

Issue Date:	December 12, 2024	Reference/Project No.:	2022-4728.01
To:	Agnes Wittmann Director, Environmental Approvals Branch Environment and Climate Change	Previous Issue Date:	October 3, 2024
From:	Associated Engineering (Sask.) Ltd.		
Client:	Rural Municipality of Macdonald and MWSB		
Project Name:	Rural Municipality of Macdonald Water Treatment Plant Upgrades		
Subject:	Notice of Alteration – Response to Request for Supplementary Information		

1 INTRODUCTION

In response to a request for further information from the Environmental Approvals Branch, Department of Environment and Climate Change Technical Advisory Committee, this supplementary document has been prepared. This document is supplemental to the Notice of Alteration submitted for the Rural Municipality (RM) of Macdonald Water Treatment Plant (WTP) currently operating under Licence Number 1599 R.

2 HUMAN HEALTH & RESIDENTIAL PROXIMITY

All major works for the project primarily will take place at the existing WTP. This new expansion will connect to the west wall of the existing 1988 WTP. This expansion includes a new 1000 m² pre-engineered super structure on a 2,500,000 L cast-in-place concrete reservoir. The nearest resident to the expansion footprint is approximately 130 m. Project activities that will not take place at the WTP include the raw water twinning from the existing WTP to the property line and replacing the non-Fisheries and Oceans Canada (DFO) compliant intake screen in the La Salle River. The civil works near the property line, are directly adjacent to a Private residential property. The in-river works that are taking place to replace the non-DFO compliant intake screen will also take place adjacent to Private residential property. It is not expected that the civil works near the WTP property line or the in-river works will have major impacts on residents. It is expected that this work will be completed in a timely manner.

There will be minor negative effects to human health from this project. The major effects will be positive as the WTP will continue to provide safe and reliable drinking water for the community and the expansion will increase capacity of the plant and allow for continued growth within the community. In the following sections the potential effects (during both construction and operation) the project will have on human health and the related mitigation strategies are discussed.

2.1 Human Health Effects

As mentioned previously, the potential for the Project to have adverse effects on human health are negligible to minor. Short term, during construction, there will be increased activity at the Project site. This increased activity is the construction that will be taking place to complete the project along with monitoring of construction activities and general operations traffic. This increased activity and traffic will result in increased noise and vibrations in the area and may temporarily affect air quality. Since it is expected that construction will take place largely during working hours and will be temporary, the effects to human health can be considered negligible. Human health may be affected by a short term, temporary reduction in air quality due to increased traffic in the area. Emissions from construction vehicles will affect air quality temporarily. Mitigation strategies for the effects to air quality include ensuring construction vehicles

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and equipment are well maintained and unnecessary transportation and idling is reduced. Construction activities will also create dust. Dust suppression using water or sprays can be used to mitigate dust during these activities. Air quality effects from any dust generation during construction will be localized and temporary and are considered to have low or negligible human health effects.

During construction it is expected that the new WTP will be tied into the old WTP. Therefore, the appropriate Boil Water Advisories will be put in place during these times. These advisories will only be issued as needed under the recommendations of the Office of Drinking Water. When these advisories are in place, residents will be affected because they will be subject to the rules of the advisory. For planned Boil Water Advisories, residents will be provided adequate notice to prepare. These advisories are in place so that human health is not affected, however residents will be temporarily inconvenienced. Construction activities will be carried out in such a way to avoid these kinds of advisories and any unnecessary interruptions of service to the community to mitigate these inconveniences. Best construction practices will also be maintained to ensure that the prospect of cross contamination (existing plant that is currently online and new elements) does not occur.

3 PROCESS EFFLUENT DISCHARGE

The Macdonald WTP draws water from the La Salle River for treatment and distribution to the community. In total per year, based on projections to the ultimate plant capacity in 2042, the total amount of water diverted from the La Salle River is 2001 dam³. Of that volume 82% or, 1694 dam³ is treated water, distributed to the RM. The remaining 18% of yearly diverted water is effluent returned to the La Salle River. The yearly volume of process effluent is 307 dam³. Note that these volumes are based on the 2042 projections and are therefore considering higher plant capacities and higher process effluent volumes. Once these upgrades are in place, the capacity will increase with population and RM growth and the appropriate increased withdrawal permits will be requested and obtained as needed. Process effluent is created during the treatment processes. In the upgraded WTP, process effluent will generally consist of ultrafiltration backwash, reverse osmosis concentrate and Greensand Filter backwash. The process effluent stream will be similar to the raw water stream in the sense that no significant amount of additional chemicals or particulates are added to the water before disposal. Therefore, the process effluent stream has generally the same mass of particulates as the raw water stream, just in a lower volume of water and therefore at higher concentrations. Before disposal, chlorine is neutralized with sodium bisulphite (SBS) and acids and bases are neutralized. With the addition of SBS to neutralize the chlorine before discharge, this does add Sodium to the effluent. Based on the dosing rates and requirements of the new treatment system, the yearly mass of Sodium added to the effluent is 35,808 kilograms or at a concentration of approximately 116 mg/L. This is similar to the current concentration of sodium in the process waste (34,701 kg, 113 mg/L) and therefore the change in effect is expected to be minimal.

