

# Report to Council



**Date:** September 14, 2020  
**To:** Council  
**From:** City Manager  
**Subject:** City Wastewater Treatment - Biosolids Management  
**Department:** Infrastructure Engineering

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## **Recommendation:**

THAT Council receives for information, the report from Infrastructure Engineering dated September 14, 2020, regarding the City Wastewater Treatment - Biosolids Management;

AND THAT Council approves staff proceeding to the next phase of Preliminary Design and Final Siting of the Biosolids Management Process.

## **Purpose:**

To update Council on City Wastewater Treatment - Biosolids Management.

## **Background:**

Municipal wastewater in the City of Kelowna is treated at its wastewater treatment facility (WWTF) on Raymer Avenue. The original plant was built in the 1980's, and components have been added to expand to service a population up to 172,500. The City's plan is to add components necessary to fill the Raymer Plant footprint to service a maximum population of 235,000, anticipated to last well beyond 2050 at today's current growth rate.

Residuals, or biosolids, are end products of the wastewater treatment process, and the City relies on managing residuals through composting. Dewatered biosolids are trucked to the Regional Biosolids Composting Facility (RBCF) operated in partnership with the City of Vernon. The RBCF produces a Class A Compost which is marketed and sold as a soil amendment. This Class A Compost product assures that biosolids are completely stabilized to acceptable regulated standards, however there is still a reliance on a number of supplied inputs such as wood chips, hog fuel and water. The final compost product must also be used or marketed for sale. When sales and usage slows, the compost must be stored. When inputs or end markets are impacted, the City has few limited sustainable backup processes to dispose of biosolids.

The current layout of the RBCF is anticipated to reach capacity by mid 2020's, and so both cities, Kelowna and Vernon, collaborated to commission a biosolids management plan in 2017 that helps address next steps. Following an internal stakeholder engagement program and review of potential

biosolids management options, it was recommended that an anaerobic digestion process be further analyzed and designed conceptually to reduce biosolid volumes, thereby extending the life of the current RBCF and allowing for alternate disposal (e.g. land application) when the compost system was not in operation. In 2019, the City retained AECOM to complete a comprehensive feasibility study for a proposed Anaerobic Digestion Facility (the Facility). Assuming a timely permitting and siting process, the Facility is planned to be operational by 2024.

The City's consultant, AECOM is in the process of submitting the final report called the Kelowna Biosolids Feasibility Study by end of September, 2020. This report will be made available on the City's website upon completion. The report will include an executive summary and six technical memoranda (TM):

- TM-1 Background Information Review: Identifying design loading rates and regulatory framework.
- TM-2 - Site Summaries: Reviewing available sites for anaerobic digestion.
- TM-3 - Anaerobic Digestion Options: Reviewing anaerobic digestion technologies that would lead to Class A Biosolids
- TM-4 Biogas, Biosolids and Side streams: A background of added technologies for nutrient handling, post-processing and biogas recovery,
- TM-5 Interim Report: Examining lifecycle cost comparisons between five anaerobic digestion alternatives
- TM-6 Odour Assessment Report - Reviewing the potential effects of future facility odour on local residents and other sensitive receptors.

### **Facility Siting**

The conceptual study included significant effort to determine the optimal site for a new digestion system. Anaerobic digestion is an industrial type process, requiring space, road and truck access and a limit to the amount of residential development that surrounds it. Several locations were analyzed, including at the existing Raymer plant, the landfill, the Brandts Creek Tradewaste Treatment Plant, offsite (example Brenda Mines) and at the future WWTF location on Byrns Road. Adding a digester at the existing WWTF would reduce the expansion footprint and accelerate the need to construct the new plant; which is not a desirable outcome at this time.

The consultant led a decision process involving a number of senior staff based on a number of technical, social, environmental and financial criteria. It was concluded that the optimal site to install an anaerobic digestion process is at the future Byrns Road WWTF site. There is sufficient land in this location for expansion of wastewater treatment capacity to service a City population of over 500,000.

