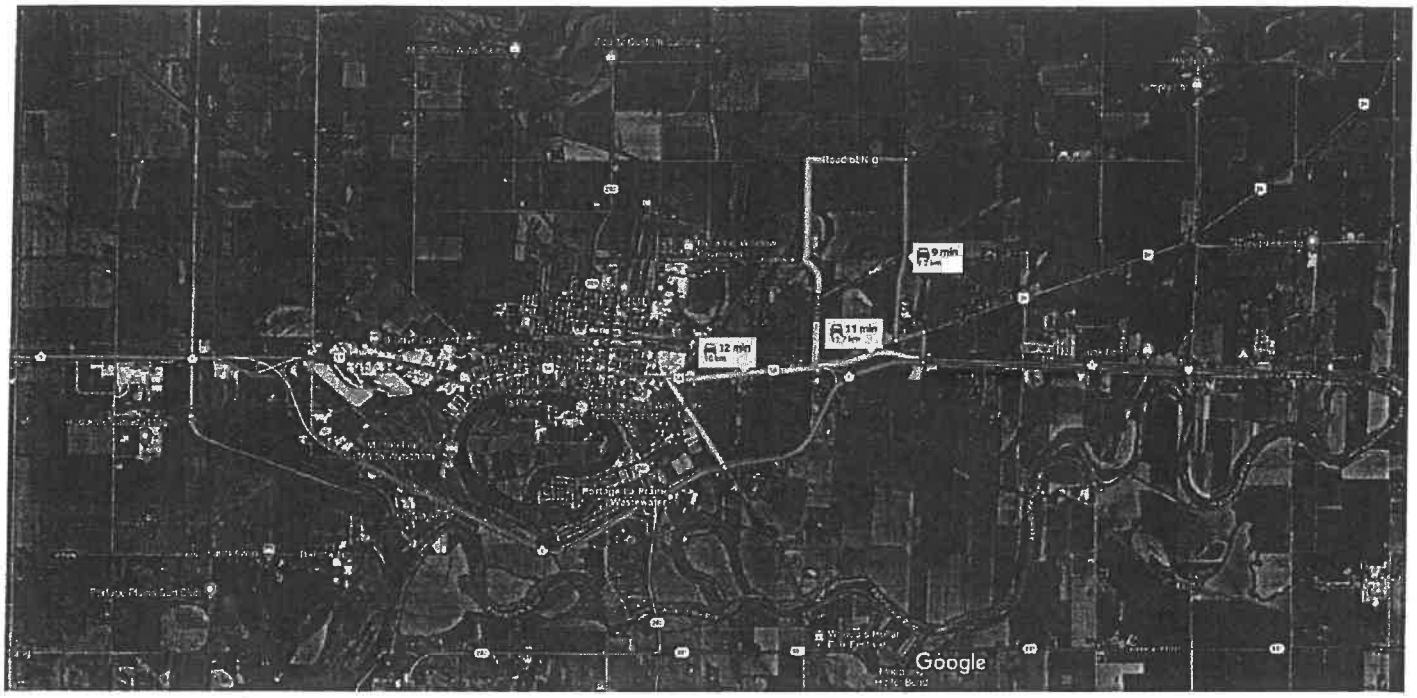
Please find the enclosed route maps for the fall Residual Biosolids Land application for review and comment. The contractor will be applying to fields N 9-12-6 and SE 16-12-6. Transport and application of biosolids is scheduled to begin on Thursday, September 29, 2022, pending dry weather conditions. Should there be any concerns with the routes provided or throughout the hauling process with traffic and/or dust, please contact myself as the contractor is responsible for both items. I can be reached via phone at 204-239-8359 or email at kfriesen@city-plap.com.

Sincerely,

Karly Friesen
Director of Utility
City of Portage la Prairie

Google Maps Portage La Prairie Wastewater, 400 River Rd, Portage la Prairie, MB R1N 3V6 to Rd 68N, High Bluff, MB R0H 0K0 Drive 9.7 km, 9 min

From WPCF to NE 9-12-6, NW 9-12-6, SE 16-12-6



Imagery ©2022 CNES / Airbus, Landsat / Copernicus, Maxar Technologies, Southport Aerospace, Map data ©2022 Google 1 km

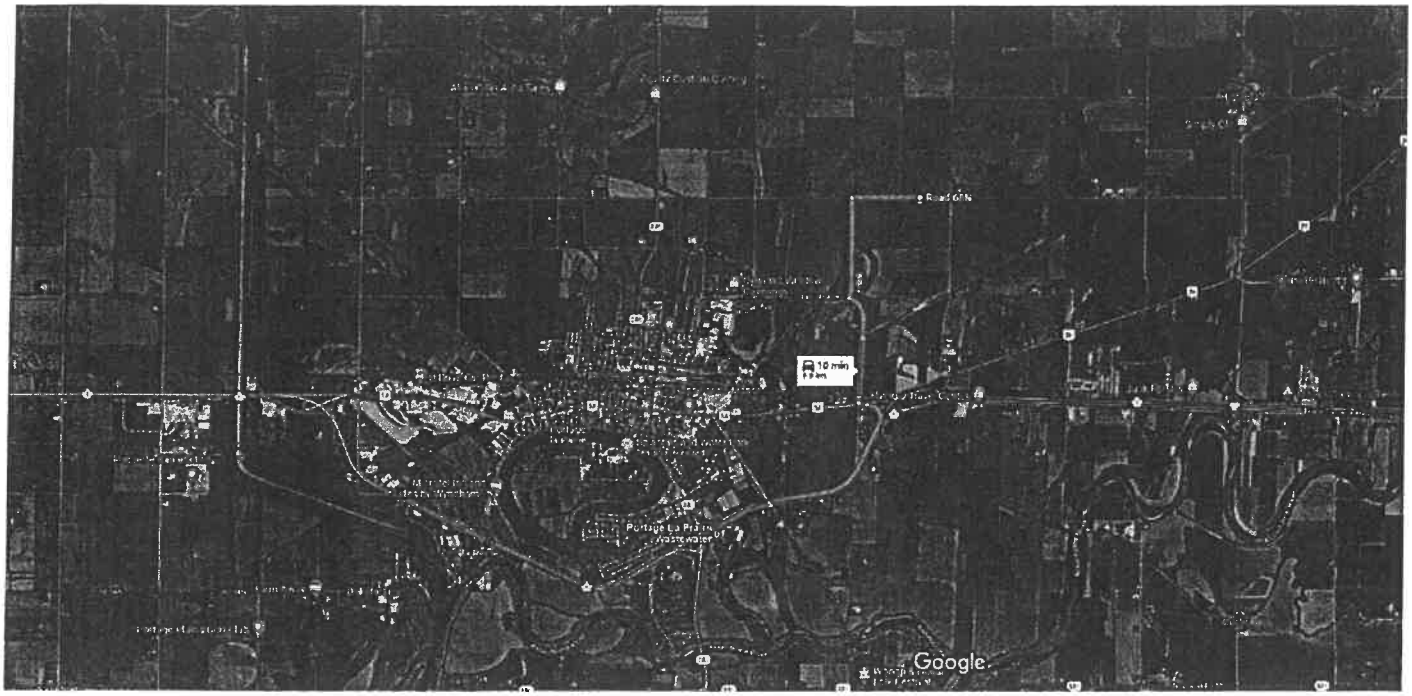
via Trans-Canada Hwy/MB-1 E and Rd 33W	9 min	9.7 km
Fastest route now due to traffic conditions		
via Trans-Canada Hwy/MB-1 E and Rd 34 W	11 min	11.7 km
via Rd 34 W	12 min	10.0 km

Explore Rd 68N

Restaurants Hotels Gas stations Parking Lots More

Google Maps Rd 68N, High Bluff, MB R0H 0K0 to Portage La Prairie Wastewater, 400 River Rd, Portage la Prairie, MB R1N 3V6 Drive 8.9 km, 10 min

From Fields to WPCF



Imagery ©2022 CNES / Airbus, Landsat / Copernicus, Maxar Technologies, Map data ©2022 Google 1 km

via Rd 34 W and Trans-Canada Hwy/MB-1 W	10 min	8.9 km
9 min without traffic		

Explore Portage La Prairie Wastewater

Restaurants Hotels Gas stations Parking Lots More

Portage la Prairie
City of Possibilities

97 Saskatchewan Avenue East
Portage la Prairie, MB R1N 0L8
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September 29, 2022

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Chief Administrative Officer
Rural Municipality of Portage la Prairie
35 Tupper Street South
Portage la Prairie, MB R1N 1W7

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Karly Friesen
Director of Utility
City of Portage la Prairie

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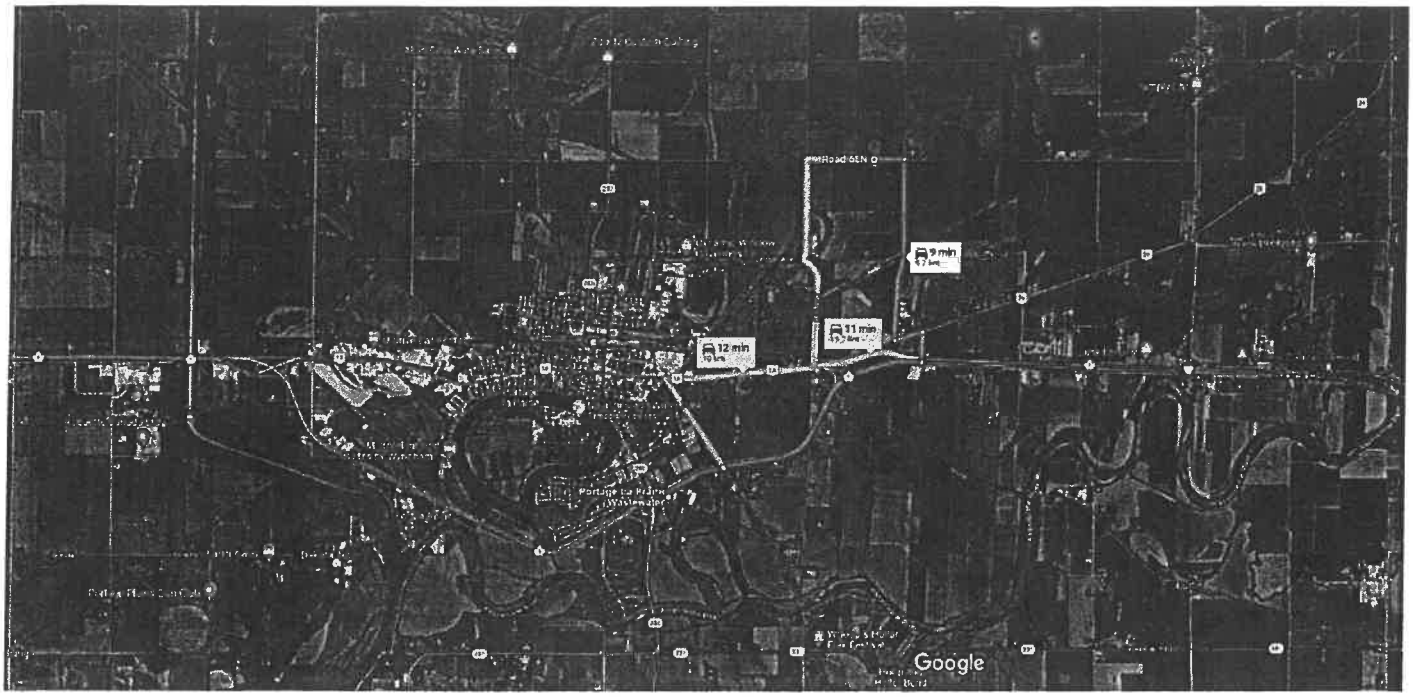
From WPCF to NE 9-12-6, NW 9-12-6, SE 16-12-6



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Restaurants Hotels Gas stations Parking Lots More

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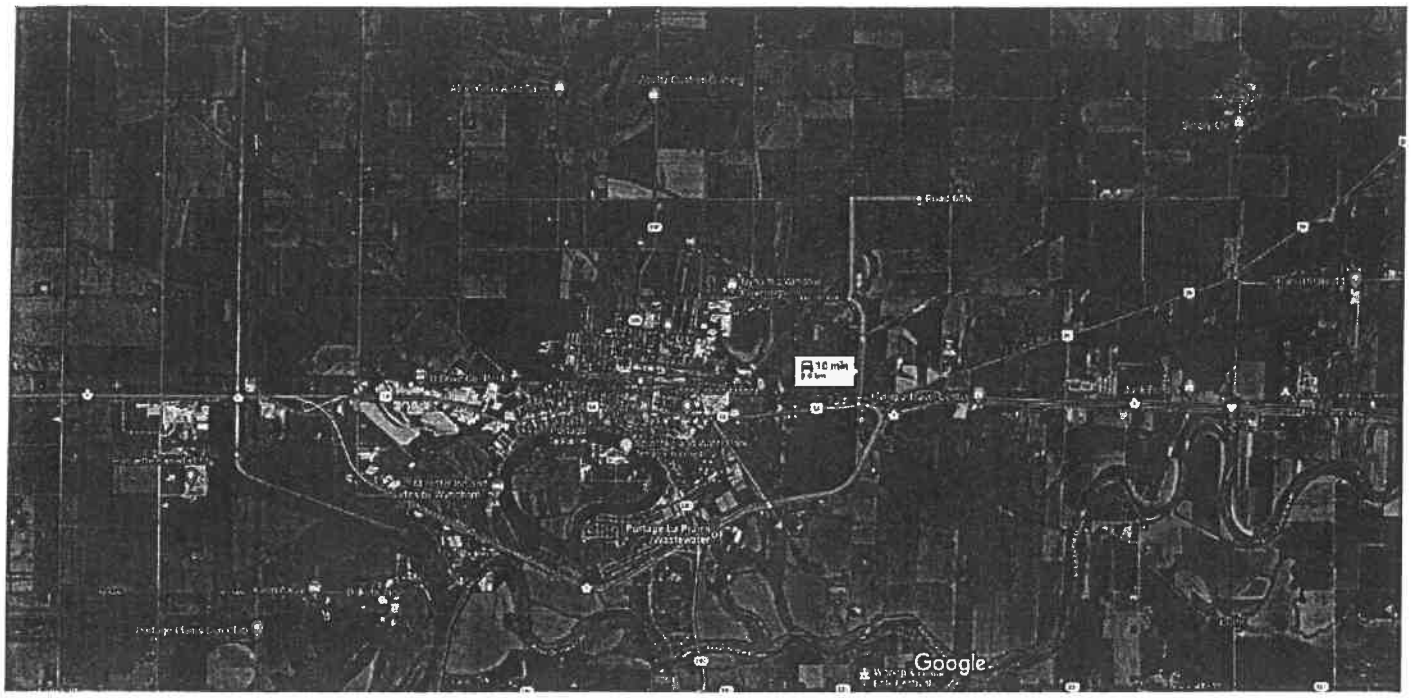


Imagery ©2022 CNES / Airbus, Landsat / Copernicus, Maxar Technologies, Map data ©2022 Google 1 km

via Rd 34 W and Trans-Canada Hwy/MB-1 W 10 min 8.9 km

9 min without traffic

Explore Portage La Prairie Wastewater

Restaurants Hotels Gas stations Parking Lots More

LETTER OF AGREEMENT

Ms. Karly Friesen
Director of Utility
City of Portage la Prairie
97 Saskatchewan Ave. E.
Portage la Prairie, MB
R1N 0L8

Dear Land Owner:

I hereby agree to permit the City of Portage la Prairie to apply wastewater treatment residual biosolids to the land, which I own as described below, on the understanding that:

1. The biosolids will be injected approximately 15 cm below the surface.
2. The biosolids will be injected to a maximum rate of 10 dry tonnes per hectare. (Maximum allowable over a 4-year period.)
3. Application will occur in the 2022 crop year, or as otherwise indicated.
4. Biosolids application will not be closer than 300 meters to a dwelling not belonging to the owner or lessee of the land on which biosolids are applied.
5. Biosolids will not be applied within 15 meters of a ditch draining less than one section and 30 meters from drains serving a larger watershed.
6. All roadways, access roads, and ditches will be repaired to the original condition upon completion of the application program, to the satisfaction of the City, municipality and the landowner.
7. The City makes no warranties or representations as to the fertilizer content nor any soil conditioning effect of the biosolids.
8. The City will determine background levels of nutrients, heavy metals, pH, and clay depth prior to the application of biosolids. This information will be provided to the landowner.
9. The City will assess the biosolids quality prior to the application program and will monitor it throughout the program. Test results will be provided to the landowner.
10. Temporary halting of the application due to wet field conditions will occur upon mutual agreement between representatives of the City, contractor and landowner.
11. Biosolids may be injected at a maximum rate of addition of plant-available nitrogen of 100 kilograms per hectare.
12. The cumulative mass per hectare of each heavy metal in the soil does not exceed the respective value stipulated in the City's Environment Act License, and that not more than one-third of the initial maximum addition of each heavy metal will be applied in this year's program.
13. The City will restore the field to a condition similar that as found prior to the application program.