Hydrometric Data Station 05OG001, Daily Discharge for LA SALLE RIVER NEAR SANFORD [MB], is located approximately midway between the raw water intake screen and the process effluent discharge location. The process effluent discharge location will not change with these upgrades and is located approximately 620 m downstream (southwest) of the raw water intake. Using data from station 05OG001, a low flow condition was determined to be 171,908 dam³/year. This flow was based on data gathered at the station from 1915 to 2023 and is meant to represent a low flow scenario for process effluent discharge, i.e. when there is a normal/expected amount of process effluent but the La Salle River flows are less than average flows. The total diverted amount of water is approximately 1% of the total

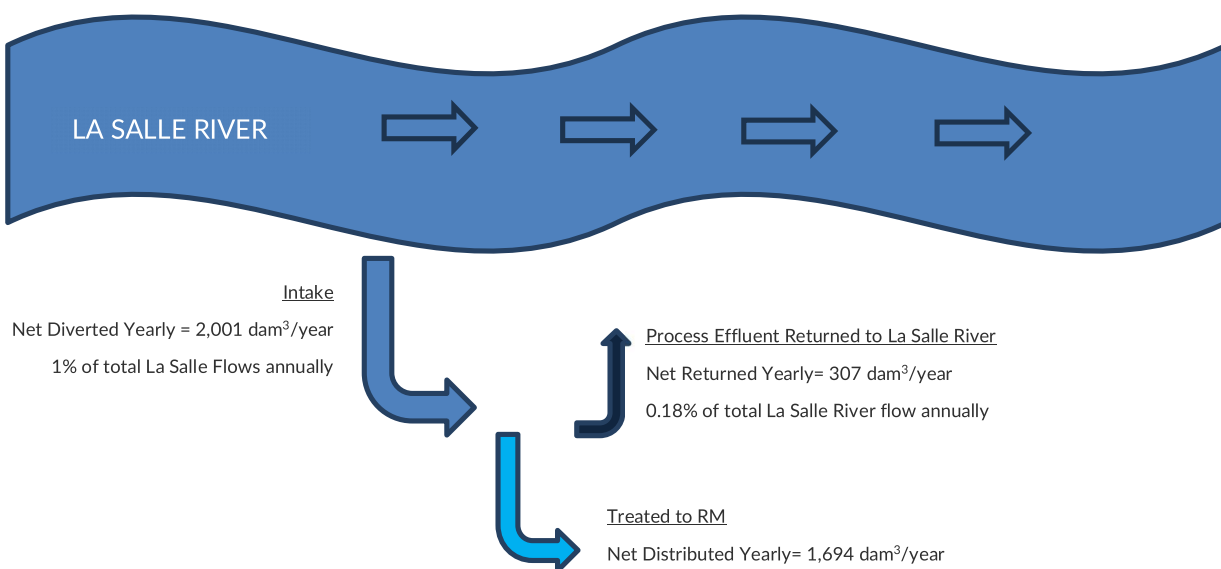
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flow volume of the river in a given year, therefore the total process effluent volume is approximately 0.18% of the total river volume, based on this low flow and average flow conditions. Using this data the 7Q10 of the river at this location is estimated to be 3 L/s or 94,608,000 L/year. Both of these concentrations were used to evaluate the process effluent discharge effects. Below in Figure 3-1, the annual withdrawal and return are shown based on the low flow condition of 171,908 dam³/year.

Figure 3-1 Diversion and Return from La Salle River (Low Flow Conditions)



Below, in Table 3-1 the La Salle River water quality, treated water quality, process effluent quality and combined concentration quality (Process Effluent and La Salle River) are listed. All values are in mg/L.

Table 3-1 Projected Water Quality in the La Salle River, Distribution System, Process Waste and Combined

Parameter	Units	La Salle River Water Quality	Process Effluent Discharge Concentration at WTP	Final Combined Concentration: Normal to low La Salle River Flows	Final Combined Concentration: Approx. 7Q10 La Salle River Flows
<i>Physical Tests</i>					
Hardness (as CaCO ₃), from total Ca/Mg	mg/L	333	832	333.89	714.48
Solids, total dissolved [TDS]	mg/L	496	1190	497.24	1026.55
Ammonia, total (as N)	mg/L	0.047	0.0377	0.047	0.040
Bromide	mg/L	0.1	0.25	0.10	0.21

