

## COUNCIL REPORT

M&C No.	2018 - 86
Report Date	March 21, 2018
Meeting Date	March 26, 2018
Service Area	Saint John Water

His Worship Mayor Don Darling and Members of Common Council

***SUBJECT: Safe, Clean Drinking Water - East Side Potable Water System pH Adjustment and Orthophosphate Treatment***

***OPEN OR CLOSED SESSION***

This matter is to be discussed in open session of Common Council.

***AUTHORIZATION***

Primary Author	Commissioner/Dept. Head	City Manager
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***RECOMMENDATION***

That Common Council adopt the following resolution:

RESOLVED that in an effort to minimize any undesired impacts associated with the upcoming change in transition to fully treated drinking water, your City Manager is recommending that Council direct staff to undertake the following actions:

- In mid to late April 2018 commence operation of a sodium hydroxide treatment system at the Latimer Lake Treatment Facility to slowly, over the course of approximately 10 to 15 weeks, increase the pH of the water upwards toward that of the future finished water quality that will come from the Loch Lomond Drinking Water Treatment Facility.
- Once the water reaches a point where orthophosphate corrosion inhibitor becomes effective, commence operation of a temporary orthophosphate treatment system at the Latimer Lake Treatment Facility.

***EXECUTIVE SUMMARY***

The purpose of this report is to advise Common Council of the water quality transition that is scheduled to commence on the east side of Saint John and the steps Saint John Water is taking in preparation for the full operation of the Loch Lomond Drinking Water treatment facility.

Port City Water Partners remains focused on completing all components of the Safe, Clean Drinking Water Project while Saint John Water are preparing for the upcoming water quality transition period to fully treated surface water that meets the New Brunswick and Canadian Drinking Water Guidelines.

Early pH adjustment of the drinking water utilizing sodium hydroxide is the first incremental step in preparation for the transition to fully treated Loch Lomond/Latimer Lake drinking water. The second step will occur once the pH of the water rises above 7, at which time treatment with orthophosphate will commence.

Currently east side drinking water is surface water from the Latimer Lake and Loch Lomond watershed with coarse screening and disinfection (by injecting a chlorine solution into the water) at the Latimer Lake Chlorination Facility. In the near future the surface water will be screened at Latimer Lake and treated at the new Loch Lomond Drinking Water Treatment Facility producing a drinking water that meets the New Brunswick and the Canadian Drinking Water Guidelines.

These interim system changes are being planned in collaboration with the New Brunswick Departments of Health and Environment and Local Government as well as expert advisors in drinking water treatment.

It is important to note that while this interim work is being done to minimize any possible impacts to customers there will remain the potential for customers to experience discoloured water and changes in chlorine levels during the interim water quality transition period.

Fully treated water will result in higher quality drinking water for all east side customers.

### ***PREVIOUS RESOLUTION***

On May 29, 2017 Council RESOLVED the tender for the establishment of a supply agreement for Sodium Hydroxide (50%) be awarded to the lowest compliant bidder, Univar Canada.

### ***STRATEGIC ALIGNMENT***

This report aligns with Council's Priority for Valued Service Delivery, specifically as it relates to investing in sustainable City services and municipal infrastructure.

### ***BACKGROUND***

#### **Eastern Potable Water System**

The east side drinking water system is supplied from the Loch Lomond and Latimer Lake watersheds which include the following major Lakes: Loch Lomond

Lakes, Robertson Lake, Latimer Lake and other smaller contributing lakes. A schematic key map is presented in Figure 1 showing the future flow of water (once the new water treatment facility is commissioned) through the watershed lakes into the large raw water transmission system to the future Loch Lomond Drinking Water Treatment Facility that remains under construction.