The City owns two properties comprising the Byrns Road site covering an area of 28.4 hectares. For comparison the existing site is on an 8.5 hectare parcel. These properties were purchased specifically to accommodate future expansion and relocation of the existing wastewater treatment facility. Both parcels are currently in the Agricultural Land Reserve and need to be converted to zoning for future Public Services/Utilities (PSU) land use to support the wastewater treatment upgrades. A third adjacent property to the west along Burtch Road is also zoned for future PSU and has been identified for possible future acquisition by the City. The Byrns Road site is adjacent to environmentally sensitive land and is surrounded by ALR land which reduces the likely nuisance impacts of wastewater treatment on sensitive properties.

## **Digester Alternatives**

A conceptual design was completed for the selected site on Byrns Road. Biosolids will be transferred by a 1.6 km pipeline from the WWTF on Raymer Ave for digestion. Following digestion, the dewatered biosolids can be either composted at the RBCF or directly land applied.

Several options for a digestion process were examined, and several resulting products are available at varying costs. The least expensive and less complex digestion method is a Mesophilic digestion process (38°C), which ultimately reduces solids by up to 45 percent and produces Class B biosolids. The Class B biosolids would then be trucked to the RBCF for further stabilization by producing Class A compost. In comparison to simply increasing capacity at the RBCF, the addition of anaerobic digestion would eliminate vehicle traffic through the developed areas surrounding the Raymer Avenue WWTF, reduce truck traffic to the RBCF, and ultimately reduce composting process odours.

The second process of interest is more complex and operationally costly and involves the digestion of using a Thermophilic process (55 °C). This process provides the added pathogen destruction and results in a Class A Biosolid as defined in the Organic Matter Recycling Regulation (OMRR), which allows for many more options for disposal, as they can be directly land applied or further processed to a Class A compost. Having multiple re-use options available for digested solids would allow for flexible strategies and help build resilience within the City's biosolids management plan.

Additional sub-processes can be added post-digestion to better manage materials and provide flexible solutions. Nitrogen and Phosphorus removal into fertilizers are the most marketable, however other considerations such as biogas power generation, digestion of biosolids from Brandts Creek Trade Waste Treatment Plant, odour management, handling of fats, oil and grease (FOG) from private or commercial disposal sites, and the options of a larger regionalized facility to increase output and share operational costs.

## **The Path Forward**

From a technical and engagement perspective, a significant amount of work is required in anticipation of a final design and construction of a facility. The following tasks are required prior to final design of the facility:

- Public engagement to communicate the proposed expansion plans and allow the City an opportunity to address potential concerns.
- An environmental impact assessment of the Fascieux Creek corridor under the Riparian Areas Protection Regulation is recommended to inform the site layout plan and address any concerns ahead of a public information session.
- Piloting of the selected process should be undertaken to develop design criteria for both the digestion and side-streams (i.e., biogas scrubber and centrate treatment). In addition, piloting will generate digested solids that could be used to develop protocols for composting.
- Design of the anaerobic digesters should be reassessed as part of the facility pre-design to account for decisions which allow for receiving trucked dewatered sludge from other facilities or FOG.
- Examine further land purchases and policies to preserve the buffer of the new site with existing and future residential areas.
- Odour sampling is recommended to more accurately reflect the odour potential of the anaerobic processes.

- A capacity assessment for the existing WWTF should be undertaken to more accurately assess projected build-out timeline and consider potential new technologies.