LETTER OF AGREEMENT

I, on my part, agree to:

a) Plant a cereal, oilseed, forage, field pea, or lentil crop at the beginning of the next growing season. Only these listed crops will be grown for three growing seasons following biosolids application. A crop will not be grown that is a vegetable or a fruit and livestock will not be allowed to graze for three growing seasons after biosolids application on the land.
b) Provide crop information to the City on an annual basis.
c) Consider the soil and biosolids test results prior to applying nitrogen fertilizer in the growing season following biosolids application and restrict the addition of plant-available nitrogen to a maximum of 100 kg/ha, including that derived from the application of biosolids. Fertilizer, including that derived from biosolids, will be applied at the recommended agronomic rates.
d) Release and discharge the City of Portage la Prairie of and from all claims, demands, actions or causes of actions which I have or may have as the result of the application of wastewater biosolids to my land.
e) Provide the City with a letter of acceptance upon completion of the biosolids application indicating my acceptance of field conditions.
f) Notify the lessee of the land (if applicable) of this agreement.

Yours truly,

Land Owner

City Representative KARLY FRASER

31/08/22
Date

31/5/22
Date

Land Location(s): S 16-12-6

N 9-12-6

2022 Bio-Solid Application Recording Sheet

Reference Sample Soil Material Criteria is SRM 1646a/SRM2709
See Appendix Section for Information

	Name of Land Owner		Watson					
	Legal Description		NW 9-12-6					
	Land Owner Authorization		Yes					
	Dist. >300m from residences							
	Map Enclosed		Yes					
	Year Field previously Used							
	GPS	Lat				Long		
		Date	Date	Date	Date	Date	Date	
		BST 12/10/2022	BST 12/10/2022 lbs/ac	LRAR 12/10/2022	LRAR 12/10/2022 lbs/ac			Comments
Field Soil Analaysis mg/kg 0-15 cm	Cadmium	0.595		0.595				
	Calcium							
	Chromium	24.3		24.3				
	Copper	21.8		21.8				
	Lead	10.3		10.3				
	Mercury	0.0351		0.0351				
	Nickel	23.9		23.9				
	pH	7.55		7.55				
	Phosphorus < 60 ug/g	1110		1110				
	Potassium	3440		3440				
	Soil Nitrate Nitrogen 0-60cm<100kg/ha	7.6		7.6				
	Zinc	96.7		96.7				
Bio-Solids Analysis mg/kg	Ammonia Nitrogen	598		170				
	Cadmium	0.0152		0.0249				
	Chromium	0.498		0.203				
	Conductivity	5080		3400				
	Copper	8.57		1.30				
	Lead	0.266		0.0701				
	Mercury	0.00706		0.000302				
	Nickel	0.498		0.328				
	Nitrate Nitrogen	0.400		0.400				
	Organic Nitrogen	1400		2540				
	pH	7.11		6.99				
	Potassium	249		281				
	Total Nitrogen	2000		2710				
	Total Phosphorus	339		82.7				
	Total Solids	24900		64200				
	Volatile Solids	15800		22400				
	Zinc	7.99		5.410				
Cummulative Results Kg/Hectare	Cadmium < 2.88	1.071	0.956	1.071	0.956			
	Chromium < 216	43.741	39.02	43.745	39.03			
	Copper < 90	39.262	35.03	39.318	35.08			
	Lead < 90	18.541	16.54	18.543	16.54			
	Mercury < 0.9	0.063	0.06	0.063	0.06			
	Nickel < 90	43.021	38.38	43.025	38.39			
	Nutrient Appl. Rate PAN<100/kg	88.79	79.22	110.33	98.43			99.56 field average
	Solids <10	2.54	2.27	9.06	8.08			5.80 field average
	Zinc < 270	174.101	155.33	174.200	155.42			
	Phosphorus	1998.863	1783.35	2001.07	1785.31			
	Comments							

2022 Bio-Solid Application Recording Sheet

Reference Sample Soil Material Criteria is SRM 1646a/SRM2709
See Appendix Section for Information

Name of Land Owner	Watson
Legal Description	NE 9-12-6
Land Owner Authorization	Yes
Dist. >300m from residences	
Map Enclosed	Yes
Year Field previously Used	
GPS Lat	
Long	

		Date	Date	Date	Date	Date	Date	
		BST 4/10/2022	BST 4/10/2022 lbs/ac	LRAR 4/10/2022	LRAR 4/10/2022 lbs/ac			Comments
Field Soil Analysis mg/kg 0-15 cm	Cadmium	0.543		0.543				
	Calcium							
	Chromium	21.8		21.8				
	Copper	20.8		20.8				
	Lead	11.1		11.1				
	Mercury	0.0341		0.0341				
	Nickel	24.7		24.7				
	pH	7.77		7.77				
	Phosphorus < 60 ug/g	781		781				
	Potassium	2800		2800				
	Soil Nitrate Nitrogen 0-60cm<100kg/ha	5.3		5.3				
	Zinc	91.8		91.8				
Bio-Solids Analysis mg/kg	Ammonia Nitrogen	598		170				
	Cadmium	0.0152		0.0249				
	Chromium	0.498		0.203				
	Conductivity	5080		3400				
	Copper	8.57		1.30				
	Lead	0.266		0.0701				
	Mercury	0.00706		0.000302				
	Nickel	0.498		0.328				
	Nitrate Nitrogen	0.400		0.400				
	Organic Nitrogen	1400		2540				
	pH	7.11		6.99				
	Potassium	249		281				
	Total Nitrogen	2000		2710				
	Total Phosphorus	339		82.7				
	Total Solids	24900		64200				
	Volatile Solids	15800		22400				
	Zinc	7.99		5.410				
Cummulative Results Kg/Hectare	Cadmium < 2.88	0.977	0.872	0.978	0.873			
	Chromium < 216	39.241	35.01	39.245	35.01			
	Copper < 90	37.463	33.42	37.527	33.48			
	Lead < 90	19.981	17.83	19.983	17.83			
	Mercury < 0.9	0.061	0.05	0.061	0.05			
	Nickel < 90	44.461	39.67	44.465	39.67			
	Nutrient Appl. Rate PA N<100/kg	95.32	85.04	131.77	117.56			113.55 field average
	Solids <10	2.68	2.39	10.21	9.11			6.45 field average
	Zinc < 270	165.289	147.47	165.427	147.59			
	Phosphorus	1406.709	1255.04	1409.260	1257.31			
	Comments							

2022 Bio-Solid Application Recording Sheet

Reference Sample Soil Material Criteria is SRM 1646a/SRM2709
See Appendix Section for Information

	Name of Land Owner		Watson					
	Legal Description		SE 16-12-6					
	Land Owner Authorization		Yes					
	Dist. >300m from residences							
	Map Enclosed		Yes					
	Year Field previously Used							
	GPS	**Lat**				**Long**		
		Date	**Date**	**Date**	**Date**	**Date**	**Date**	
		BST 13/10/2022	**BST 13/10/2022 lbs/ac**	**LRAR 13/10/2022**	**LRAR 13/10/2022 lbs/ac**			**Comments**
Field Soil Analysis mg/kg 0-15 cm	Cadmium	0.485		0.485				
	Calcium							
	Chromium	21.5		21.5				
	Copper	18.3		18.3				
	Lead	9.71		9.71				
	Mercury	0.0307		0.0307				
	Nickel	23.6		23.6				
	pH	7.74		7.74				
	Phosphorus < 60 ug/g	687		687				
	Potassium	2470		2470				
	Soil Nitrate Nitrogen 0-60cm<100kg/ha	6.7		6.7				
	Zinc	84		84				
Bio-Solids Analysis mg/kg	Ammonia Nitrogen	598		170				
	Cadmium	0.0152		0.0249				
	Chromium	0.498		0.203				
	Conductivity	5080		3400				
	Copper	8.57		1.30				
	Lead	0.266		0.0701				
	Mercury	0.00706		0.000302				
	Nickel	0.498		0.328				
	Nitrate Nitrogen	0.400		0.400				
	Organic Nitrogen	1400		2540				
	pH	7.11		6.99				
	Potassium	249		281				
	Total Nitrogen	2000		2710				
	Total Phosphorus	339		82.7				
	Total Solids	24900		64200				
	Volatile Solids	15800		22400				
	Zinc	7.99		5.410				
Cummulative Results Kg/Hectare	Cadmium < 2.88	0.873	0.779	0.873	0.779			
	Chromium < 216	38.702	34.53	38.704	34.53			
	Copper < 90	32.967	29.41	33.006	29.45			
	Lead < 90	17.479	15.59	17.480	15.60			
	Mercury < 0.9	0.055	0.05	0.055	0.05			
	Nickel < 90	42.482	37.90	42.484	37.90			
	Nutrient Appl. Rate PA N<100/kg	82.01	73.17	96.61	86.19			89.31 field average
	Solids <10	3.11	2.77	7.72	6.89			5.42 field average
	Zinc < 270	150.358	134.15	150.442	134.22			
	Phosphorus	1237.654	1104.21	1239.217	1105.60			
	Comments							

