

Water Treatment Residuals Processing for Phosphorus Removal Amendments

Municipal stormwater runoff carries excess nutrients into natural waterbodies, where phosphorus leads to eutrophication. These impacts are intensified by urbanization through increases in runoff volume and nutrient concentrations.

MAGNA Engineering is developing a method of using water treatment residuals (WTRs), a municipal water treatment by-product, to improve phosphorous removal in the vertical flow biofilter that is part of their Storm Park Designs. The objective of this project is to pilot the application of WTRs within biofilters and wetlands including WTR processing, installation, two years of monitoring, and a comparison to a biofilter amended with commercially based amendments.

The below image shows the biofilter at the sister facility, Dawson's Landing Pond 2A, which utilized commercially available amendments. Similar nature-based systems will be constructed and tested as part of this project.



RECIPIENT:
**MAGNA
Engineering**



PARTNERS:
City of Calgary



TOTAL BUDGET:
\$1,431,000



AI FUNDING:
\$500,000



PROJECT DATES:
**AUG 2022 –
AUG 2024**



PROJECT TRL:
**Start: 4
End: 7**

APPLICATION

The target market for this application are municipalities and private entities for stormwater and wastewater treatment who are aiming to improve their phosphorous removal capabilities. This would include municipalities that require system upgrades to meet regulatory requirements, or those who are experiencing eutrophication-related issues and are seeking solutions. There is potential to construct new WTR amended engineered wetlands and biofilters or incorporate WTRs into existing constructed wetlands. Further potential exists in naturalized wastewater treatment.

PROJECT GOALS

The overarching goal of this project is to pilot the full-scale application of WTRs within biofilters and treatment wetlands, which are nature-based systems that remove nutrients and contaminants of concern from stormwater runoff. The internal goals include:

1. Optimizing the WTR amendment manufacturing process;
2. Optimizing the field implementation of the WTR amendment;
3. Validating WTR performance, which includes a comparison study of WTR amended biofilters and existing biofilters;
4. Optimizing the ratio and application mode of WTR amendment to wetland media for phosphorous removal;
5. Identifying and assessing the risks associated with WTR use; and
6. Conducting a desktop end-of-life analysis to understand WTR longevity and what their post-application use or disposal may be.

BENEFITS TO ALBERTA

This pilot project will inform the full-scale use of WTRs and quantify their effectiveness for phosphorous removal. Freshwater phosphorous impacts are detrimental and far-reaching in Alberta. The development of an effective treatment strategy to capture phosphorous will reduce diverse environmental impacts associated with eutrophication. Biodiversity loss and community structure changes are common consequences of eutrophication, which in turn can impact associated ecosystem services for nearby communities. The results of this project can be applied to communities and municipalities across Alberta to improve freshwater quality province wide.

Furthermore, this project supports sustainable development through the utilization of a water treatment byproduct. This provides the opportunity for Alberta to improve water-related sustainability and waste reduction initiatives and pioneer sustainability research and development.



1 New
Product/Service



1 Patent



11 Project Jobs

CURRENT STATUS

APR 2023

To date, WTR processing methods and optimization have been conducted and development of a processed amendment material is nearing completion. Dehydration appears to produce a suitable product, but optimization of the process is required to yield the optimal particle size of the processed amendment and set up the process for future scaling up. MAGNA is working with a local vendor on the optimization. Modifications to the dehydration unit are currently being tested to optimize the amendment for installation in spring 2023.