### **Funding Expectations**

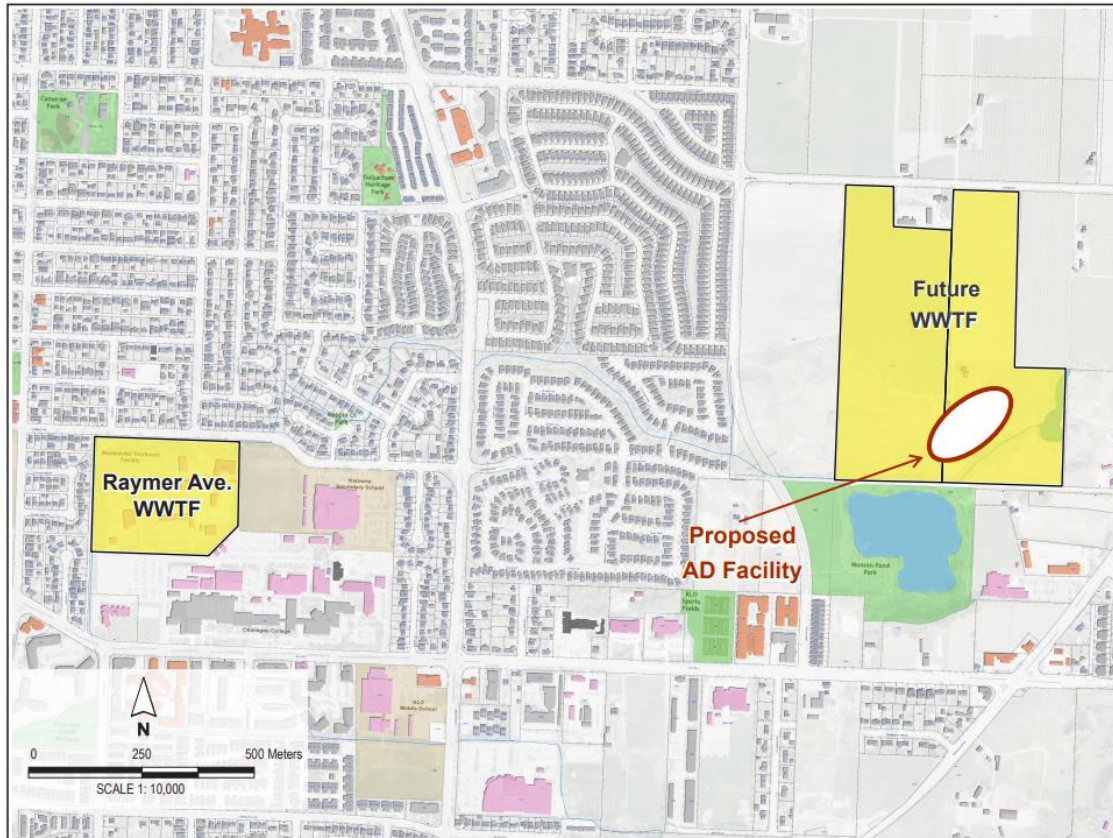
The next stage of preliminary design will set the final process selection. The facility is anticipated to cost between \$60 and \$100M, depending on final options selected, breadth of regionalization and level of regulatory encumbrances. The City's next iteration of the 10 Year Capital Plan will be updated with provisional cost estimate values for the project. Grant opportunities will continue to be pursued by staff. The digestion facility will be included in the City's 20 Year Servicing Plan being developed in coordination with the 2040 Official Community Plan, and will result in cost allocations for future Development Cost Charges and what level of long term borrowing will be required under the Municipal Funding Authority.

### **Next Steps**

On July 27<sup>th</sup>, Council approved the 20 year level of service goals of providing enhanced wastewater services that improve biosolids management and provide additional resiliency. Staff will continue the preliminary design of the digester system and investigate optional processes that could enhance the both the product and cost-offsets to the Wastewater Utility.

It is recommended that the proposed scope of the next phase of work include:

- An investigation into the technical aspects mentioned earlier in the "Path Forward",
- A preliminary design of the facility and provide further detail of the siting requirements,
- An application to the Agricultural Land Commission for Land Removal for siting of the future WWTF at 1639 Byrns Road,
- An application to the Province for amendment of the City's Wastewater Operational Certificate to site a digestion facility at 1639 Byrns Road,
- Further investigation into regional options and cost implications, and
- Confirmation of the cost requirements for inclusion in the DCC program, long term borrowing plan, and long-term utility rate structure.



**Internal Circulation:**

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Submitted by:

**Approved for inclusion:**

Alan Newcombe, Divisional Director, Infrastructure

Attachment 1 - City Wastewater Treatment - Biosolids Management presentation

cc: Deputy City Manager  
 Divisional Director, Corporate Strategic Services  
 Divisional Director, Financial Services  
 Divisional Director, Infrastructure