PORTAGE FALL OF 2022

ASSINIBOINE INJECTIONS LTD

BOX 160 177 NOTRE DAME AVE NOTRE DAME, MB ROG 1M0 PH: 204-248-2559 FAX: 204-248-2799

DAILY SLUDGE APPLICATION PLAN

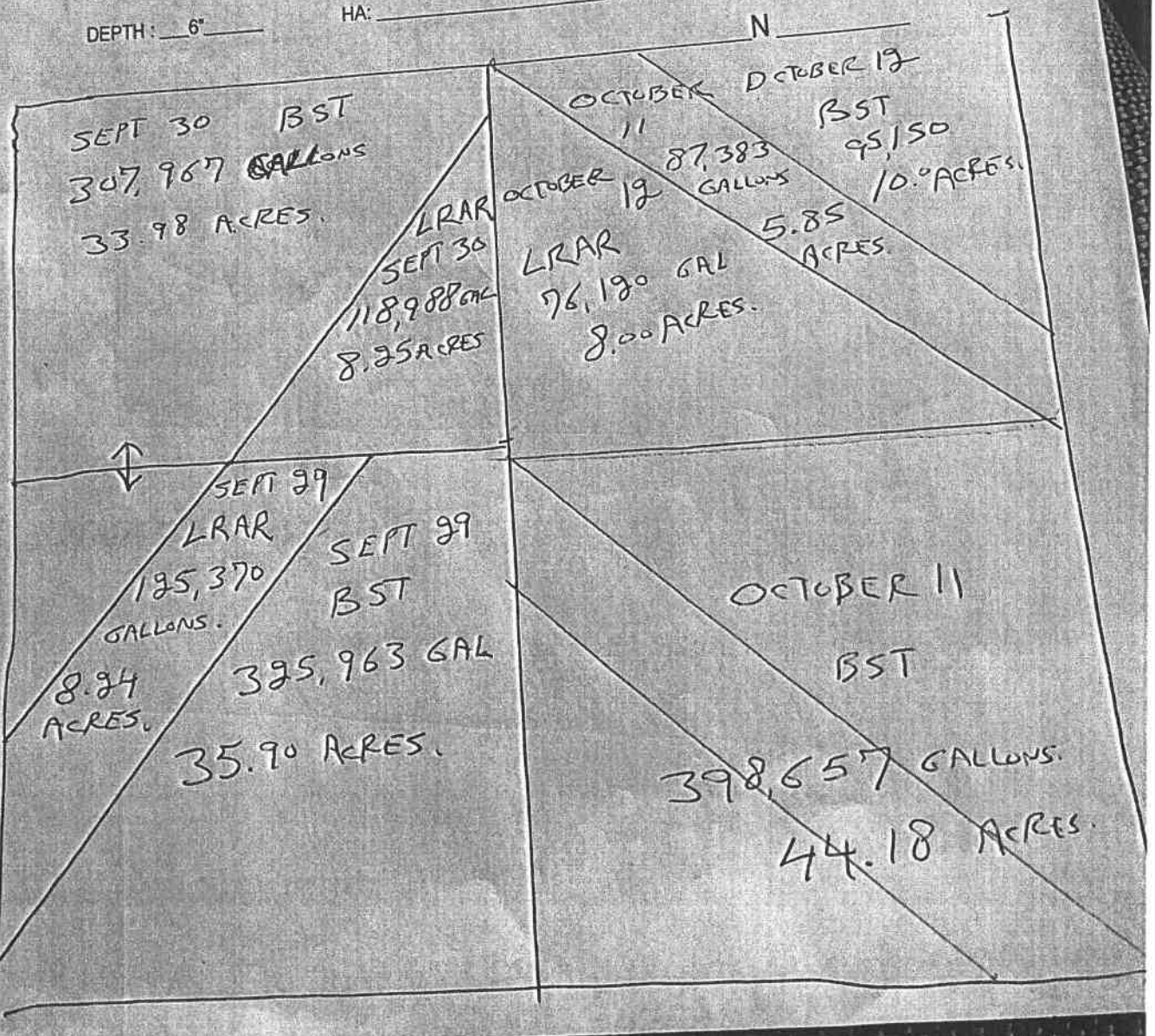
DATE: _____

FARMERS NAME: _____

FIELD: SEC. ____ TWP _____ RGE _____

APPLICATION TYPE: INJECTION

DEPTH : 6" HA: _____ CM3: _____



PORTAGE FALL OF 2022

ASSINIBOINE INJECTIONS LTD

BOX 160 177 NOTRE DAME AVE NOTRE DAME, MB ROG 1M0 PH: 204-248-2559 FAX: 204-248-2799

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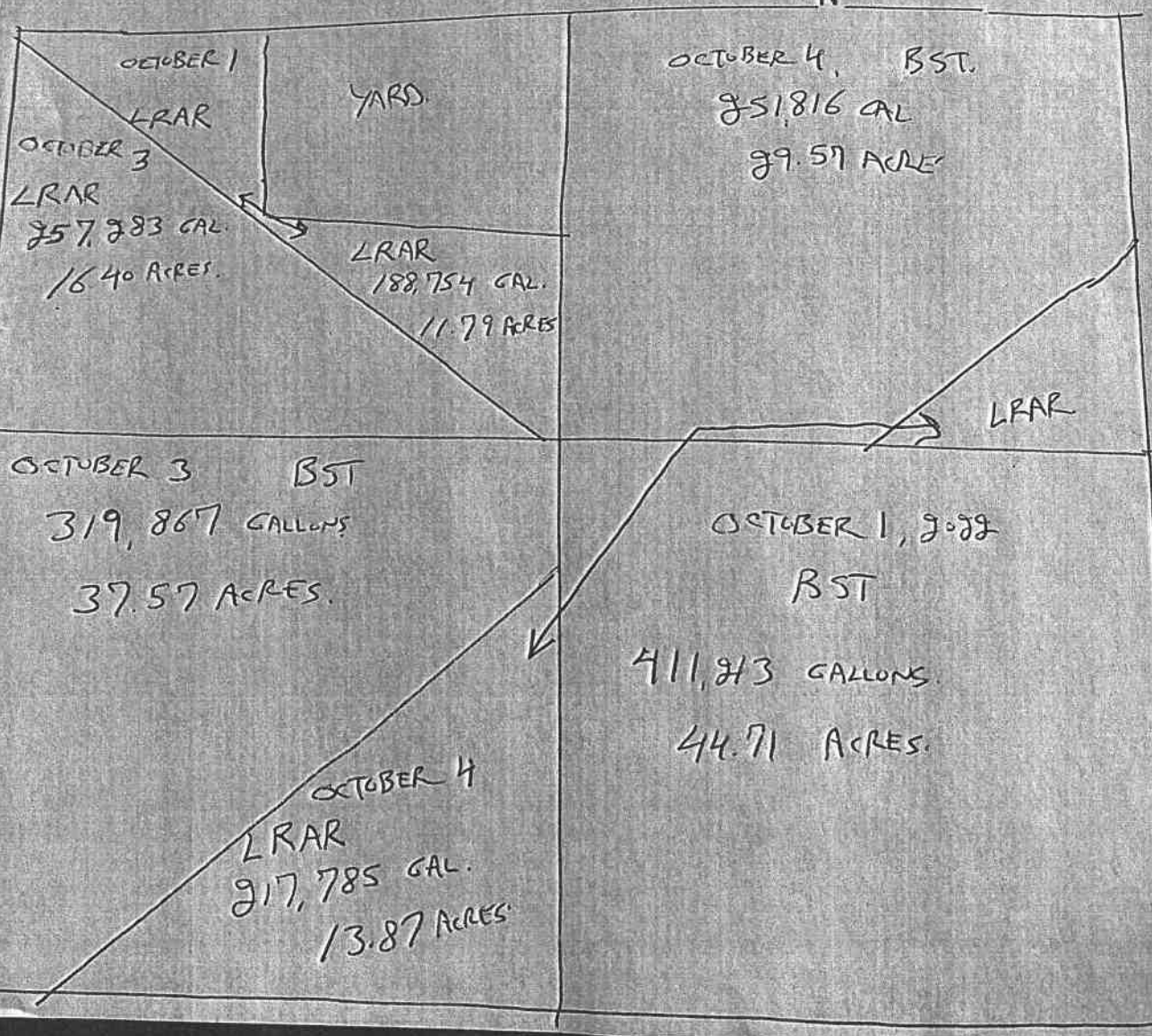


ASSINIBOINE INJECTIONS LTD

BOX 160 177 NOTRE DAME AVE NOTRE DAME, MB ROG 1M0 PH: 204-248-2559 FAX: 204-248-2799

DAILY SLUDGE APPLICATION PLAN

DATE: _____

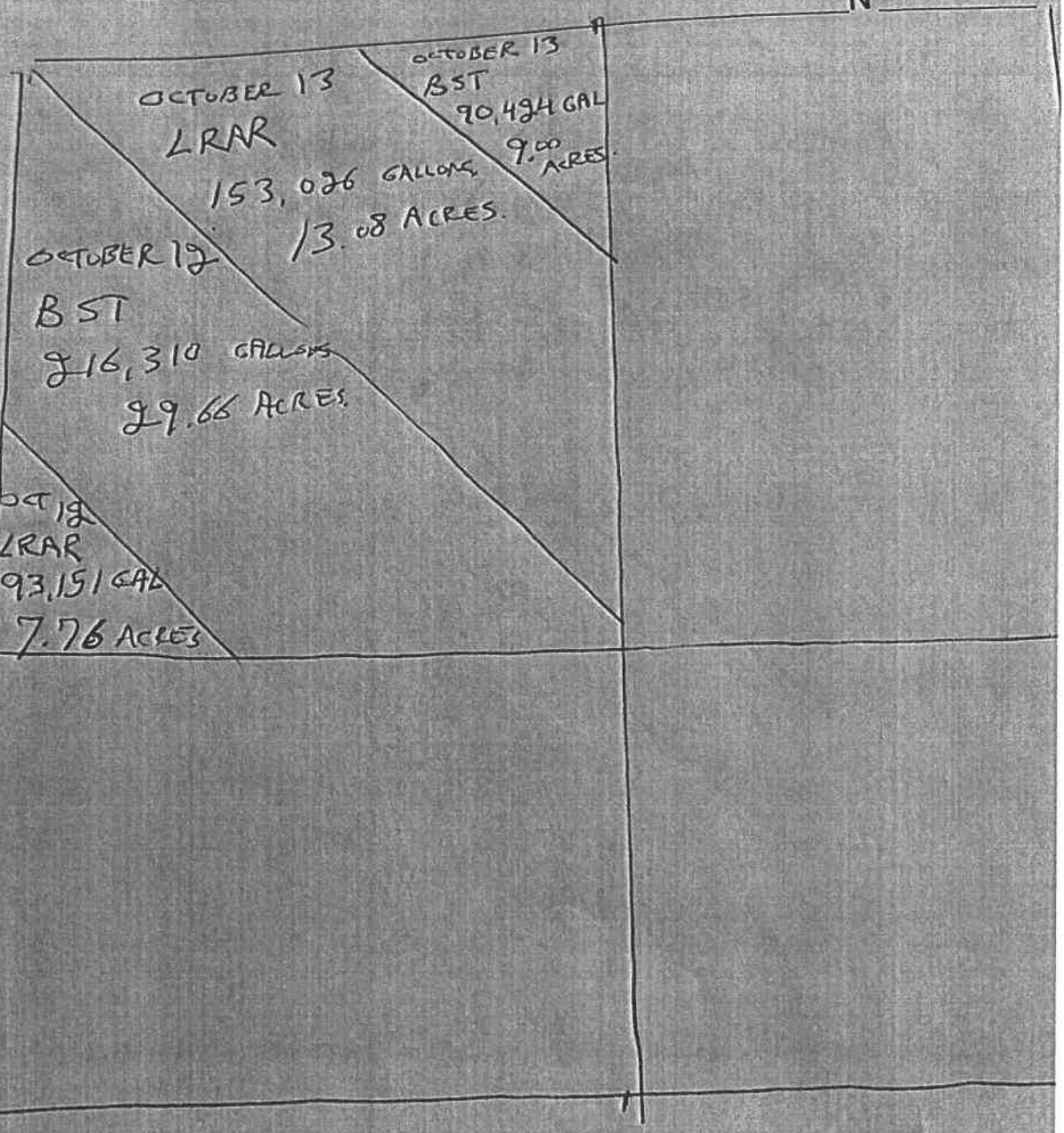
FARMERS NAME: _____

FIELD: SEC. ____ TWP _____ RGE _____

APPLICATION TYPE: INJECTION

DEPTH : ___6"_____ HA: _____ CM3: _____

N



NW 9-12-6 Watson w/ Phosphorus Resuets

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **WP2203574**	Page	: 1 of 3
Amendment	: **1**		
Client	: **City of Portage la Prairie**	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg MB Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 15-Sep-2022 13:45
PO	: W22006	Date Analysis Commenced	: 21-Sep-2022
C-O-C number	: ----	Issue Date	: 26-Sep-2022 17:07
Sampler	: ----		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Quality Systems Coordinator	Inorganics, Saskatoon, Saskatchewan
Colby Bingham	Quality Systems Coordinator	Sask Soils, Saskatoon, Saskatchewan
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Amendment 26-Sept-22: This report has been amended and re-released to allow the reporting of additional analytical data.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	22-09-36	22-09-37	22-09-38	---	---
					Client sampling date / time	15-Sep-2022 11:25	15-Sep-2022 11:25	15-Sep-2022 11:25	---	---
						WP2203574-001	WP2203574-002	WP2203574-003	-----	-----
						Result	Result	Result	---	---
Physical Tests										
Atterberg plastic limit [PL] (moisture)	---	E199	1.0	%		---	---	19.8	---	---
pH (1:2 soil:water)	---	E108	0.10	pH units		7.77	---	---	---	---
Atterberg liquid limit [LL] (moisture)	---	E199	1.0	%		---	---	35.0	---	---
Atterberg plasticity index [PI]	---	E199	1.0	%		---	---	15.1	---	---
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		---	0.186	---	---	---
Plant Available Nutrients										
ammonium, available (as N)	14798-03-9	E312A	1.0	mg/kg		---	<1.0	---	---	---
nitrate + nitrite, available (as N)	---	E269.N+N	1.0	mg/kg		---	7.6	---	---	---
nitrate + nitrite, available (as N)	---	E269A.N+N	2.0	mg/kg		---	7.0	---	---	---
nitrate, available (as N)	14797-55-8	EC269.NO3	2.0	mg/kg		---	7.6	---	---	---
nitrite, available (as N)	14797-65-0	E269.NO2	0.40	mg/kg		---	<0.40	---	---	---
nitrogen, total available	7727-37-9	EC269A.N	2.2	mg/kg		---	7.0	---	---	---
phosphate, available (as P)	14265-44-2	E385	1.0	mg/kg		20.6	---	---	---	---
Metals										
cadmium	7440-43-9	E440	0.020	mg/kg		0.595	---	---	---	---
chromium	7440-47-3	E440	0.50	mg/kg		24.3	---	---	---	---
copper	7440-50-8	E440	0.50	mg/kg		21.8	---	---	---	---
lead	7439-92-1	E440	0.50	mg/kg		10.3	---	---	---	---
mercury	7439-97-6	E510	0.0050	mg/kg		0.0351	---	---	---	---
nickel	7440-02-0	E440	0.50	mg/kg		23.9	---	---	---	---
phosphorus	7723-14-0	E440	50	mg/kg		1110	---	---	---	---
potassium	7440-09-7	E440	100	mg/kg		3440	---	---	---	---
zinc	7440-66-6	E440	2.0	mg/kg		96.7	---	---	---	---

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Environmental

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WP2203574**	Page	: 1 of 8
Amendment	: 1		
Client	: **City of Portage la Prairie**	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 15-Sep-2022 13:45
PO	: W22006	Issue Date	: 26-Sep-2022 17:01
C-O-C number	: ----		
Sampler	: ----		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "—" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Combustion										
LDPE bag 22-09-37	E366	15-Sep-2022	21-Sep-2022	---	---		21-Sep-2022	28 days	6 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap 22-09-36	E510	15-Sep-2022	22-Sep-2022	---	---		22-Sep-2022	28 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 22-09-36	E440	15-Sep-2022	22-Sep-2022	---	---		22-Sep-2022	180 days	7 days	✓
Physical Tests : Atterberg Limits										
LDPE bag 22-09-38	E199	15-Sep-2022	---	---	---		21-Sep-2022	180 days	6 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap 22-09-36	E108	15-Sep-2022	23-Sep-2022	---	---		23-Sep-2022	30 days	8 days	✓
Plant Available Nutrients : Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)										
LDPE bag 22-09-37	E312A	15-Sep-2022	22-Sep-2022	---	---		22-Sep-2022	60 days	0 days	✓
Plant Available Nutrients : Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride										
LDPE bag 22-09-37	E269.N+N	15-Sep-2022	22-Sep-2022	---	---		22-Sep-2022	3 days	7 days	* EHT

