SELKIRK

Investing in a state-of-the-art wastewater treatment plant

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Source: City of Selkirk Facebook page

THE SCIENCE

Public infrastructure that was built decades ago met construction and environmental standards of the past. However, as climate science advances and cities set climate resilience targets, some aging infrastructure no longer meet those targets or comply with new provincial regulations. Several public infrastructure were also designed to accommodate the needs of smaller local populations and must be rehabilitated to accommodate the needs of growing communities. As Canadian municipalities plan the construction or rehabilitation of their infrastructure, considerations for both future risks and needs are essential to ensure long-term performance and the highest possible return on investment. These concepts were at the core of the reflection of the City of Selkirk when the time came to rebuild their wastewater treatment plant (WWTP).

THE TRIGGER

The rehabilitation of Selkirk's wastewater treatment plant was triggered by new provincial regulations regarding the amount of effluent that could be released into Lake Winnipeg. To prevent further nutrification of the lake and resultant algae blooms, the provincial government limited the amount of nitrogen and phosphorus that wastewater treatment plants could release. The old wastewater treatment plant was 40 years old and did not meet these requirements. The City of Selkirk had also set the need to invest in safe and sustainable infrastructure as a priority in its 2014 Strategic Plan.

A complete redesign of the existing plant to meet the new provincial requirements was too costly to be considered by the municipality. However, the City of Selkirk was committed to "future-proof" its infrastructure and decided to work towards the planning, design, and construction of a new plant that would be more efficient, resilient, and could support future population growth.

THE APPROACH

In seeking to address its aging infrastructure and associated risk, the City of Selkirk constructed a new wastewater treatment plant that features a membrane-bioreactor treatment process. With two sets of membrane filtration cartridge units operating in the plant, each capable of handling six million litres of wastewater per day, the new facility can treat 12 million litres of sewage in total every day. This capacity is greater than Selkirk's current need as it is designed to allow for future expansion with population growth. To increase capacity by 50%, the City will need to add a third cartridge costing about $1 million. The modular design of the plant allows for significant expansion if needed, which could easily accommodate future population growth without completely redesigning the infrastructure.
As part of its greenhouse gas reduction plan, the City has chosen to power its wastewater treatment plant using solar arrays. Furthermore, to avoid the carbon footprint involved in building a large structure, the City built a diversion system that directs large amounts of water to lagoons for temporary retainment during a peak event. Current provincial regulations require effluent to contain no more than

Figure 21:*Construction of the new wastewater treatment plant. (Source: City of Selkirk Facebook Page)*

1 mg/L of phosphorus and 15 mg/L of nitrogen. With the wastewater treatment plant's new technology in place, high-quality effluent is released into the Red River and Lake Winnipeg without increasing the risk of toxic algae blooms.

The need to follow new provincial regulatory requirements prompted Selkirk to hire a panel of experts for advice. Scientists and engineers were consulted to help assess different wastewater treatment options, and the membrane-bioreactor treatment process was selected because of its lower cost and higher effectiveness. To proactively consult with stakeholders, the City organized public hearings, broad community information sessions, reached out to the media, and released updates via social media. There was general acceptance by the public, but most residents were concerned about what the new WWTP would cost. Hence, a water conservation program was introduced to address their concerns. The program educates people about steps they can take to reduce water use in hopes of reducing their costs.

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THE OUTCOME

In addition, to be more adapted to future needs and risks, one of the greatest achievements of the new WWTP is its contribution to fight climate change. The old plant contributed 60% of greenhouse gas emissions in the city, whereas the new plant

is an emissions-free building. This can be attributed to the elimination of fossil fuel to power the plant, which uses electric heating and recovered waste heat from the wastewater. It also has the ability to accept solar energy as a power source, making it a significant improvement in a bid to decarbonize the city.

Furthermore, the new plant produces the highest effluent quality possible with today's modern technology, safeguarding the biodiversity and water quality of the Red River and Lake Winnipeg. Even if provincial regulations were to change again soon, the new infrastructure could meet those requirements with small alterations at minimal cost.

To establish partnerships with academia and the private sector, a Centre of Excellence is included in the WWTP to provide space for innovation. The City is considering repurposing the 40-year-old plant for a wide variety of potential new uses, including possibly a fish farm or hydroponic garden, which could be supplied by Selkirk's recycled water.

It is also important to note that the recently published climate change adaptation strategy (CCAS) was not in place when the municipality started building the new plant. Climate-sensitive decisions were made by a group of experts within the City who were determined to push for climate action and challenge the general tendency to be risk averse. It was not until 2019 that the City published its CCAS, which helped Selkirk integrate climate change into asset management planning. It has since encouraged policymakers to change their thinking behind how decisions are made and has ensured outcomes that align with climate resilience targets.

A WORD FROM SELKIRK

Achieving community resilience will require better decisions over long periods of time – longer than the careers of most senior decision-makers. Duane Nicol, Selkirk's Chief Administrative Officer, remarked "Policymakers need to think about how to ensure the people after them will be empowered to make better decisions." He mentioned one way to achieve this target is by modifying existing decision-making frameworks so that they are based on long-term targets and demonstrate the impact of different planning decisions so that appropriate steps can be taken. Additionally, it is essential to think in systems. Decision-making is not one event but a series of dozens or hundreds of asynchronous events that culminate into a conclusion. Changing the rules of those events would change their outcomes and, thus, change the decision. If the current municipal government is reluctant to consider future climate impacts and externalities, a paradigm change is needed. "Changing the pattern of thought in decision-making attracts young, skilled, creative talents. Their new way of thinking helps us improve," Mr. Nicol said.