

# 9<sup>th</sup> Avenue Pond, Lethbridge, Canada

Application dates: Seven applications from April 24<sup>th</sup> 2014 to October 23<sup>rd</sup> 2014

## Summary

**Aim:** Reduction of the phosphorus loading within the the pond to reduce excessive growth of filamentous algae.

**Description:** Industrial stormwater management facility.

**Size (ha):** 0.75  
**Average depth (m):** 2

**Dosage to date (tonnes):** 5.25

## The Water body



Figure 1: 9<sup>th</sup> Avenue Storm water pond, Canada.

The 9<sup>th</sup> Avenue Pond in Lethbridge is an industrial stormwater management facility constructed in 1981. It is located in an industrial area in North Lethbridge and is bordered by 9<sup>th</sup> Avenue N and 39<sup>th</sup> Street N. The pond provides no significant secondary function and is fenced off from the public. It has a simple nearly-rectangular design, and outflow is pumped. It is not used for irrigation. The pond contains aquatic invertebrates such as freshwater snails. Waterfowl are reported to be present at the pond.

## Background

The City of Lethbridge is keen to improve the ecological conditions of its stormwater management facilities, with an aim of achieving reduced incidence of filamentous algae, blue green algae and nuisance aquatic plants, while retaining the desirable macrophyte species necessary for a healthy ecosystem. Stormwater ponds are dynamic

systems with continual inputs of phosphorus (mainly due to storm events). The following dosing strategy was chosen as best practice for the 9<sup>th</sup> Avenue pond; an initial larger application of Phoslock was undertaken in April 2014 (2.1 MT) with six further smaller maintenance applications (0.525 MT each) over the following six months.



Figure 2 : Aerial photo of 9<sup>th</sup> Avenue pond showing the sampling points.

## Results

Water data was collected from within the pond with the results displayed in Figures 3,4 and 5. Data plotted in the total phosphorus (TP) and orthophosphate graphs show that there was a significant reduction in the phosphorus concentrations in the pond after the applications of Phoslock. There was an

increase in these concentrations after the high rainfall event, however the TP and orthophosphate concentrations dropped rapidly to very low concentrations after the event. This shows that even when there was a major influx of phosphorus entering the pond in runoff, the Phoslock was able to rapidly bind it and remove it

from the water column. Hence, being unavailable for utilization by algae. Continual small applications of Phoslock were able to keep the phosphorus concentrations low in the storm water pond over time.

**Total Phosphorus vs. Rainfall**

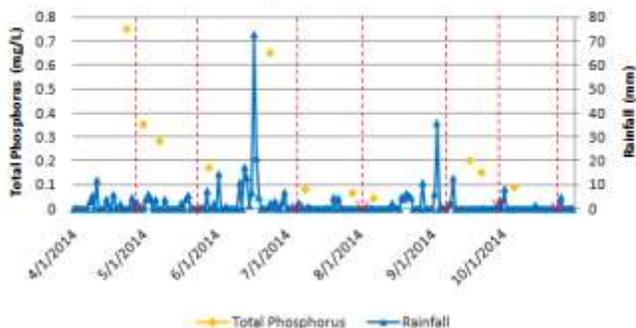


Figure 3: The total phosphorus concentrations verses rainfall over time in 9<sup>th</sup> Avenue pond (Phoslock doses are marked with red dotted lines).

**Orthophosphate vs. Rainfall**

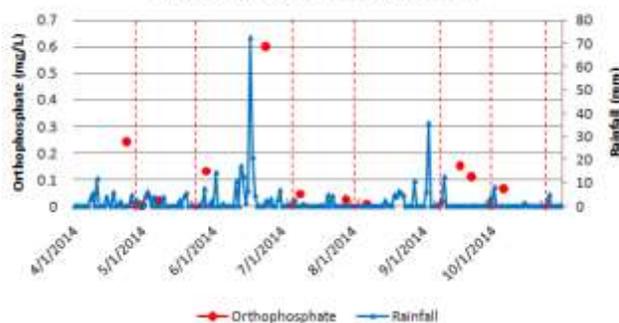


Figure 4: The orthophosphate concentrations verses rainfall over time in 9<sup>th</sup> Avenue pond (Phoslock doses are marked with red dotted lines).