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Available Nutrients : Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride										
LDPE bag 22-09-37	E269A.N+N	15-Sep-2022	22-Sep-2022	---	---		22-Sep-2022	1 days	0 days	✓
Plant Available Nutrients : Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)										
LDPE bag 22-09-37	E269.NO2	15-Sep-2022	22-Sep-2022	---	---		22-Sep-2022	1 days	0 days	✓
Plant Available Nutrients : Available Phosphorus by Colourimetry (Olsen)										
LDPE bag 22-09-36	E385	15-Sep-2022	24-Sep-2022	---	---		24-Sep-2022	---	0 days	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Atterberg Limits	E199	657735	1	1	100.0	5.0	✓
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	658669	1	8	12.5	5.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	658700	1	8	12.5	5.0	✓
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N	658670	1	1	100.0	5.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	658701	1	4	25.0	5.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	658675	1	4	25.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	659053	1	11	9.0	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	659054	1	17	5.8	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	662379	1	1	100.0	5.0	✓
Total Nitrogen by Combustion	E366	658696	1	6	16.6	5.0	✓
Laboratory Control Samples (LCS)							
Atterberg Limits	E199	657735	1	1	100.0	5.0	✓
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	658669	2	8	25.0	10.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	658700	2	8	25.0	10.0	✓
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N	658670	2	1	200.0	10.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	658701	2	4	50.0	10.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	658675	2	4	50.0	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	659053	2	11	18.1	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	659054	2	17	11.7	10.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	662379	2	1	200.0	10.0	✓
Total Nitrogen by Combustion	E366	658696	2	6	33.3	10.0	✓
Method Blanks (MB)							
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	658669	1	8	12.5	5.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	658700	1	8	12.5	5.0	✓
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N	658670	1	1	100.0	5.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	658701	1	4	25.0	5.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	658675	1	4	25.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	659053	1	11	9.0	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	659054	1	17	5.8	5.0	✓
Total Nitrogen by Combustion	E366	658696	1	6	16.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Saskatoon - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Atterberg Limits	E199 Saskatoon - Environmental	Soil/Solid	CSSS Ch. 58 (mod)	Atterberg Limits are measures of physical properties of fine grained soils. Liquid Limit (LL) is the water content where soil behaviour changes from plastic to liquid, and is determined by Casagrande cup. Plastic Limit (PL) is the water content where soil begins to exhibit plastic behaviour, and is measured as the moisture content of a 3 mm diameter thread of soil which begins to crumble when rolled. Plasticity Index (PI) is equal to LL - PL.
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N Saskatoon - Environmental	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Plant available nitrate and nitrite are analyzed by colourimetry using a flow injection analyzer on a soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2 Saskatoon - Environmental	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Plant available nitrite is analyzed by colourimetry using a segmented flow analyzer on a soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2/APHA 4500-NO3 I (mod)	Plant available nitrate and nitrite is analyzed by colourimetry using a flow injection analyzer on a soil sample extract that has been extracted using 2N potassium chloride, then shaken well and filtered prior to analysis.
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2/Comm Soil Sci 19(6) (mod)	Plant available ammonium is analyzed by colourimetry using a segmented flow analyzer on a soil sample extract that has been extracted using 2N Potassium Chloride, then shaken well and filtered prior to analysis.
Total Nitrogen by Combustion	E366 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.4	The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.
Available Phosphorus by Colourimetry (Olsen)	E385 Saskatoon - Environmental	Soil/Solid	Carter CSSS (2008) 8.3	Plant available phosphorus is extracted from air dried soil using a fixed ratio bicarbonate extraction. Phosphorus is determined by colorimetry.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 Waterloo - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Waterloo - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Available Nitrate by Difference (0.01M Calcium Chloride Ext.)	EC269.NO3 Saskatoon - Environmental	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Available Nitrate is determined by difference between Nitrate+Nitrite-N and Nitrite-N. A soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Total Available Nitrogen (Calculation)	EC269A.N Saskatoon - Environmental	Soil/Solid	Calculation	Total available nitrogen is calculated as the sum of NO2-N+NO3-N and NH3-N extracted from soil using 2N potassium chloride solution.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Saskatoon - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Fixed ratio 0.01M Calcium Chloride extraction for plant available nutrients	EP269 Saskatoon - Environmental	Soil/Solid	Alberta Agriculture	Plant available nutrients (N&S) extracted using 0.01M calcium chloride, then shaken well and filtered prior to analysis.
2N Potassium Chloride extraction for available nutrients	EP269A Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2	A soil sample extract is generated by fixed ratio extraction using 2N Potassium Chloride, then shaken well and filtered prior to analysis.
Bicarbonate extraction for soil	EP385 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 8.2	Plant available phosphorus is extracted using fixed ratio sodium bicarbonate solution (Olsen method).
Digestion for Metals and Mercury	EP440 Waterloo - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dry and Grind	EPP442 Saskatoon - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	:**WP2203574**	Page	: 1 of 8
Amendment	:**1**		
Client	: City of Portage la Prairie	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 15-Sep-2022 13:45
PO	: W22006	Date Analysis Commenced	: 21-Sep-2022
C-O-C number	: ---	Issue Date	: 26-Sep-2022 17:00
Sampler	: ---		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Quality Systems Coordinator	Saskatoon Inorganics, Saskatoon, Saskatchewan
Colby Bingham	Quality Systems Coordinator	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Hedy Lai	Team Leader - Inorganics	Saskatoon Inorganics, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 657735)											
WP2203574-003	22-09-38	Atterberg liquid limit [LL] (moisture)	---	E199	1.0	%	35.0	34.6	0.867%	20%	---
		Atterberg plastic limit [PL] (moisture)	---	E199	1.0	%	19.8	19.9	0.414%	20%	---
Physical Tests (QC Lot: 662379)											
WP2203574-001	22-09-36	pH (1:2 soil:water)	---	E108	0.10	pH units	7.77	7.79	0.257%	10%	---
Anions and Nutrients (QC Lot: 658696)											
CG2212653-004	Anonymous	nitrogen, total	7727-37-9	E366	0.020	%	0.082	0.081	0.001	Diff <2x LOR	---
Plant Available Nutrients (QC Lot: 658669)											
WP2203574-002	22-09-37	ammonium, available (as N)	14798-03-9	E312A	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	---
Plant Available Nutrients (QC Lot: 658670)											
WP2203574-002	22-09-37	nitrate + nitrite, available (as N)	---	E269A.N+N	2.0	mg/kg	7.0	7.1	0.04	Diff <2x LOR	---
Plant Available Nutrients (QC Lot: 658675)											
WP2203574-001	22-09-36	phosphate, available (as P)	14265-44-2	E385	1.0	mg/kg	20.6	20.2	2.41%	30%	---
Plant Available Nutrients (QC Lot: 658700)											
FC2202231-001	Anonymous	nitrate + nitrite, available (as N)	---	E269.N+N	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	---
Plant Available Nutrients (QC Lot: 658701)											
FC2202231-001	Anonymous	nitrite, available (as N)	14797-65-0	E269.NO2	0.40	mg/kg	<0.40	<0.40	0	Diff <2x LOR	---
Metals (QC Lot: 659053)											
WT2215065-001	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.0201	0.0200	0.0001	Diff <2x LOR	---
Metals (QC Lot: 659054)											
WT2215065-001	Anonymous	cadmium	7440-43-9	E440	0.020	mg/kg	0.132	0.126	0.006	Diff <2x LOR	---
		chromium	7440-47-3	E440	0.50	mg/kg	25.3	25.4	0.216%	30%	---
		copper	7440-50-8	E440	0.50	mg/kg	27.7	27.5	0.687%	30%	---
		lead	7439-92-1	E440	0.50	mg/kg	9.73	9.38	3.65%	40%	---
		nickel	7440-02-0	E440	0.50	mg/kg	26.4	25.6	2.84%	30%	---
		phosphorus	7723-14-0	E440	50	mg/kg	802	824	2.74%	30%	---
		potassium	7440-09-7	E440	100	mg/kg	2610	2570	1.49%	40%	---
		zinc	7440-66-6	E440	2.0	mg/kg	59.8	59.3	0.888%	30%	---

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 658696)						
nitrogen, total	7727-37-9	E366	0.02	%	<0.020	—
Plant Available Nutrients (QCLot: 658669)						
ammonium, available (as N)	14798-03-9	E312A	1	mg/kg	<1.0	—
Plant Available Nutrients (QCLot: 658670)						
nitrate + nitrite, available (as N)	—	E269A.N+N	2	mg/kg	<2.0	—
Plant Available Nutrients (QCLot: 658675)						
phosphate, available (as P)	14265-44-2	E385	1	mg/kg	<1.0	—
Plant Available Nutrients (QCLot: 658700)						
nitrate + nitrite, available (as N)	—	E269.N+N	1	mg/kg	<1.0	—
Plant Available Nutrients (QCLot: 658701)						
nitrite, available (as N)	14797-65-0	E269.NO2	0.4	mg/kg	<0.40	—
Metals (QCLot: 659053)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	—
Metals (QCLot: 659054)						
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	—
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	—
copper	7440-50-8	E440	0.5	mg/kg	<0.50	—
lead	7439-92-1	E440	0.5	mg/kg	<0.50	—
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	—
phosphorus	7723-14-0	E440	50	mg/kg	<50	—
potassium	7440-09-7	E440	100	mg/kg	<100	—
zinc	7440-66-6	E440	2	mg/kg	<2.0	—

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 662379)									
pH (1:2 soil:water)	---	E108	---	pH units	6.86 pH units	101	97.0	103	---
Anions and Nutrients (QCLot: 658696)									
nitrogen, total	7727-37-9	E366	0.02	%	22.37 %	100	90.0	110	---
Plant Available Nutrients (QCLot: 658669)									
ammonium, available (as N)	14798-03-9	E312A	1	mg/kg	10 mg/kg	107	80.0	120	---
Plant Available Nutrients (QCLot: 658670)									
nitrate + nitrite, available (as N)	---	E269A.N+N	2	mg/kg	40 mg/kg	120	70.0	130	---
Plant Available Nutrients (QCLot: 658675)									
phosphate, available (as P)	14265-44-2	E385	1	mg/kg	20 mg/kg	103	80.0	120	---
Plant Available Nutrients (QCLot: 658700)									
nitrate + nitrite, available (as N)	---	E269.N+N	1	mg/kg	40 mg/kg	125	70.0	130	---
Plant Available Nutrients (QCLot: 658701)									
nitrite, available (as N)	14797-65-0	E269.NO2	0.4	mg/kg	20 mg/kg	93.5	70.0	130	---
Metals (QCLot: 659053)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	---
Metals (QCLot: 659054)									
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	103	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	111	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	109	80.0	120	---
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	---

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 657735)									
	RM	Atterberg liquid limit [LL] (moisture)	—	E199	33.68 %	101	80.0	120	—
	RM	Atterberg plastic limit [PL] (moisture)	—	E199	20 %	110	80.0	120	—
Physical Tests (QCLot: 662379)									
	RM	pH (1:2 soil:water)	—	E108	8.13 pH units	101	96.0	104	—
Anions and Nutrients (QCLot: 658696)									
	RM	nitrogen, total	7727-37-9	E366	0.11 %	99.1	80.0	120	—
Plant Available Nutrients (QCLot: 658669)									
	RM	ammonium, available (as N)	14798-03-9	E312A	72 mg/kg	98.5	80.0	120	—
Plant Available Nutrients (QCLot: 658670)									
	RM	nitrate + nitrite, available (as N)	—	E269A.N+N	20.1 mg/kg	74.5	70.0	130	—
Plant Available Nutrients (QCLot: 658675)									
	RM	phosphate, available (as P)	14265-44-2	E385	7 mg/kg	89.2	80.0	120	—
Plant Available Nutrients (QCLot: 658700)									
	RM	nitrate + nitrite, available (as N)	—	E269.N+N	18.9 mg/kg	77.3	70.0	130	—
Plant Available Nutrients (QCLot: 658701)									
	RM	nitrite, available (as N)	14797-65-0	E269.NO2	0.17 mg/kg	23.5	0	570	—
Metals (QCLot: 659053)									
	RM	mercury	7439-97-6	E510	0.0585 mg/kg	116	70.0	130	—
Metals (QCLot: 659054)									
	RM	cadmium	7440-43-9	E440	0.91 mg/kg	116	70.0	130	—
	RM	chromium	7440-47-3	E440	101 mg/kg	118	70.0	130	—
	RM	copper	7440-50-8	E440	123 mg/kg	113	70.0	130	—
	RM	lead	7439-92-1	E440	267 mg/kg	105	70.0	130	—
	RM	nickel	7440-02-0	E440	26.7 mg/kg	115	70.0	130	—
	RM	phosphorus	7723-14-0	E440	752 mg/kg	114	70.0	130	—
	RM	potassium	7440-09-7	E440	1587 mg/kg	118	70.0	130	—
	RM	zinc	7440-66-6	E440	297 mg/kg	112	70.0	130	—

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	City of Portage La Prairie
Contact:	Aaron Stechesen
Phone:	1-204-239-8361
	Company address below will appear on the final report
Street:	97 Saskatchewan Avenue East
City/Province:	Portage La Prairie
Postal Code:	R1N 0L8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: astechesen@city-plap.com
Email 2: astechesen@city-plap.com
Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: astechesen@city-plap.com
Email 2:

Turnaround Time (TAT) Requested

☐ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☑ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	GMPP100 / WP2022GMPP1000002
Job #:	
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO# W22006
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	E108	E510	E440	E365	E312A, EC269A.NO3, E269A.N+N, E269A.NO2, EC269A.N, EC269A.NO2	E366	EC269.NO3, E269 N+N, E269.NO2	MOIST-SK	PREP-DRY/GRIND-SK	E199	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	22-09-36	15-Sep-22	11:25	Soil	1	E	E	E	E				E	E				
	22-09-37	15-Sep-22	11:25	Soil	2					E	E	E	E	E				
	22-09-38	15-Sep-22	11:25	Soil	1									E	E			

Environmental Division
Winnipeg
Work Order Reference
WP2203574

Telephone : +1 204 255 9720

RUSH

S-6194, ULINE, 800-295-5510

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human consumption/ use?
☐ YES ☐ NO

...cting from drop-down below

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
19.1							

SHIPMENT RELEASE (client use)

Released by: Aaron Stechesen Date: ~~September 14, 2022~~ September 15, 2022 Time: 11:25

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: SEP 15 2022 Time: 1:45

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

FER 2022 FRONT

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

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

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	City of Portage La Prairie
Contact:	Aaron Stechesen
Phone:	1-204-239-8361
	Company address below will appear on the final report
Street:	97 Saskatchewan Avenue East
City/Province:	Portage La Prairie
Postal Code:	R1N 0L8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: astechesen@city-plap.com
Email 2: astechesen@city-plap.com
Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: astechesen@city-plap.com
Email 2:

Turnaround Time (TAT) Requested

☐ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☑ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	GMPP100 / WP2022GMPP1000002	AFE/Cost Center:	PO# W22006
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact:	Sampler:

Oil and Gas Required Fields (client use)

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	E108	E510	E440	E385	E312A.EC269A.NO3, E269A.N+N, E269A.NO2, E269A.N	E366	EC269.NO3, E269 N+N, E269.NO2	MOIST-SK	PREP-DRY/GRIND-SK	E199	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	22-09-36	15-Sep-22	11:25	Soil	1	E	E	E	E				E	E				
	22-09-37	15-Sep-22	11:25	Soil	2					E	E	E	E	E				
	22-09-38	15-Sep-22	11:25	Soil	1									E	E			

Environmental Division
Winnipeg
Work Order Reference
WP2203574

Telephone : +1 204 255 9720

RUSH

S-8194, ULINE, 800-295-5510

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

...ting from drop-down below

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
19.1							

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Aaron Stechesen	~~September 14, 2022~~ September 15, 2022	11:25

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	SEP 15 2022	1:45

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

FE6 2020 FRONT

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

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

NE 9-12-6 Watson Phosphorus added to metal results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **WP2203412**	Page	: 1 of 3
Amendment	: **1**		
Client	: **City of Portage la Prairie**	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg MB Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 12-Sep-2022 11:49
PO	: W22006	Date Analysis Commenced	: 15-Sep-2022
C-O-C number	: ----	Issue Date	: 26-Sep-2022 16:34
Sampler	: ---		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Quality Systems Coordinator	Inorganics, Saskatoon, Saskatchewan
Henry Lai	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Jwan Abdalla	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Jwan Abdalla	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Amendment - 26-Sep-22: This report has been amended and re-released to allow the reporting of additional analytical data.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	22-09-25	22-09-26	22-09-27	---	---
					Client sampling date / time	09-Sep-2022 16:00	09-Sep-2022 16:00	09-Sep-2022 16:00	---	---
						WP2203412-001	WP2203412-002	WP2203412-003	----	----
						Result	Result	Result	---	---
Physical Tests										
Atterberg plastic limit [PL] (moisture)	---	E199	1.0	%		---	---	24.0	---	---
pH (1:2 soil:water)	---	E108	0.10	pH units		7.77	---	---	---	---
Atterberg liquid limit [LL] (moisture)	---	E199	1.0	%		---	---	44.7	---	---
Atterberg plasticity index [PI]	---	E199	1.0	%		---	---	20.7	---	---
Plant Available Nutrients										
ammonium, available (as N)	14798-03-9	E312A	1.0	mg/kg		---	2.2	---	---	---
nitrate + nitrite, available (as N)	---	E269.N+N	1.0	mg/kg		---	5.7	---	---	---
nitrate + nitrite, available (as N)	---	E269A.N+N	2.0	mg/kg		---	5.0	---	---	---
nitrate, available (as N)	14797-55-8	EC269.NO3	2.0	mg/kg		---	5.3	---	---	---
nitrite, available (as N)	14797-65-0	E269.NO2	0.40	mg/kg		---	0.41	---	---	---
nitrite, available (as N)	14797-65-0	E269A.NO2	1.0	mg/kg		---	<1.0	---	---	---
nitrogen, total available	7727-37-9	EC269A.N	2.2	mg/kg		---	7.2	---	---	---
phosphate, available (as P)	14265-44-2	E385	1.0	mg/kg		20.1	---	---	---	---
Metals										
cadmium	7440-43-9	E440	0.020	mg/kg		0.543	---	---	---	---
chromium	7440-47-3	E440	0.50	mg/kg		21.8	---	---	---	---
copper	7440-50-8	E440	0.50	mg/kg		20.8	---	---	---	---
lead	7439-92-1	E440	0.50	mg/kg		11.1	---	---	---	---
mercury	7439-97-6	E510	0.0050	mg/kg		0.0341	---	---	---	---
nickel	7440-02-0	E440	0.50	mg/kg		24.7	---	---	---	---
phosphorus	7723-14-0	E440	50	mg/kg		781	---	---	---	---
potassium	7440-09-7	E440	100	mg/kg		2800	---	---	---	---
zinc	7440-66-6	E440	2.0	mg/kg		91.8	---	---	---	---