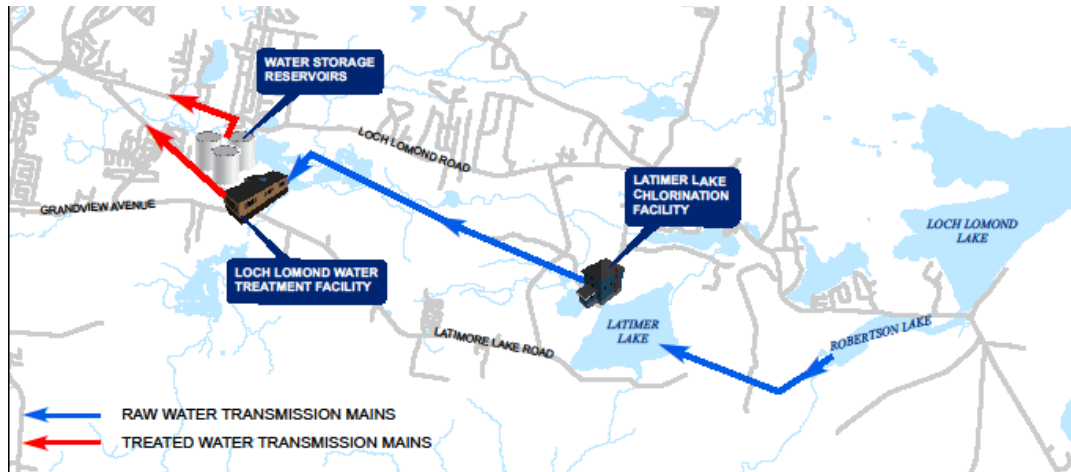


Figure 1. New East Saint John Potable Water System Schematic

A photograph of the future Loch Lomond Drinking Water Treatment Facility and water storage reservoirs currently under construction is presented in Figure 2. This water treatment facility will service all potable water customers east of the Reversing Falls Bridge (with the exception of the Harbourview Subdivision). The water treatment facility will have a capacity of producing a net output of 75 MLD (million litres per day). The three water storage reservoirs shown in Figure 2 below will have a capacity of 33 Million Litres.



Figure 2.

## ANALYSIS

The water quality provided to customers east of the Saint John River has been relatively unchanged for many decades. Water from Latimer Lake is screened, chlorinated, and flows directly to the distribution system.

The City has developed a plan with the City's Water Treatment Consulting Team that takes into account the changes in water quality between present conditions, and future water quality conditions when the new water treatment plant for water customers on the eastern water distribution system in Saint John commences operation.

CBCL's Water Treatment Consulting Team have presented to the City potential impacts with respect to the transition to the fully treated future water quality and impacts on the water distribution system and premise plumbing. These potential impacts are being considered and mitigated through intermediate steps that are noted in this report.

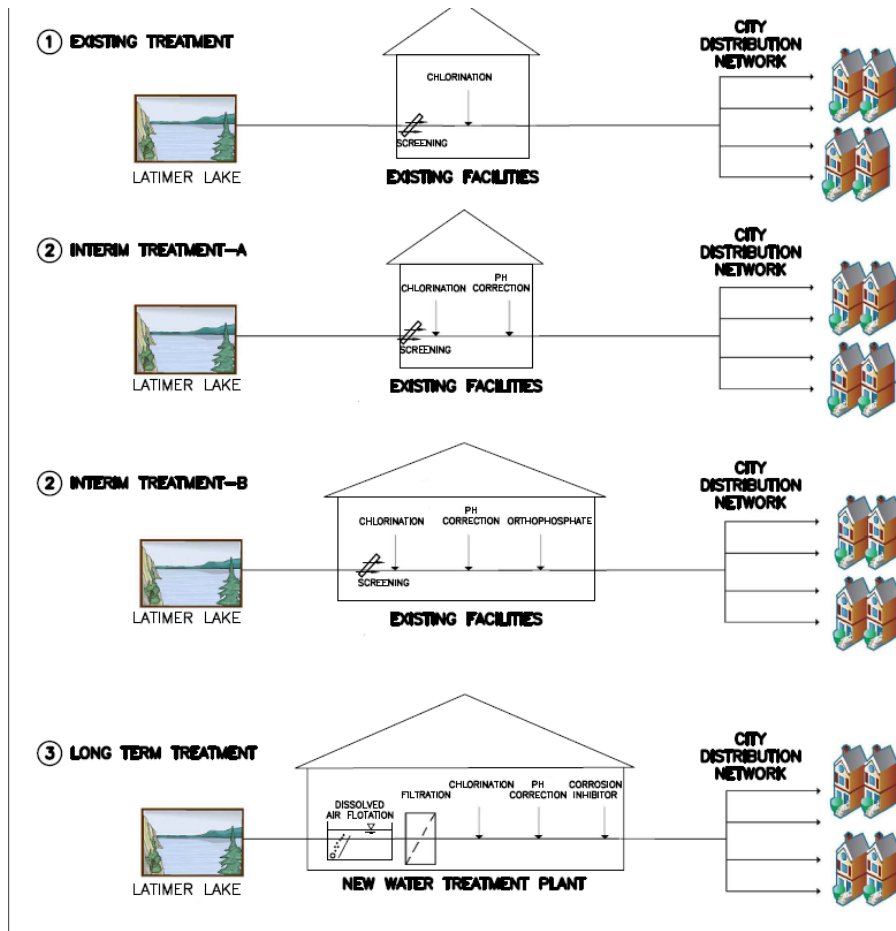
The changes in water quality from the current water to the future drinking water produced at the Loch Lomond Drinking Water Treatment Facility include pH, chlorine residual, organic matter content, and mineral balance. The new surface water treatment plant will increase treated water pH, reduce organic matter concentrations, alter the balance of alkalinity and hardness, have a chlorine residual that persists in the distribution system, and include corrosion inhibitor (orthophosphate) treatment.