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Parameter	Units	La Salle River Water Quality	Process Effluent Discharge Concentration at WTP	Final Combined Concentration: Normal to low La Salle River Flows	Final Combined Concentration: Approx. 7Q10 La Salle River Flows
Chloride	mg/L	43.3	116	43.43	98.88
Fluoride	mg/L	0.207	0.484	0.21	0.42
Nitrate (as N)	mg/L	0.01	0.025	0.010	0.021
Nitrite (as N)	mg/L	0.002	0.005	0.0020	0.0043
Sulfate (as SO ₄)	mg/L	123	346	123.40	293.48
<i>Organic / Inorganic Carbon</i>					
Carbon, dissolved organic [DOC]	mg/L	15.4	32.6	15.43	28.55
Carbon, total organic [TOC]	mg/L	16.6	33.3	16.63	29.37
<i>Total Metals</i>					
Aluminum, total	mg/L	0.16	0.430	0.16	0.37
Antimony, total	mg/L	0.00023	0.00059	0.00023	0.00051
Arsenic, total	mg/L	0.0100	0.0161	0.010	0.015
Barium, total	mg/L	0.0603	0.153	0.060	0.13
Beryllium, total	mg/L	0.00002	0.000023	0.000020	0.000022
Bismuth, total	mg/L	0.00005	0.00005	0.000050	0.000050
Boron, total	mg/L	0.078	0.099	0.078	0.094
Cadmium, total	mg/L	0.000005	0.0000439	0.000005	0.000035
Calcium, total	mg/L	70	175	70.19	150.27
Cesium, total	mg/L	0.000022	0.000061	0.000022	0.000052
Chromium, total	mg/L	0.0005	0.00087	0.000501	0.000783
Cobalt, total	mg/L	0.00021	0.00066	0.000211	0.000554
Copper, total	mg/L	0.0026	0.0485	0.0027	0.038
Iron, total	mg/L	0.16	0.606	0.16	0.50
Lead, total	mg/L	0.00007	0.000980	0.00007	0.00077

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Parameter	Units	La Salle River Water Quality	Process Effluent Discharge Concentration at WTP	Final Combined Concentration: Normal to low La Salle River Flows	Final Combined Concentration: Approx. 7Q10 La Salle River Flows
Lithium, total	mg/L	0.051	0.108	0.051	0.095
Magnesium, total	mg/L	38.5	95.9	38.60	82.38
Manganese, total	mg/L	0.0343	0.112	0.034	0.094
Molybdenum, total	mg/L	0.0011	0.00590	0.0011	0.0048
Nickel, total	mg/L	0.0033	0.0138	0.0033	0.011
Phosphorus, total	mg/L	1.14	1.38	1.14	1.32
Potassium, total	mg/L	11.4	23.4	11.42	20.57
Rubidium, total	mg/L	0.0021	0.00259	0.0021	0.0025
Selenium, total	mg/L	0.00022	0.000501	0.00022	0.00043
Silicon, total	mg/L	0.94	17.0	0.97	13.22
Silver, total	mg/L	0.00001	0.00001	0.000010	0.000010
Sodium, total	mg/L	48.8	113	48.91	97.88
Strontium, total	mg/L	0.296	0.769	0.30	0.66
Sulfur, total	mg/L	42.6	146	42.78	121.65
Tellurium, total	mg/L	0.0002	0.0002	0.00020	0.00020
Thallium, total	mg/L	0.00001	0.000012	0.000010	0.000012
Thorium, total	mg/L	0.0001	0.0001	0.00010	0.00010
Tin, total	mg/L	0.0001	0.0001	0.00010	0.00010
Titanium, total	mg/L	0.0049	0.0132	0.0049	0.011
Tungsten, total	mg/L	0.0001	0.0001	0.00010	0.00010
Uranium, total	mg/L	0.0013	0.00630	0.0013	0.0051
Vanadium, total	mg/L	0.0036	0.0105	0.0036	0.0089
Zinc, total	mg/L	0.0049	0.0387	0.0050	0.031
Zirconium, total	mg/L	0.00031	0.00082	0.0003	0.00070

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Based on the data listed above, it is anticipated the Process Effluent discharge will have little measurable impact on the La Salle River. Using the *Tier II Water Quality Objectives* as they relate to the receiving body, the La Salle River, following mixing, the combined concentrations are all within the Objectives. The exception to this is the combined concentration of Total Dissolved Solids (TDS), and the combined concentration of copper during the 7Q10 flow events. During low flow events, 10% of the lowest average monthly flow from 1915 to 2023, all Objectives are met. The combined concentration of TDS during a 7Q10 flow is approximately 1025 mg/L. The *Tier II Water Quality Objective* is a range from 500-3500 mg./L. The combined concentration of Copper in the La Salle River following Process Effluent discharge during 7Q10 flows is 0.038 mg/L. The *Tier II Water Quality Objective* is 0.025 mg/L. Aligning with existing Water Treatment Plant operations, the process waste from water treatment will be discharged to settling ponds and then ultimately back into the La Salle River. Process effluent concentrations are based on the concentration of waste leaving the water treatment plant.

4 CLOSURE

This document is meant to be Supplemental to the Notice of Alteration was prepared for the Environmental Approvals Branch on behalf of the RM of Macdonald. This supplemental information is in response to a request for further information from the Environmental Approvals Branch, Department of Environment and Climate Change.

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