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Environmental

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WP2203412**	Page	: 1 of 9
Amendment	: 1		
Client	: **City of Portage la Prairie**	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 12-Sep-2022 11:49
PO	: W22006	Issue Date	: 26-Sep-2022 16:34
C-O-C number	: ----		
Sampler	: ----		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	Anonymous	Anonymous	copper	7440-50-8	E440	114 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap										
22-09-25	E510	09-Sep-2022	16-Sep-2022	---	---		16-Sep-2022	28 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap										
22-09-25	E440	09-Sep-2022	16-Sep-2022	---	---		16-Sep-2022	180 days	7 days	✓
Physical Tests : Atterberg Limits										
LDPE bag										
22-09-27	E199	09-Sep-2022	---	---	---		15-Sep-2022	180 days	6 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
22-09-25	E108	09-Sep-2022	20-Sep-2022	---	---		20-Sep-2022	30 days	11 days	✓
Plant Available Nutrients : Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)										
LDPE bag										
22-09-26	E312A	09-Sep-2022	16-Sep-2022	---	---		16-Sep-2022	60 days	0 days	✓
Plant Available Nutrients : Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride										
LDPE bag										
22-09-26	E269.N+N	09-Sep-2022	16-Sep-2022	---	---		16-Sep-2022	3 days	7 days	* EHTL
Plant Available Nutrients : Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride										
LDPE bag										
22-09-26	E269A.N+N	09-Sep-2022	16-Sep-2022	---	---		16-Sep-2022	1 days	0 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Available Nutrients : Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)										
LDPE bag 22-09-26	E269.NO2	09-Sep-2022	16-Sep-2022	---	---		16-Sep-2022	1 days	0 days	✓
Plant Available Nutrients : Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)										
LDPE bag 22-09-26	E269A.NO2	09-Sep-2022	16-Sep-2022	---	---		16-Sep-2022	---	0 days	
Plant Available Nutrients : Available Phosphorus by Colourimetry (Olsen)										
LDPE bag 22-09-25	E385	09-Sep-2022	16-Sep-2022	---	---		16-Sep-2022	---	0 days	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Atterberg Limits	E199	648966	1	1	100.0	5.0	✓
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	648868	1	8	12.5	5.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	648847	1	7	14.2	5.0	✓
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N	648869	1	2	50.0	5.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	648848	1	7	14.2	5.0	✓
Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.NO2	648870	1	1	100.0	5.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	648899	1	1	100.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	650237	1	7	14.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	650236	1	7	14.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	654302	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Atterberg Limits	E199	648966	1	1	100.0	5.0	✓
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	648868	2	8	25.0	10.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	648847	2	7	28.5	10.0	✓
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N	648869	2	2	100.0	10.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	648848	2	7	28.5	10.0	✓
Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.NO2	648870	2	1	200.0	10.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	648899	2	1	200.0	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	650237	2	7	28.5	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	650236	2	7	28.5	10.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	654302	2	13	15.3	10.0	✓
Method Blanks (MB)							
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	648868	1	8	12.5	5.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	648847	1	7	14.2	5.0	✓
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N	648869	1	2	50.0	5.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	648848	1	7	14.2	5.0	✓
Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.NO2	648870	1	1	100.0	5.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	648899	1	1	100.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	650237	1	7	14.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	650236	1	7	14.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Saskatoon - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Atterberg Limits	E199 Saskatoon - Environmental	Soil/Solid	CSSS Ch. 58 (mod)	Atterberg Limits are measures of physical properties of fine grained soils. Liquid Limit (LL) is the water content where soil behaviour changes from plastic to liquid, and is determined by Casagrande cup. Plastic Limit (PL) is the water content where soil begins to exhibit plastic behaviour, and is measured as the moisture content of a 3 mm diameter thread of soil which begins to crumble when rolled. Plasticity Index (PI) is equal to LL - PL.
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N Saskatoon - Environmental	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Plant available nitrate and nitrite are analyzed by colourimetry using a flow injection analyzer on a soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2 Saskatoon - Environmental	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Plant available nitrite is analyzed by colourimetry using a segmented flow analyzer on a soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2/APHA 4500-NO3 I (mod)	Plant available nitrate and nitrite is analyzed by colourimetry using a flow injection analyzer on a soil sample extract that has been extracted using 2N potassium chloride, then shaken well and filtered prior to analysis.
Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.NO2 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2/APHA 4500-NO3 I (mod)	Plant available nitrite is analyzed by colourimetry using a segmented flow analyzer on a soil sample extract that has been extracted using 2N potassium chloride, then shaken well and filtered prior to analysis.
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2/Comm Soil Sci 19(6) (mod)	Plant available ammonium is analyzed by colourimetry using a segmented flow analyzer on a soil sample extract that has been extracted using 2N Potassium Chloride, then shaken well and filtered prior to analysis.
Available Phosphorus by Colourimetry (Olsen)	E385 Saskatoon - Environmental	Soil/Solid	Carter CSSS (2008) 8.3	Plant available phosphorus is extracted from air dried soil using a fixed ratio bicarbonate extraction. Phosphorus is determined by colorimetry.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 Saskatoon - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Saskatoon - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Available Nitrate by Difference (0.01M Calcium Chloride Ext.)	EC269.NO3 Saskatoon - Environmental	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Available Nitrate is determined by difference between Nitrate+Nitrite-N and Nitrite-N. A soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Total Available Nitrogen (Calculation)	EC269A.N Saskatoon - Environmental	Soil/Solid	Calculation	Total available nitrogen is calculated as the sum of NO2-N+NO3-N and NH3-N extracted from soil using 2N potassium chloride solution.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Saskatoon - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Fixed ratio 0.01M Calcium Chloride extraction for plant available nutrients	EP269 Saskatoon - Environmental	Soil/Solid	Alberta Agriculture	Plant available nutrients (N&S) extracted using 0.01M calcium chloride, then shaken well and filtered prior to analysis.
2N Potassium Chloride extraction for available nutrients	EP269A Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2	A soil sample extract is generated by fixed ratio extraction using 2N Potassium Chloride, then shaken well and filtered prior to analysis.
Bicarbonate extraction for soil	EP385 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 8.2	Plant available phosphorus is extracted using fixed ratio sodium bicarbonate solution (Olsen method).
Digestion for Metals and Mercury	EP440 Saskatoon - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dry and Grind	EPP442 Saskatoon - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	:**WP2203412**	Page	: 1 of 6
Amendment	:1		
Client	:City of Portage la Prairie	Laboratory	:Winnipeg - Environmental
Contact	:Aaron Stechesen	Account Manager	:Judy Dalmaijer
Address	:97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	:1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	:204 239 8361	Telephone	:+1 204 255 9720
Project	:Wastewater	Date Samples Received	:12-Sep-2022 11:49
PO	:W22006	Date Analysis Commenced	:15-Sep-2022
C-O-C number	:---	Issue Date	:26-Sep-2022 16:34
Sampler	:---		
Site	:Wastewater		
Quote number	:Wastewater		
No. of samples received	:3		
No. of samples analysed	:3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Quality Systems Coordinator	Saskatoon Inorganics, Saskatoon, Saskatchewan
Henry Lai	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Jwan Abdalla	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Jwan Abdalla	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 648966)											
WP2203412-003	22-09-27	Atterberg liquid limit [LL] (moisture)	—	E199	1.0	%	44.7	44.9	0.526%	20%	—
		Atterberg plastic limit [PL] (moisture)	—	E199	1.0	%	24.0	24.0	0.0421%	20%	—
Physical Tests (QC Lot: 654302)											
KS2203373-031	Anonymous	pH (1:2 soil:water)	—	E108	0.10	pH units	8.35	8.35	0.00%	10%	—
Plant Available Nutrients (QC Lot: 648847)											
YL2201441-003	Anonymous	nitrate + nitrite, available (as N)	—	E269.N+N	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 648848)											
YL2201441-003	Anonymous	nitrite, available (as N)	14797-65-0	E269.NO2	0.40	mg/kg	<0.40	<0.40	0	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 648868)											
WP2203412-002	22-09-26	ammonium, available (as N)	14798-03-9	E312A	1.0	mg/kg	2.2	2.1	0.06	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 648869)											
WP2203412-002	22-09-26	nitrate + nitrite, available (as N)	—	E269A.N+N	2.0	mg/kg	5.0	5.2	0.1	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 648870)											
WP2203412-002	22-09-26	nitrite, available (as N)	14797-65-0	E269A.NO2	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 648899)											
WP2203412-001	22-09-25	phosphate, available (as P)	14265-44-2	E385	1.0	mg/kg	20.1	20.2	0.816%	30%	—
Metals (QC Lot: 650236)											
RG2201267-001	Anonymous	cadmium	7440-43-9	E440	0.020	mg/kg	12.0	10.2	16.8%	30%	—
		chromium	7440-47-3	E440	0.50	mg/kg	603	594	1.48%	30%	—
		copper	7440-50-8	E440	3.69	mg/kg	3390	930	114%	30%	DUP-H
		lead	7439-92-1	E440	3.69	mg/kg	886	746	17.1%	40%	—
		nickel	7440-02-0	E440	0.50	mg/kg	299	339	12.4%	30%	—
		phosphorus	7723-14-0	E440	50	mg/kg	716	819	13.4%	30%	—
		potassium	7440-09-7	E440	100	mg/kg	1890	1960	3.73%	40%	—
		zinc	7440-66-6	E440	14.8	mg/kg	2550	2740	7.24%	30%	—
Metals (QC Lot: 650237)											
RG2201267-001	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.889	0.894	0.562%	40%	—

Qualifiers

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

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Plant Available Nutrients (QCLot: 648847)						
nitrate + nitrite, available (as N)	---	E269.N+N	1	mg/kg	<1.0	---
Plant Available Nutrients (QCLot: 648848)						
nitrite, available (as N)	14797-65-0	E269.NO2	0.4	mg/kg	<0.40	---
Plant Available Nutrients (QCLot: 648868)						
ammonium, available (as N)	14798-03-9	E312A	1	mg/kg	<1.0	---
Plant Available Nutrients (QCLot: 648869)						
nitrate + nitrite, available (as N)	---	E269A.N+N	2	mg/kg	<2.0	---
Plant Available Nutrients (QCLot: 648870)						
nitrite, available (as N)	14797-65-0	E269A.NO2	1	mg/kg	<1.0	---
Plant Available Nutrients (QCLot: 648899)						
phosphate, available (as P)	14265-44-2	E385	1	mg/kg	<1.0	---
Metals (QCLot: 650236)						
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	---
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	---
copper	7440-50-8	E440	0.5	mg/kg	<0.50	---
lead	7439-92-1	E440	0.5	mg/kg	<0.50	---
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	---
phosphorus	7723-14-0	E440	50	mg/kg	<50	---
potassium	7440-09-7	E440	100	mg/kg	<100	---
zinc	7440-66-6	E440	2	mg/kg	<2.0	---
Metals (QCLot: 650237)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 654302)									
pH (1:2 soil:water)	---	E108	---	pH units	6.86 pH units	101	97.0	103	---
Plant Available Nutrients (QCLot: 648847)									
nitrate + nitrite, available (as N)	---	E269.N+N	1	mg/kg	40 mg/kg	124	70.0	130	---
Plant Available Nutrients (QCLot: 648848)									
nitrite, available (as N)	14797-65-0	E269.NO2	0.4	mg/kg	20 mg/kg	98.4	70.0	130	---
Plant Available Nutrients (QCLot: 648868)									
ammonium, available (as N)	14798-03-9	E312A	1	mg/kg	10 mg/kg	101	80.0	120	---
Plant Available Nutrients (QCLot: 648869)									
nitrate + nitrite, available (as N)	---	E269A.N+N	2	mg/kg	40 mg/kg	126	70.0	130	---
Plant Available Nutrients (QCLot: 648870)									
nitrite, available (as N)	14797-65-0	E269A.NO2	1	mg/kg	20 mg/kg	99.8	70.0	130	---
Plant Available Nutrients (QCLot: 648899)									
phosphate, available (as P)	14265-44-2	E385	1	mg/kg	20 mg/kg	103	80.0	120	---
Metals (QCLot: 650236)									
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.6	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	96.7	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.3	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	95.1	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	102	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	100	80.0	120	---
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	93.8	80.0	120	---
Metals (QCLot: 650237)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	97.7	80.0	120	---

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 648966)									
	RM	Atterberg liquid limit [LL] (moisture)	—	E199	33.68 %	102	80.0	120	—
	RM	Atterberg plastic limit [PL] (moisture)	—	E199	20 %	96.0	80.0	120	—
Physical Tests (QCLot: 654302)									
	RM	pH (1:2 soil:water)	—	E108	8.13 pH units	100	96.0	104	—
Plant Available Nutrients (QCLot: 648847)									
	RM	nitrate + nitrite, available (as N)	—	E269.N+N	18.9 mg/kg	82.5	70.0	130	—
Plant Available Nutrients (QCLot: 648848)									
	RM	nitrite, available (as N)	14797-65-0	E269.NO2	0.17 mg/kg	49.4	0	570	—
Plant Available Nutrients (QCLot: 648868)									
	RM	ammonium, available (as N)	14798-03-9	E312A	72 mg/kg	98.3	80.0	120	—
Plant Available Nutrients (QCLot: 648869)									
	RM	nitrate + nitrite, available (as N)	—	E269A.N+N	20.1 mg/kg	70.8	70.0	130	—
Plant Available Nutrients (QCLot: 648870)									
	RM	nitrite, available (as N)	14797-65-0	E269A.NO2	0.32 mg/kg	36.9	0	725	—
Plant Available Nutrients (QCLot: 648899)									
	RM	phosphate, available (as P)	14265-44-2	E385	7 mg/kg	94.3	80.0	120	—
Metals (QCLot: 650236)									
	RM	cadmium	7440-43-9	E440	0.91 mg/kg	108	70.0	130	—
	RM	chromium	7440-47-3	E440	101 mg/kg	88.6	70.0	130	—
	RM	copper	7440-50-8	E440	123 mg/kg	95.7	70.0	130	—
	RM	lead	7439-92-1	E440	267 mg/kg	99.4	70.0	130	—
	RM	nickel	7440-02-0	E440	26.7 mg/kg	96.8	70.0	130	—
	RM	phosphorus	7723-14-0	E440	752 mg/kg	102	70.0	130	—
	RM	potassium	7440-09-7	E440	1587 mg/kg	95.7	70.0	130	—
	RM	zinc	7440-66-6	E440	297 mg/kg	92.0	70.0	130	—
Metals (QCLot: 650237)									
	RM	mercury	7439-97-6	E510	0.059 mg/kg	93.0	70.0	130	—

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	City of Portage La Prairie
Contact:	Aaron Stecheson
Phone:	1-204-239-8361
	Company address below will appear on the final report
Street:	97 Saskatchewan Avenue East
City/Province:	Portage La Prairie
Postal Code:	R1N 0L8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: astechesen@city-plap.com

Email 2: astechesen@city-plap.com

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: astechesen@city-plap.com

Email 2:

Project Information

ALS Account # / Quote #: GMPP100 / WP2022GMPP1000002

Job #:

PO / AFE:

LSD:

ALS Lab Work Order # (ALS use only):

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#: W22006

Major/Minor Code: | Routing Code:

Requisitioner:

Location:

ALS Contact: | Sampler:

Turnaround Time (TAT) Requested

☐ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☑ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	E108	E510	E440	E385	E312A, EC296A.NO3,E269A.N+N,	E366	EC269.NO3, E269 N+N, E269.NO2	MOIST-SK	PREP-DRY/GRIND-SK	E199	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	22-09-25	9-Sep-22	16:00	Soil	1	P2	P2	P2	P2				P2	P2				
	22-09-26	9-Sep-22	16:00	Soil	3					P2	P2	P2	P2	P2				
	22-09-27	9-Sep-22	16:00	Soil	2									P2	P2			