As a part of planning for these pending changes in water quality it is important to implement pH correction at Latimer Lake Water Treatment Facility prior to the new Loch Lomond Drinking Water Treatment Facility delivering water to customers. The objective is to phase in the water quality changes to the greatest extent possible.

Figure 3 below presents a schematic diagram of the various interim stages of treatment leading up to full treatment. Item 1 within the schematic shows the current water treatment (chlorination) at Latimer Lake.

Item 2-A shows the interim treatment process which includes chlorination and pH adjustment. Item 2-B shows the addition of orthophosphate at the Latimer Lake Water Treatment Facility.

The long term schematic diagram presented as item 3 includes all steps of the new water treatment facility process when fully functioning.



**Figure 3.**

The American Water Works Association defines pH as a measure of the acidity or alkalinity of a solution such as water. A pH with a value of 7 is neutral; lower numbers represent acidic solution and higher numbers, represent alkaline solutions. The pH of the Loch Lomond/Latimer Lake drinking water with current treatment ranges between 5.7 to 6.9 as presented in Appendix 1. The tables in Appendix 1 represent the water parameters immediately following production or treatment and are intended to provide a sense of the range of fluctuation or change in water quality as we progressed from current treatment through interim treatment. Water quality can vary slightly from what is presented in the Tables as chemistry changes occur as the water travels through the distribution system and onto a customer's private plumbing.

## **2. Interim Treatment - A**

Treating the water with sodium hydroxide would increase the pH and the alkalinity of the drinking water delivered to customers on the east water distribution system. The pH would increase to meet the Guidelines for Canadian Drinking Water Quality.

Sodium hydroxide is a chemical frequently used in water treatment processes to neutralize acidity, increase alkalinity, or raise the pH value. For example it is used

Moncton and in Nova Scotia it is used in Halifax at two of their water treatment facilities, Antigonish and at various utilities within the Cape Breton Regional Municipality. The sodium hydroxide product is National Sanitation Foundation (NSF)/ANSI Standard 60 certified, meaning it is approved as a food grade product for use in drinking water treatment operations. The use of sodium hydroxide is also supported for use in drinking water by the American Water Works Association (AWWA), a non-profit, scientific and educational association founded to improve water quality and supply.

With the addition of sodium hydroxide the drinking water pH would be slowly increased to a range of between 7.0-9.0. Corrosiveness of the water would decrease at the higher pH. The drinking water quality parameters are presented in Table 2 in Appendix 1 for the interim stage that involves coarse screening, chlorination and adjustment of pH with sodium hydroxide.

The target timeline to commence the process of slowly adjusting the pH is mid to late April 2018. The addition of sodium hydroxide will be gradually increased so the pH is incrementally increased from its current value to a pH greater than 7 in approximately 10 – 15 weeks. Once the pH increases above the designed value of 7 orthophosphate treatment will then commence.

It should be noted that in interim step 2a, Saint John Water is only adjusting the pH of the drinking water. Based on practice and historical data there should be no adverse effects for copper piping with pH adjustment however Saint John Water advises customers to be cognizant of the system changes that will be commencing. Treatment of the drinking water with orthophosphate once the pH is above 7.0 will also add additional protection to the distribution infrastructure and plumbing systems.

## **2. Interim Treatment - B**

Since orthophosphate is ineffective at low pH, the pH correction (increase) has to be completed first until such time as the pH is greater than 7 so as to allow the orthophosphate to be effective. Once the pH is in a stable range that orthophosphate can be effective, treatment with orthophosphate would commence.

### **Potential Customer Impacts**

The adjustment of pH is being undertaken to reduce pipe corrosion, both for larger buried pipes and for premise plumbing. The implementation of an early pH correction program is intended to introduce changes slowly, to allow infrastructure a period of adjustment, before the new drinking water treatment facility begins to deliver treated water to customers.