# 9<sup>th</sup> Avenue Pond

**Chlorophyll *a* vs. Rainfall**

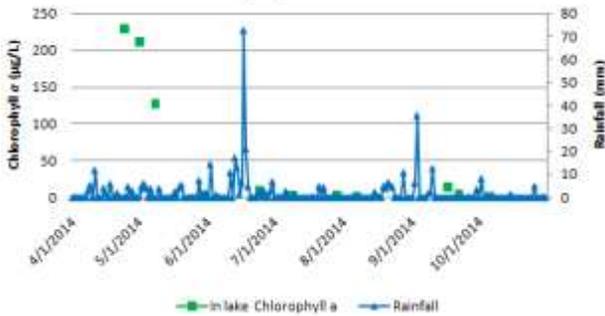


Figure 5: The chlorophyll *a* concentrations versus rainfall over time in 9<sup>th</sup> Avenue pond.

The concentration of chlorophyll *a* significantly decreased after the application of Phoslock on April 24<sup>th</sup> 2014 (as seen in Figure 5) and continued to remain low over the duration of the application period (April-October 2014). Prior to the first Phoslock application, the storm water pond had recurrent blue green algae blooms. The concentration of chlorophyll *a* decreased from 230µg/L to 2µg/L in 2 ½ months and this was even with a heavy rainfall event and a sharp increase in phosphorus in the water in mid June. Chlorophyll *a* has remained around the 2µg/L concentration for the rest of the application/sampling period (to October 2014). The significant reduction in chlorophyll (hence algal load) is highlighted in the before (2013) and after (2014) photos displayed in Figure 6). The ponds water quality and aesthetics has greatly improved with the regular applications of Phoslock to the storm water pond.

The following is an account from the water body manager at the City of Lethbridge.

*“In 2012/2013, the 9<sup>th</sup> Avenue storm pond was reported to have intense algal blooms throughout the year; mats of filamentous algae covered significant portions of the ponds water surface. In 2014, approximately a month after treatments began in April, the 9<sup>th</sup> Avenue storm pond water quality began to change. At the beginning of the season algae were present but as each week passed, the amount of algae growing on the surface and in the water column decreased. Together with the decreasing algae growth, the turbidity also*

*improved and water clarity was much greater than 1 meter in depth. The clarity did cause an increase in aquatic vegetation growth however, that was to be expected and not a concern at this pond. Also, aquatic invertebrates seemed to increase in numbers. Each time observations were recorded at the pond there were significant numbers of species around the pond edge and quite often when water samples were taken, invertebrates had to be poured out of the sample. The increase in invertebrates is a relative observation as there were no specific counts made of the invertebrates or the type of species present. “*



Figure 6: Visual differences in the aesthetics and quality of 9<sup>th</sup> Avenue pond before (photos from 2013) and after (photos from 2014) the application of Phoslock.

**“The main success here is a healthier looking pond in which the algae levels were controlled after only a few months of treatment with Phoslock.”**

Taren Hager, B.Sc., *Storm Pond Operations Technician*,  
City of Lethbridge. 2014

## Conclusion

Initial results are encouraging. Even with a large influx of phosphorus entering the pond via a large rainfall event in mid June, the regular use of Phoslock was able to bind the new source of dissolved phosphorus. This resulted in a significant reduction in the amount of algae in the pond compared to previous years. Continued applications of

Phoslock will ensure that the Storm Water Management Facility will continue to remove P from the outflow water.

Further monitoring will be needed to show the continued success in future years.

Publication date: November 2014



Additional information can be provided on request.