RU S-8194, ULINE, ®

Environmental Division Winnipeg

Work Order Reference WP2203412

Telephone : +1 204 255 9720

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT

Cooling Method: ☐ NONE ☐ ICE ☐ ICE

Submission Comments identified on Sample R

Cooler Custody Seals Intact: ☐ YES ☐ N/A ☐ N/A

INITIAL COOLER TEMPERATURES °C

8.1

SHIPMENT RELEASE (client use)

Released by: | Date: September 12, 2022 | Time: 9:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: O.A. | Date: SEP 12 2022 | Time: 11:45 am

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: | Date: | Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

FEB 2022 FRONT

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

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

2412

Watson SE 16-12-6 W/Phosphorus

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **WP2204062**	Page	: 1 of 3
Amendment	: **1**		
Client	: **City of Portage la Prairie**	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg MB Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 04-Oct-2022 14:41
PO	: W22006	Date Analysis Commenced	: 06-Oct-2022
C-O-C number	: ----	Issue Date	: 14-Oct-2022 10:08
Sampler	: ----		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Quality Systems Coordinator	Inorganics, Saskatoon, Saskatchewan
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Jwan Abdalla	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Amendment (14-Oct-22): This report has been amended and re-released to allow the reporting of additional analytical data.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	22-10-07	22-10-08	22-10-09	---	---
					Client sampling date / time	04-Oct-2022 12:45	04-Oct-2022 12:45	04-Oct-2022 12:45	---	---
						WP2204062-001	WP2204062-002	WP2204062-003	-----	-----
						Result	Result	Result	---	---
Physical Tests										
Atterberg plastic limit [PL] (moisture)	---	E199	1.0	%		---	---	23.5	---	---
pH (1:2 soil:water)	---	E108	0.10	pH units		7.74	---	---	---	---
Atterberg liquid limit [LL] (moisture)	---	E199	1.0	%		---	---	50.6	---	---
Atterberg plasticity index [PI]	---	E199	1.0	%		---	---	27.1	---	---
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		---	0.127	---	---	---
Plant Available Nutrients										
ammonium, available (as N)	14798-03-9	E312A	1.0	mg/kg		---	<1.0	---	---	---
nitrate + nitrite, available (as N)	---	E269.N+N	1.0	mg/kg		---	6.7	---	---	---
nitrate + nitrite, available (as N)	---	E269A.N+N	2.0	mg/kg		---	6.6	---	---	---
nitrate, available (as N)	14797-55-8	EC269.NO3	2.0	mg/kg		---	6.7	---	---	---
nitrite, available (as N)	14797-65-0	E269.NO2	0.40	mg/kg		---	<0.40	---	---	---
nitrite, available (as N)	14797-65-0	E269A.NO2	1.0	mg/kg		---	<1.0	---	---	---
nitrogen, total available	7727-37-9	EC269A.N	2.2	mg/kg		---	6.6	---	---	---
phosphate, available (as P)	14265-44-2	E385	1.0	mg/kg		18.4	---	---	---	---
nitrate, available (as N)	14797-55-8	EC269A.NO3	2.0	mg/kg		---	6.6	---	---	---
Metals										
cadmium	7440-43-9	E440	0.020	mg/kg		0.485	---	---	---	---
chromium	7440-47-3	E440	0.50	mg/kg		21.5	---	---	---	---
copper	7440-50-8	E440	0.50	mg/kg		18.3	---	---	---	---
lead	7439-92-1	E440	0.50	mg/kg		9.71	---	---	---	---
mercury	7439-97-6	E510	0.0050	mg/kg		0.0307	---	---	---	---
nickel	7440-02-0	E440	0.50	mg/kg		23.6	---	---	---	---
phosphorus	7723-14-0	E440	50	mg/kg		687	---	---	---	---
potassium	7440-09-7	E440	100	mg/kg		2470	---	---	---	---
zinc	7440-66-6	E440	2.0	mg/kg		83.5	---	---	---	---

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Environmental

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WP2204062**	Page	: 1 of 8
Amendment	: 1		
Client	: **City of Portage la Prairie**	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 04-Oct-2022 14:41
PO	: W22006	Issue Date	: 14-Oct-2022 10:05
C-O-C number	: ----		
Sampler	: ----		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "—" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Combustion										
LDPE bag 22-10-08	E366	04-Oct-2022	07-Oct-2022	---	---		07-Oct-2022	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap 22-10-07	E510	04-Oct-2022	06-Oct-2022	---	---		07-Oct-2022	28 days	2 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap 22-10-07	E440	04-Oct-2022	06-Oct-2022	---	---		07-Oct-2022	180 days	2 days	✓
Physical Tests : Atterberg Limits										
LDPE bag 22-10-09	E199	04-Oct-2022	---	---	---		06-Oct-2022	180 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap 22-10-07	E108	04-Oct-2022	12-Oct-2022	---	---		12-Oct-2022	30 days	8 days	✓
Plant Available Nutrients : Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)										
LDPE bag 22-10-08	E312A	04-Oct-2022	07-Oct-2022	---	---		07-Oct-2022	60 days	0 days	✓
Plant Available Nutrients : Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride										
LDPE bag 22-10-08	E269.N+N	04-Oct-2022	07-Oct-2022	---	---		07-Oct-2022	3 days	3 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Available Nutrients : Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride										
LDPE bag 22-10-08	E269A.N+N	04-Oct-2022	07-Oct-2022	---	---		07-Oct-2022	1 days	0 days	✓
Plant Available Nutrients : Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)										
LDPE bag 22-10-08	E269.NO2	04-Oct-2022	07-Oct-2022	---	---		07-Oct-2022	1 days	0 days	✓
Plant Available Nutrients : Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)										
LDPE bag 22-10-08	E269A.NO2	04-Oct-2022	07-Oct-2022	---	---		07-Oct-2022	---	0 days	
Plant Available Nutrients : Available Phosphorus by Colourimetry (Olsen)										
LDPE bag 22-10-07	E385	04-Oct-2022	07-Oct-2022	---	---		07-Oct-2022	---	0 days	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Atterberg Limits	E199	683899	1	1	100.0	5.0	✓
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	685289	1	1	100.0	5.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	685285	1	10	10.0	5.0	✓
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N	685290	1	1	100.0	5.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	685287	1	1	100.0	5.0	✓
Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.NO2	685291	1	1	100.0	5.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	685292	1	1	100.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	684881	1	13	7.6	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	684882	1	13	7.6	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	690476	1	1	100.0	5.0	✓
Total Nitrogen by Combustion	E366	686557	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
Atterberg Limits	E199	683899	1	1	100.0	5.0	✓
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	685289	2	1	200.0	10.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	685285	2	10	20.0	10.0	✓
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N	685290	2	1	200.0	10.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	685287	2	1	200.0	10.0	✓
Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.NO2	685291	2	1	200.0	10.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	685292	2	1	200.0	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	684881	2	13	15.3	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	684882	2	13	15.3	10.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	690476	2	1	200.0	10.0	✓
Total Nitrogen by Combustion	E366	686557	2	1	200.0	10.0	✓
Method Blanks (MB)							
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	685289	1	1	100.0	5.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	685285	1	10	10.0	5.0	✓
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N	685290	1	1	100.0	5.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	685287	1	1	100.0	5.0	✓
Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.NO2	685291	1	1	100.0	5.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	685292	1	1	100.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	684881	1	13	7.6	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	684882	1	13	7.6	5.0	✓
Total Nitrogen by Combustion	E366	686557	1	1	100.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Saskatoon - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Atterberg Limits	E199 Saskatoon - Environmental	Soil/Solid	CSSS Ch. 58 (mod)	Atterberg Limits are measures of physical properties of fine grained soils. Liquid Limit (LL) is the water content where soil behaviour changes from plastic to liquid, and is determined by Casagrande cup. Plastic Limit (PL) is the water content where soil begins to exhibit plastic behaviour, and is measured as the moisture content of a 3 mm diameter thread of soil which begins to crumble when rolled. Plasticity Index (PI) is equal to LL - PL.
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N Saskatoon - Environmental	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Plant available nitrate and nitrite are analyzed by colourimetry using a flow injection analyzer on a soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2 Saskatoon - Environmental	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Plant available nitrite is analyzed by colourimetry using a segmented flow analyzer on a soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Available Nitrate and Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.N+N Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2/APHA 4500-NO3 I (mod)	Plant available nitrate and nitrite is analyzed by colourimetry using a flow injection analyzer on a soil sample extract that has been extracted using 2N potassium chloride, then shaken well and filtered prior to analysis.
Available Nitrite by Colourimetry (2N Potassium Chloride Ext.)	E269A.NO2 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2/APHA 4500-NO3 I (mod)	Plant available nitrite is analyzed by colourimetry using a segmented flow analyzer on a soil sample extract that has been extracted using 2N potassium chloride, then shaken well and filtered prior to analysis.
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2/Comm Soil Sci 19(6) (mod)	Plant available ammonium is analyzed by colourimetry using a segmented flow analyzer on a soil sample extract that has been extracted using 2N Potassium Chloride, then shaken well and filtered prior to analysis.
Total Nitrogen by Combustion	E366 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.4	The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.
Available Phosphorus by Colourimetry (Olsen)	E385 Saskatoon - Environmental	Soil/Solid	Carter CSSS (2008) 8.3	Plant available phosphorus is extracted from air dried soil using a fixed ratio bicarbonate extraction. Phosphorus is determined by colorimetry.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 Waterloo - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Waterloo - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Available Nitrate by Difference (0.01M Calcium Chloride Ext.)	EC269.NO3 Saskatoon - Environmental	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Available Nitrate is determined by difference between Nitrate+Nitrite-N and Nitrite-N. A soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Total Available Nitrogen (Calculation)	EC269A.N Saskatoon - Environmental	Soil/Solid	Calculation	Total available nitrogen is calculated as the sum of NO2-N+NO3-N and NH3-N extracted from soil using 2N potassium chloride solution.
Available Nitrate by Difference (2N Potassium Chloride Ext.)	EC269A.NO3 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2/APHA 4500-NO3 I (mod)	Available Nitrate is determined by difference between Nitrate+Nitrite-N and Nitrite-N. A soil sample extract that has been extracted using 2N Potassium Chloride, then shaken well and filtered prior to analysis.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Saskatoon - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Fixed ratio 0.01M Calcium Chloride extraction for plant available nutrients	EP269 Saskatoon - Environmental	Soil/Solid	Alberta Agriculture	Plant available nutrients (N&S) extracted using 0.01M calcium chloride, then shaken well and filtered prior to analysis.
2N Potassium Chloride extraction for available nutrients	EP269A Saskatoon - Environmental	Soil/Solid	CSSS (2008) 6.2	A soil sample extract is generated by fixed ratio extraction using 2N Potassium Chloride, then shaken well and filtered prior to analysis.
Bicarbonate extraction for soil	EP385 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 8.2	Plant available phosphorus is extracted using fixed ratio sodium bicarbonate solution (Olsen method).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Metals and Mercury	EP440 Waterloo - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 Saskatoon - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	:**WP2204062**	Page	: 1 of 8
Amendment	:**1**		
Client	: City of Portage la Prairie	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 04-Oct-2022 14:41
PO	: W22006	Date Analysis Commenced	: 06-Oct-2022
C-O-C number	: —	Issue Date	: 14-Oct-2022 10:05
Sampler	: —		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Quality Systems Coordinator	Saskatoon Inorganics, Saskatoon, Saskatchewan
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Hedy Lai	Team Leader - Inorganics	Saskatoon Inorganics, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Jwan Abdalla	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "—" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 683899)											
WP2204062-003	22-10-09	Atterberg liquid limit [LL] (moisture)	—	E199	1.0	%	50.6	50.5	0.234%	20%	—
		Atterberg plastic limit [PL] (moisture)	—	E199	1.0	%	23.5	23.5	0.0747%	20%	—
Physical Tests (QC Lot: 690476)											
WP2204062-001	22-10-07	pH (1:2 soil:water)	—	E108	0.10	pH units	7.74	7.71	0.388%	10%	—
Anions and Nutrients (QC Lot: 686557)											
WP2204062-002	22-10-08	nitrogen, total	7727-37-9	E366	0.020	%	0.127	0.125	0.002	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 685285)											
RG2201406-001	Anonymous	nitrate + nitrite, available (as N)	—	E269.N+N	1.0	mg/kg	1.1	1.0	0.05	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 685287)											
WP2204062-002	22-10-08	nitrite, available (as N)	14797-65-0	E269.NO2	0.40	mg/kg	<0.40	<0.40	0	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 685289)											
WP2204062-002	22-10-08	ammonium, available (as N)	14798-03-9	E312A	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 685290)											
WP2204062-002	22-10-08	nitrate + nitrite, available (as N)	—	E269A.N+N	2.0	mg/kg	6.6	6.6	0.04	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 685291)											
WP2204062-002	22-10-08	nitrite, available (as N)	14797-65-0	E269A.NO2	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	—
Plant Available Nutrients (QC Lot: 685292)											
WP2204062-001	22-10-07	phosphate, available (as P)	14265-44-2	E385	1.0	mg/kg	18.4	18.7	1.58%	30%	—
Metals (QC Lot: 684881)											
WT2216997-001	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.0102	0.0089	0.0013	Diff <2x LOR	—
Metals (QC Lot: 684882)											
WT2216997-001	Anonymous	cadmium	7440-43-9	E440	0.020	mg/kg	0.022	0.030	0.008	Diff <2x LOR	—
		chromium	7440-47-3	E440	0.50	mg/kg	29.1	32.2	10.2%	30%	—
		copper	7440-50-8	E440	0.50	mg/kg	28.8	33.0	13.8%	30%	—
		lead	7439-92-1	E440	0.50	mg/kg	3.34	3.16	5.45%	40%	—
		nickel	7440-02-0	E440	0.50	mg/kg	37.4	41.1	9.27%	30%	—
		phosphorus	7723-14-0	E440	50	mg/kg	731	824	12.0%	30%	—
		potassium	7440-09-7	E440	100	mg/kg	3400	4070	17.9%	40%	—
		zinc	7440-66-6	E440	2.0	mg/kg	72.7	81.0	10.9%	30%	—

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 686557)						
nitrogen, total	7727-37-9	E366	0.02	%	<0.020	—
Plant Available Nutrients (QCLot: 685285)						
nitrate + nitrite, available (as N)	—	E269.N+N	1	mg/kg	<1.0	—
Plant Available Nutrients (QCLot: 685287)						
nitrite, available (as N)	14797-65-0	E269.NO2	0.4	mg/kg	<0.40	—
Plant Available Nutrients (QCLot: 685289)						
ammonium, available (as N)	14798-03-9	E312A	1	mg/kg	<1.0	—
Plant Available Nutrients (QCLot: 685290)						
nitrate + nitrite, available (as N)	—	E269A.N+N	2	mg/kg	<2.0	—
Plant Available Nutrients (QCLot: 685291)						
nitrite, available (as N)	14797-65-0	E269A.NO2	1	mg/kg	<1.0	—
Plant Available Nutrients (QCLot: 685292)						
phosphate, available (as P)	14265-44-2	E385	1	mg/kg	<1.0	—
Metals (QCLot: 684881)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	—
Metals (QCLot: 684882)						
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	—
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	—
copper	7440-50-8	E440	0.5	mg/kg	<0.50	—
lead	7439-92-1	E440	0.5	mg/kg	<0.50	—
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	—
phosphorus	7723-14-0	E440	50	mg/kg	<50	—
potassium	7440-09-7	E440	100	mg/kg	<100	—
zinc	7440-66-6	E440	2	mg/kg	<2.0	—