While the slow adjustment of the water chemistry will be done in an attempt to mitigate any possible impacts it is important to note that simply raising the pH itself could destabilize the tuberculation inside the water system. Tuberculation as defined by AWWA states it is the growth of nodules (tubercules) on the pipe interior, which reduces the inside diameter and increases the pipe roughness. These nodules are essentially a buildup of corrosion that has formed on the inside of cast-iron pipes over a number years.

It is important to note that significant efforts have been made over the past 12 years to clean and line the unlined cast iron water mains in the distribution system; there have been approximately 50km cleaned and lined which equates to approximately 33% of the entire cast iron water distribution inventory of the City of Saint John. The work that has been completed over the past 12 years will be of significant benefit in reducing possible issues with water quality however there still remains approximately 100km of distribution main that still has to be cleaned and lined and raising the pH could destabilize the tuberculation as raising the pH has the ability to soften the tuberculation.

Therefore adjusting the pH with the addition of sodium hydroxide at the Latimer Lake Drinking Water Treatment Facility has the potential for Customers to experience discoloured water, increased iron in the water and changes in chlorine levels. However the early and slow adjustments to the pH are being done to mitigate these potential issues to the extent possible. Should there be any instances of discoloured water, customers are advised to notify Saint John Water and flush the water through their bath tub (given there is no aerator on it) until the water runs clear.

If there are any changes to water quality or if there are any questions regarding the changes in water chemistry, customers can contact 658-4455.

It should also be noted that increased water sampling and testing will also be done by Saint John Water during the period of transition.

### **System Flushing**

Saint John Water has planned additional maintenance activities in the eastern water distribution system during the periods of water chemistry changes. Saint John Water will be flushing the east water distribution system utilizing the unidirectional flushing process (UDF) that has been successfully cleaning the pipes in water distribution in Saint John for many years.

UDF involves the strategic closing of valves in the distribution system thereby increasing the flushing velocities of the water to scour the pipe walls and expel sediment, grit and particles in the water distribution pipes and flush this water out of the system through fire hydrants. This process will be ongoing as part of the annual program.

## **Communications**

A new east water webpage has been created on the City of Saint John website which will include this council report along with general project information, question and answers, and project updates. The webpage is available at [www.saintjohn.ca/eastsidewater](http://www.saintjohn.ca/eastsidewater) and is scheduled to go live on Monday March 26, 2018 prior to the council meeting.

In addition separate communications will be happening with specific industrial, commercial and institutional customers re the interim water quality changes.

If customers have questions they can contact Saint John Water at 658-4455 or via email at [waterandsewerage@saintjohn.ca](mailto:waterandsewerage@saintjohn.ca) . While the customer service phone is staffed 24/7 it is best to call between the hours of 8:30am to 4:30pm Monday to Friday.

## ***SERVICE AND FINANCIAL OUTCOMES***

The use of sodium hydroxide at the Latimer Lake Treatment Facility is a planned expenditure and as such funds are provided in the annual Utility Operating Budget to cover this expense.

The use of orthophosphate on the east system is part of the new Loch Lomond Drinking Water Treatment Facility. Expenses within the 2018 Utility Operating Budget and the costs associated with its use at the Latimer Lake Treatment Facility will be managed within the annual Utility Operating Budget.

Service outcome will be improved water quality that will meet the pH requirements of the Guidelines for Canadian Drinking Water Quality while at the same time minimizing the possibility of customer impacts when transitioning to the future fully treated water that will be produced at the new Loch Lomond Drinking Water Treatment Facility.

## ***INPUT FROM OTHER SERVICE AREAS AND STAKEHOLDERS***

Saint John Water will continue to work closely with Department of Health and Department of Environment and Local Government in the months leading up to the commissioning of the Loch Lomond Drinking Water Treatment Facility and during the conversion of the east side drinking water from current water quality through the interim pH increases and orthophosphate treatment periods.

With respect to the interim treatment of the east water with sodium hydroxide followed by orthophosphate, the Department of Health has advised that *“From a Health perspective we see no health concerns with the use of these drinking water additives as these chemical compounds are used widely in the water treatment industry and in numerous commercial applications. Therefore the NB*



*Dept. of Health gives their approval for the use of these drinking water chemical compounds.”*

The City will require written consent from the Minister of the Environment and Local Government as stipulated by Section 21 of the *Water Quality Regulation – Clean Environment Act*. Written consent from the Minister will be received in advance of commissioning the systems.

**ATTACHMENTS**

Appendix 1