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 690476)									
pH (1:2 soil:water)	—	E108	—	pH units	7 pH units	101	97.0	103	—
Anions and Nutrients (QCLot: 686557)									
nitrogen, total	7727-37-9	E366	0.02	%	22.37 %	99.1	90.0	110	—
Plant Available Nutrients (QCLot: 685285)									
nitrate + nitrite, available (as N)	—	E269.N+N	1	mg/kg	40 mg/kg	99.1	70.0	130	—
Plant Available Nutrients (QCLot: 685287)									
nitrite, available (as N)	14797-65-0	E269.NO2	0.4	mg/kg	20 mg/kg	97.4	70.0	130	—
Plant Available Nutrients (QCLot: 685289)									
ammonium, available (as N)	14798-03-9	E312A	1	mg/kg	10 mg/kg	101	80.0	120	—
Plant Available Nutrients (QCLot: 685290)									
nitrate + nitrite, available (as N)	—	E269A.N+N	2	mg/kg	40 mg/kg	106	70.0	130	—
Plant Available Nutrients (QCLot: 685291)									
nitrite, available (as N)	14797-65-0	E269A.NO2	1	mg/kg	20 mg/kg	102	70.0	130	—
Plant Available Nutrients (QCLot: 685292)									
phosphate, available (as P)	14265-44-2	E385	1	mg/kg	20 mg/kg	94.8	80.0	120	—
Metals (QCLot: 684881)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	—
Metals (QCLot: 684882)									
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	103	80.0	120	—
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	—
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	—
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	—
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	105	80.0	120	—
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	112	80.0	120	—
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	101	80.0	120	—
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	102	80.0	120	—

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 683899)									
	RM	Atterberg liquid limit [LL] (moisture)	---	E199	33.68 %	101	80.0	120	---
	RM	Atterberg plastic limit [PL] (moisture)	---	E199	20 %	93.0	80.0	120	---
Physical Tests (QCLot: 690476)									
	RM	pH (1:2 soil:water)	---	E108	8.13 pH units	99.8	96.0	104	---
Anions and Nutrients (QCLot: 686557)									
	RM	nitrogen, total	7727-37-9	E366	0.11 %	94.1	80.0	120	---
Plant Available Nutrients (QCLot: 685285)									
	RM	nitrate + nitrite, available (as N)	---	E269.N+N	18.9 mg/kg	90.6	70.0	130	---
Plant Available Nutrients (QCLot: 685287)									
	RM	nitrite, available (as N)	14797-65-0	E269.NO2	0.17 mg/kg	66.6	0	570	---
Plant Available Nutrients (QCLot: 685289)									
	RM	ammonium, available (as N)	14798-03-9	E312A	72 mg/kg	98.2	80.0	120	---
Plant Available Nutrients (QCLot: 685290)									
	RM	nitrate + nitrite, available (as N)	---	E269A.N+N	20.1 mg/kg	89.5	70.0	130	---
Plant Available Nutrients (QCLot: 685291)									
	RM	nitrite, available (as N)	14797-65-0	E269A.NO2	0.32 mg/kg	49.9	0	725	---
Plant Available Nutrients (QCLot: 685292)									
	RM	phosphate, available (as P)	14265-44-2	E385	7 mg/kg	94.8	80.0	120	---
Metals (QCLot: 684881)									
	RM	mercury	7439-97-6	E510	0.0585 mg/kg	99.1	70.0	130	---
Metals (QCLot: 684882)									
	RM	cadmium	7440-43-9	E440	0.91 mg/kg	102	70.0	130	---
	RM	chromium	7440-47-3	E440	101 mg/kg	96.0	70.0	130	---
	RM	copper	7440-50-8	E440	123 mg/kg	94.5	70.0	130	---
	RM	lead	7439-92-1	E440	267 mg/kg	95.2	70.0	130	---
	RM	nickel	7440-02-0	E440	26.7 mg/kg	97.1	70.0	130	---
	RM	phosphorus	7723-14-0	E440	752 mg/kg	101	70.0	130	---
	RM	potassium	7440-09-7	E440	1587 mg/kg	92.9	70.0	130	---
	RM	zinc	7440-66-6	E440	297 mg/kg	93.0	70.0	130	---

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	City of Portage La Prairie
Contact:	Aaron Stechesen
Phone:	1-204-239-8361
	Company address below will appear on the final report
Street:	97 Saskatchewan Avenue East
City/Province:	Portage La Prairie
Postal Code:	R1N 0L8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: astechesen@city-plap.com

Email 2: astechesen@city-plap.com

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: astechesen@city-plap.com

Email 2:

Turnaround Time (TAT) Requested

- ☐ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
- ☑ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
- ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	GMPP100 / WP2022GMPP1000002
Job #:	
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO# W22006
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	E108	E510	E440	E385	E312A, EC269A.NO3, E269A.N+N, E269A.NO2	E366	EC269.NO3, E269.N+N, E269.NO2 E269A.NO2, E269A.N	MOIST-SK	PREP-DRY/GRIND-SK	E199	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	22-10-07	4-Oct-22	12:45	Soil	1	P3	P3	P3	P3				P3	P3				
	22-10-08	4-Oct-22	12:45	Soil	1					P3	P3	P3	P3	P3				
	22-10-09	4-Oct-22	12:45	Soil	2									P3	P3			

ID TAGS ARE ON THE BOTTOM OF THE BAGS

SH

1-800-295-5510

Environmental Division Winnipeg

Work Order Reference

WP2204062

Telephone : +1 204 255 9720

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result eval (Exce

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
20.1					

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Aaron Stechesen	04-Oct-22	13:15

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	OCT 04 2022	7:82

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

FEB 2022 FRONT

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

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

4000

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **WP2203966**	Page	: 1 of 4
Amendment	: 1		
Client	: **City of Portage la Prairie**	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg MB Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 30-Sep-2022 08:41
PO	: W22006	Date Analysis Commenced	: 30-Sep-2022
C-O-C number	: ---	Issue Date	: 12-Oct-2022 11:55
Sampler	: ---		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Christine Mason	Analyst - Chemistry	Inorganics, Winnipeg, Manitoba
Lee McTavish		Inorganics, Winnipeg, Manitoba
Oleksandr Busel		Inorganics, Winnipeg, Manitoba
Oleksandr Busel		Metals, Winnipeg, Manitoba

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: **Sludge**
(Matrix: **Water**)

					BST	BVF	UCAR		
				Client sample ID	22-09-62	22-09-63	22-09-64	---	---
				Client sampling date / time	29-Sep-2022 11:00	29-Sep-2022 11:00	29-Sep-2022 11:00	---	---
Analyte	CAS Number	Method	LOR	Unit	WP2203966-001	WP2203966-002	WP2203966-003	---	---
					Result	Result	Result	---	---
Physical Tests									
conductivity	---	E100	2.0	µS/cm	5080	3180	3400	---	---
pH	---	E108	0.10	pH units	7.11	6.69	6.99	---	---
solids, fixed suspended [FSS]	---	E170	3.0	mg/L	6620	9580	17000	---	---
solids, total [TS]	---	E157	10	mg/L	24900	29300	64200	---	---
solids, total suspended [TSS]	---	E160	3.0	mg/L	22400	24100	39400	---	---
solids, volatile suspended [VSS]	---	EC167	3.0	mg/L	15800	14500	22400	---	---
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E303	0.010	mg/L	598	169	170	---	---
Kjeldahl nitrogen, total [TKN]	---	E319	0.15	mg/L	2000	1540	2710	---	---
nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.200 DLM	<0.010	<0.200 DLM	---	---
nitrogen, total organic	---	EC363	0.050	mg/L	1400	1370	2540	---	---
phosphorus, total	7723-14-0	E372	0.020	mg/L	265	305	314	---	---
nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	<0.400 DLM	<0.400 DLM	<0.400 DLM	---	---
nitrate + nitrite (as N)	---	EC235.N+N	0.0200	mg/L	<0.447	<0.400	<0.447	---	---
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	44.6	76.2	52.6	---	---
antimony, total	7440-36-0	E420	0.00010	mg/L	0.0202	0.0162	0.00379	---	---
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.121	0.111	0.0386	---	---
barium, total	7440-39-3	E420	0.00010	mg/L	10.6	10.6	1.17	---	---
beryllium, total	7440-41-7	E420	0.000020	mg/L	0.00285	0.00484	0.00333	---	---
bismuth, total	7440-69-9	E420	0.000050	mg/L	0.415	0.322	0.00852	---	---
boron, total	7440-42-8	E420	0.010	mg/L	2.31	1.17	0.312	---	---
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0152	0.0934	0.0249	---	---
calcium, total	7440-70-2	E420	0.050	mg/L	718	618	160	---	---
cesium, total	7440-46-2	E420	0.000010	mg/L	0.00611	0.00978	0.00637	---	---
chromium, total	7440-47-3	E420	0.00050	mg/L	0.498	0.484	0.203	---	---
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.141	0.178	0.0506	---	---
copper, total	7440-50-8	E420	0.00050	mg/L	8.57	6.63	1.30	---	---
iron, total	7439-89-6	E420	0.010	mg/L	107	211	105	---	---
lead, total	7439-92-1	E420	0.000050	mg/L	0.266	0.269	0.0701	---	---

Analytical Results

Sub-Matrix: **Sludge**
(Matrix: **Water**)

					Client sample ID	22-09-62	22-09-63	22-09-64	---	---
					Client sampling date / time	29-Sep-2022 11:00	29-Sep-2022 11:00	29-Sep-2022 11:00	---	---
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		WP2203966-001	WP2203966-002	WP2203966-003	---	---
						Result	Result	Result	---	---
Total Metals										
lithium, total	7439-93-2	E420	0.0010	mg/L		0.104	0.110	0.0940	---	---
magnesium, total	7439-95-4	E420	0.0050	mg/L		218	199	82.0	---	---
manganese, total	7439-96-5	E420	0.00010	mg/L		37.5	26.6	1.86	---	---
mercury, total	7439-97-6	E508	0.0000050	mg/L		0.00706	0.00689	0.000302	---	---
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.462	0.448	0.411	---	---
nickel, total	7440-02-0	E420	0.00050	mg/L		0.498	0.648	0.328	---	---
phosphorus, total	7723-14-0	E420	0.050	mg/L		339	211	82.7	---	---
potassium, total	7440-09-7	E420	0.050	mg/L		249	242	281	---	---
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.159	0.209	0.183	---	---
selenium, total	7782-49-2	E420	0.000050	mg/L		0.107	0.0932	0.0204	---	---
silicon, total	7440-21-3	E420	0.10	mg/L		86.8	146	110	---	---
silver, total	7440-22-4	E420	0.000010	mg/L		0.0164	0.0155	0.00175	---	---
sodium, total	7440-23-5	E420	0.050	mg/L		168	137	317	---	---
strontium, total	7440-24-6	E420	0.00020	mg/L		2.80	1.99	0.462	---	---
sulfur, total	7704-34-9	E420	0.50	mg/L		264	231	96.8	---	---
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00200 DLM	<0.00200 DLM	<0.00200 DLM	---	---
thallium, total	7440-28-0	E420	0.000010	mg/L		0.00168	0.00412	0.00363	---	---
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00100 DLM	<0.00100 DLM	0.00351	---	---
tin, total	7440-31-5	E420	0.00010	mg/L		0.00899	0.0102	0.00194	---	---
titanium, total	7440-32-6	E420	0.00030	mg/L		0.0974	0.299	0.662	---	---
tungsten, total	7440-33-7	E420	0.00010	mg/L		0.00919	0.00831	0.00689	---	---
uranium, total	7440-61-1	E420	0.000010	mg/L		0.146	0.186	0.0175	---	---
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.176	0.254	0.178	---	---
zinc, total	7440-66-6	E420	0.0030	mg/L		7.99	9.48	5.41	---	---
zirconium, total	7440-67-7	E420	0.00020	mg/L		0.00440	0.00644	0.0109	---	---

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Environmental

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WP2203966**	Page	: 1 of 12
Amendment	: 1		
Client	: **City of Portage la Prairie**	Laboratory	: Winnipeg - Environmental
Contact	: Aaron Stechesen	Account Manager	: Judy Dalmaijer
Address	: 97 Saskatchewan Avenue East Portage la Prairie MB Canada R1N 0L8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 239 8361	Telephone	: +1 204 255 9720
Project	: Wastewater	Date Samples Received	: 30-Sep-2022 08:41
PO	: W22006	Issue Date	: 12-Oct-2022 11:55
C-O-C number	: ----		
Sampler	: ----		
Site	: Wastewater		
Quote number	: Wastewater		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Total Metals	QC-MRG2-6745380 02	---	silicon, total	7440-21-3	E420	121 % MES	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia in Water by Colour										
Amber glass total (sulfuric acid) 22-09-62	E303	29-Sep-2022	02-Oct-2022	---	---		02-Oct-2022	28 days	3 days	✓
Anions and Nutrients : Ammonia in Water by Colour										
Amber glass total (sulfuric acid) 22-09-63	E303	29-Sep-2022	02-Oct-2022	---	---		02-Oct-2022	28 days	3 days	✓
Anions and Nutrients : Ammonia in Water by Colour										
Amber glass total (sulfuric acid) 22-09-64	E303	29-Sep-2022	02-Oct-2022	---	---		02-Oct-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE 22-09-62	E235.NO3	29-Sep-2022	04-Oct-2022	---	---		04-Oct-2022	3 days	5 days	* EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE 22-09-63	E235.NO3	29-Sep-2022	04-Oct-2022	---	---		04-Oct-2022	3 days	5 days	* EHT
Anions and Nutrients : Nitrate in Water by IC										
HDPE 22-09-64	E235.NO3	29-Sep-2022	04-Oct-2022	---	---		04-Oct-2022	3 days	5 days	* EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE 22-09-62	E235.NO2	29-Sep-2022	04-Oct-2022	---	---		04-Oct-2022	3 days	5 days	* EHT

Matrix: **Water**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC										
HDPE										
22-09-63	E235.NO2	29-Sep-2022	04-Oct-2022	---	---		04-Oct-2022	3 days	5 days	* EHT
Anions and Nutrients : Nitrite in Water by IC										
HDPE										
22-09-64	E235.NO2	29-Sep-2022	04-Oct-2022	---	---		04-Oct-2022	3 days	5 days	* EHT
Anions and Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
22-09-62	E319	29-Sep-2022	03-Oct-2022	---	---		04-Oct-2022	28 days	5 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
22-09-63	E319	29-Sep-2022	03-Oct-2022	---	---		04-Oct-2022	28 days	5 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
22-09-64	E319	29-Sep-2022	03-Oct-2022	---	---		04-Oct-2022	28 days	5 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.02 mg/L)										
Amber glass total (sulfuric acid)										
22-09-62	E372	29-Sep-2022	30-Sep-2022	---	---		03-Oct-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.02 mg/L)										
Amber glass total (sulfuric acid)										
22-09-63	E372	29-Sep-2022	30-Sep-2022	---	---		03-Oct-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.02 mg/L)										
Amber glass total (sulfuric acid)										
22-09-64	E372	29-Sep-2022	30-Sep-2022	---	---		03-Oct-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE										
22-09-62	E100	29-Sep-2022	03-Oct-2022	---	---		03-Oct-2022	28 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE 22-09-63	E100	29-Sep-2022	03-Oct-2022	---	---		03-Oct-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE 22-09-64	E100	29-Sep-2022	03-Oct-2022	---	---		03-Oct-2022	28 days	4 days	✓
Physical Tests : FSS by Gravimetry										
HDPE 22-09-62	E170	29-Sep-2022	---	---	---		01-Oct-2022	7 days	2 days	✓
Physical Tests : FSS by Gravimetry										
HDPE 22-09-63	E170	29-Sep-2022	---	---	---		01-Oct-2022	7 days	2 days	✓
Physical Tests : FSS by Gravimetry										
HDPE 22-09-64	E170	29-Sep-2022	---	---	---		01-Oct-2022	7 days	2 days	✓
Physical Tests : pH by Meter										
HDPE 22-09-62	E108	29-Sep-2022	03-Oct-2022	---	---		03-Oct-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE 22-09-63	E108	29-Sep-2022	03-Oct-2022	---	---		03-Oct-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE 22-09-64	E108	29-Sep-2022	03-Oct-2022	---	---		03-Oct-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : TS by Gravimetry										
HDPE 22-09-62	E157	29-Sep-2022	---	---	---		30-Sep-2022	7 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TS by Gravimetry										
HDPE										
22-09-63	E157	29-Sep-2022	---	---	---		30-Sep-2022	7 days	1 days	✓
Physical Tests : TS by Gravimetry										
HDPE										
22-09-64	E157	29-Sep-2022	---	---	---		30-Sep-2022	7 days	1 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
22-09-62	E160	29-Sep-2022	---	---	---		01-Oct-2022	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
22-09-63	E160	29-Sep-2022	---	---	---		01-Oct-2022	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
22-09-64	E160	29-Sep-2022	---	---	---		01-Oct-2022	7 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
22-09-62	E508	29-Sep-2022	04-Oct-2022	---	---		04-Oct-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
22-09-63	E508	29-Sep-2022	04-Oct-2022	---	---		04-Oct-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
22-09-64	E508	29-Sep-2022	04-Oct-2022	---	---		04-Oct-2022	28 days	5 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
22-09-62	E420	29-Sep-2022	30-Sep-2022	---	---		04-Oct-2022	180 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) 22-09-63	E420	29-Sep-2022	30-Sep-2022	---	---		04-Oct-2022	180 days	5 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) 22-09-64	E420	29-Sep-2022	30-Sep-2022	---	---		04-Oct-2022	180 days	5 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✗ = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Ammonia in Water by Colour	E303	676491	1	17	5.8	5.0	✓
Conductivity in Water	E100	677252	1	4	25.0	5.0	✓
FSS by Gravimetry	E170	679559	1	3	33.3	5.0	✓
Nitrate in Water by IC	E235.NO3	674920	0	3	0.0	5.0	✗
Nitrite in Water by IC	E235.NO2	674921	0	3	0.0	5.0	✗
pH by Meter	E108	677251	1	7	14.2	5.0	✓
Total Kjeldahl Nitrogen by Colourimetry	E319	677193	1	14	7.1	5.0	✓
Total Mercury in Water by CVAAS	E508	679862	1	5	20.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	674539	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.02 mg/L)	E372	674429	1	9	11.1	5.0	✓
TS by Gravimetry	E157	674949	1	3	33.3	5.0	✓
TSS by Gravimetry	E160	675775	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Ammonia in Water by Colour	E303	676491	1	17	5.8	5.0	✓
Conductivity in Water	E100	677252	1	4	25.0	5.0	✓
Nitrate in Water by IC	E235.NO3	674920	1	3	33.3	5.0	✓
Nitrite in Water by IC	E235.NO2	674921	1	3	33.3	5.0	✓
pH by Meter	E108	677251	1	7	14.2	5.0	✓
Total Kjeldahl Nitrogen by Colourimetry	E319	677193	1	14	7.1	5.0	✓
Total Mercury in Water by CVAAS	E508	679862	1	5	20.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	674539	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.02 mg/L)	E372	674429	1	9	11.1	5.0	✓
TS by Gravimetry	E157	674949	1	3	33.3	5.0	✓
TSS by Gravimetry	E160	675775	1	12	8.3	5.0	✓
Method Blanks (MB)							
Ammonia in Water by Colour	E303	676491	1	17	5.8	5.0	✓
Conductivity in Water	E100	677252	1	4	25.0	5.0	✓
FSS by Gravimetry	E170	679559	1	3	33.3	5.0	✓
Nitrate in Water by IC	E235.NO3	674920	1	3	33.3	5.0	✓
Nitrite in Water by IC	E235.NO2	674921	1	3	33.3	5.0	✓
Total Kjeldahl Nitrogen by Colourimetry	E319	677193	1	14	7.1	5.0	✓
Total Mercury in Water by CVAAS	E508	679862	1	5	20.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	674539	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.02 mg/L)	E372	674429	1	9	11.1	5.0	✓
TS by Gravimetry	E157	674949	1	3	33.3	5.0	✓
TSS by Gravimetry	E160	675775	1	12	8.3	5.0	✓
Matrix Spikes (MS)							

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Ammonia in Water by Colour	E303	676491	1	17	5.8	5.0	✓
Nitrate in Water by IC	E235.NO3	674920	0	3	0.0	5.0	×
Nitrite in Water by IC	E235.NO2	674921	0	3	0.0	5.0	×
Total Kjeldahl Nitrogen by Colourimetry	E319	677193	1	14	7.1	5.0	✓
Total Mercury in Water by CVAAS	E508	679862	1	5	20.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	674539	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.02 mg/L)	E372	674429	1	9	11.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Winnipeg - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Winnipeg - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TS by Gravimetry	E157 Winnipeg - Environmental	Water	APHA 2540 B (mod)	Total Solids (TS) are determined by drying an aliquot of a well-mixed sample in a pre-weighed dish to constant weight in an oven at 104 ± 1°C. The final weight minus the empty dish represents the total solids.
TSS by Gravimetry	E160 Winnipeg - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
FSS by Gravimetry	E170 Winnipeg - Environmental	Water	APHA 2540 E (mod)	Fixed Suspended Solids (FSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. This residue is ignited to constant weight at 550°C. The remaining solids represent the Fixed Suspended Solids (FSS), while the weight lost on ignition represents the Volatile Suspended Solids (VSS). Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Nitrite in Water by IC	E235.NO2 Winnipeg - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 Winnipeg - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Ammonia in Water by Colour	E303 Winnipeg - Environmental	Water	APHA 4500 NH3-NITROGEN (AMMONIA)	This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.
Total Kjeldahl Nitrogen by Colourimetry	E319 Winnipeg - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by colourimetric analysis.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Phosphorus by Colourimetry (0.02 mg/L)	E372 Winnipeg - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total metals in Water by CRC ICPMS	E420 Winnipeg - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Winnipeg - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
VSS by Gravimetry	EC167 Winnipeg - Environmental	Water	APHA 2540 E (mod)	Volatile Suspended Solids (VSS) are determined by filtering a well-mixed sample through a weighed standard glass-fiber filter and the residue retained on the filter is dried to a constant weight at 104 ± 1°C. This residue is ignited to constant weight at 550°C. The remaining solids represent the fixed suspended solids while the weight lost on ignition is the volatile suspended solids.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Winnipeg - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Total Organic Nitrogen (Calculation)	EC363 Winnipeg - Environmental	Water	APHA 4500-NORG (TKN)/NH3-NITROGEN (NH3)	Total Organic Nitrogen is a calculated parameter. Total Organic Nitrogen = Total Kjeldahl Nitrogen - Ammonia.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Winnipeg - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Winnipeg - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Winnipeg - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

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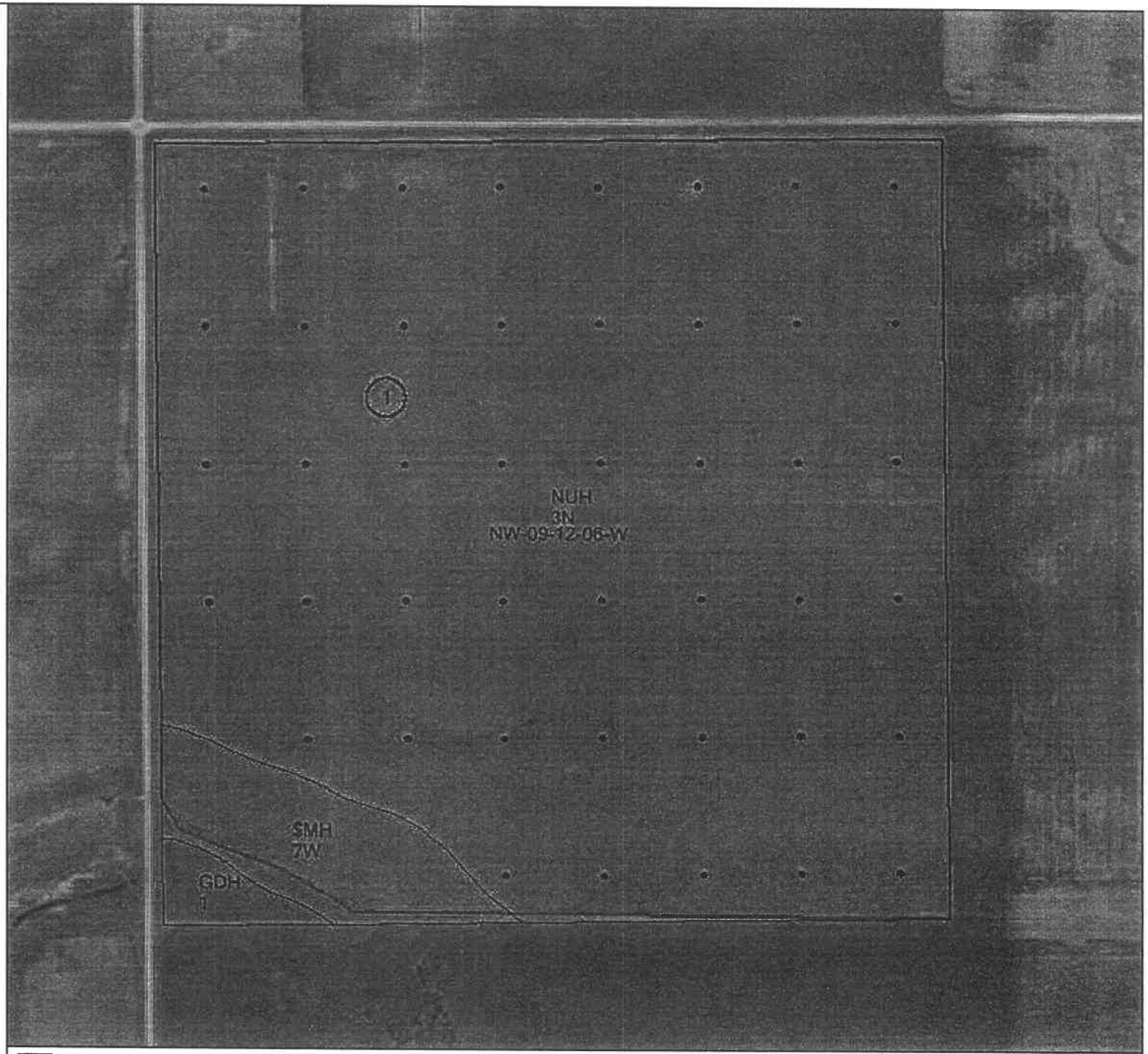
Watson NW 9-12-6



Clay test - 0.3 Ac
NW 9-12-6 - 156 Ac
Portage Soils-Clip - 160.1 Ac

Sample Points

Clay Test Site 1 had no detecable water table at the 1.5 m depth.

Delta Ag SERVICES

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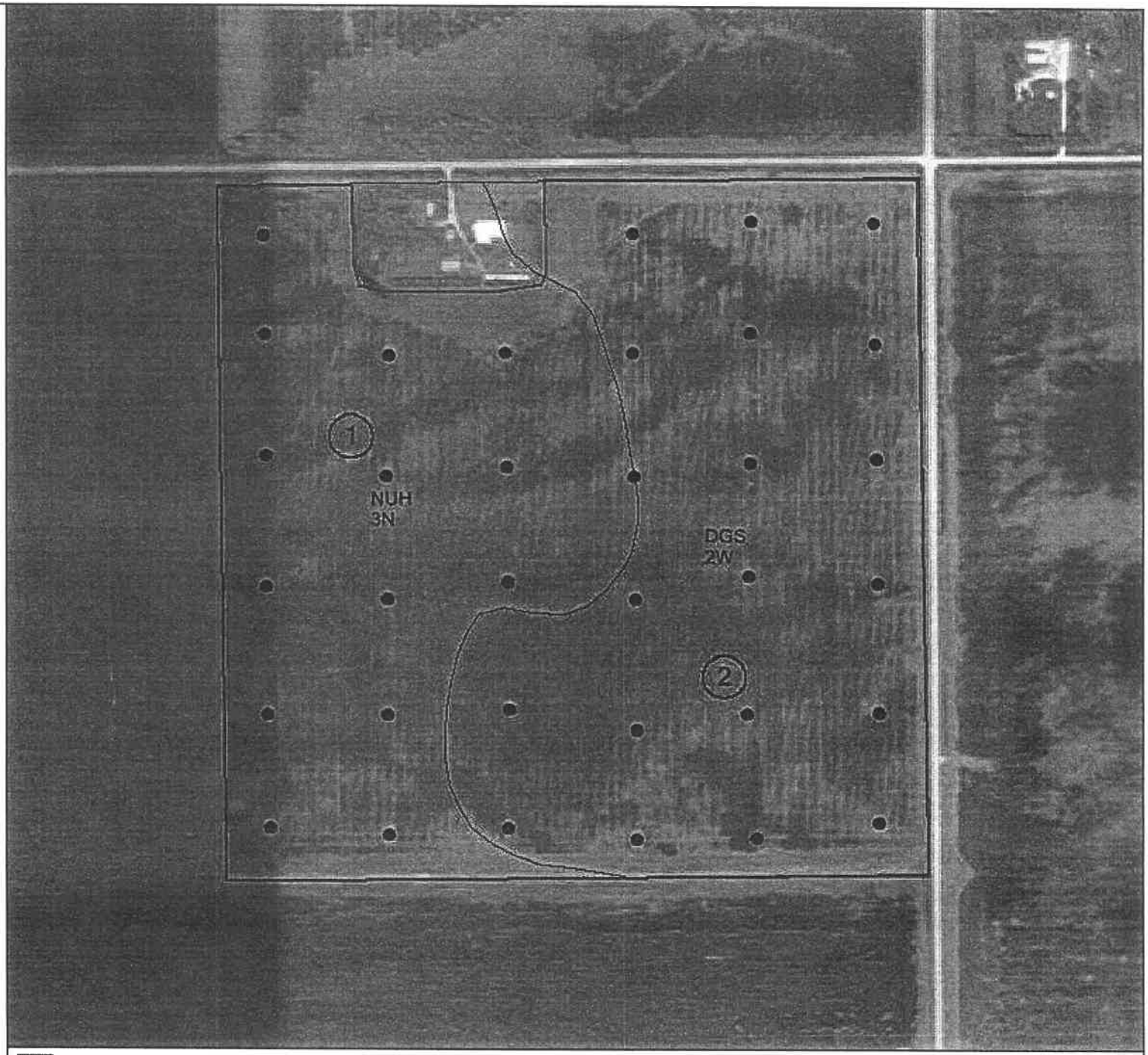
Watson NE 9-12-6



Boundary - 153.2 Ac
Clay Test - 0.9 Ac
Portage Soils-Clip - 160.3 Ac
SamplePoints

Clay Test Sites 1 & 2 had no detectable water table at the 1.5 m depth

Delta Ag SERVICES

Delta Ag Services
City of Portage
Watson SE 16-12-6

Clay Test - 2.7 Ac
Portage Soils-Clip - 160.5 Ac
SE 16-12-06 - 160.5 Ac
QuickMark2-10-4-2022_EDW

Clay Test Sites 1 & 2 had no detectable water table at the 1.5 m depth

Delta Ag SERVICES