



Report to: General Committee

Date Report Authored: February 4<sup>th</sup>, 2013

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**SUBJECT:** Update on Swan Lake Water Quality  
**PREPARED BY:** Soran Sito, Asset Management, Ext. 2521

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**RECOMMENDATION:**

- 1) THAT the report entitled “Update on Swan Lake Water Quality Monitoring” be received;
- 2) AND THAT the Phoslock application to lower Phosphorus levels in Swan Lake in the amount of \$150,000 be funded from surplus funds in Project #8445 ‘Pond 2D Buttonville’ and from Project #9241 ‘Storm Water Mgmt – Pond Maintenance (ID #10 Galleria);
- 3) AND THAT the remaining budget of \$15,931 in Projects #8445 and #9241 be returned to the original funding source;
- 4) AND THAT Staff report back in summer 2014 regarding the results of the Phoslock application and the level of reduction in Phosphorus and algae bloom in the lake;
- 5) AND THAT Staff be authorized and directed to do all things necessary to give effect to this resolution.

**PURPOSE:**

The purpose of this report is to update Council on the Swan Lake water quality monitoring, and the application of Phoslock to lower the Phosphorus level in the lake water.

**BACKGROUND:**

Swan Lake was gravel extraction pit between early 1960s – early 1970s with construction material deposited around the lake (mainly south and west edges of the lake) starting in 1980s (refer to Attachment A). The lake was originally owned by Swan Lake Ltd. Subsequently, Daniels Corporation took ownership of the lake and continued development around the lake. In early 2001 the City took ownership of most of the lake as part of the subdivision assumption, except for the lake portion of Block 9 and the lake portion of the Star Grande Custom Homes Corp. lands (refer to Attachment B).

Previous reports on the Swan Lake water quality have indicated that there are two (2) types of contamination in Swan Lake that causes poor water quality. These contaminants are metals and nutrients. Metals such as: Chromium, Copper, Lead, Mercury, Nickel, Zinc and nutrients such as: Phosphorus (P) and Nitrates (N). The reports and studies also indicated that it would be extremely difficult to remove metals from the lake water and sediment. Nutrients such as Phosphorus could be removed from the lake water using today’s new technologies. The sampling of the lake water and bottom sediment has confirmed that both P and N exceed Ministry of the Environment (MOE) and Health Canada guidelines. These nutrients (mainly P) are supporting a flourishing environment for the algae to bloom causing poor water quality in the lake.

**OPTIONS/ DISCUSSION:**

In early 2011, Asset Management hired Dr. Nurnberg, a limnologist from Freshwater Research, to provide recommendations to improve the water quality in the lake in order to reduce the algae bloom. The lake was monitored for one (1) year to assess the algae bloom and to identify if the toxic blue-green algae exist in the lake. In late summer 2012, signs around the lake were installed for no swimming and no fish consumption.

The monitoring by Dr. Nurnberg shows that:

1. Swan Lake is in a hyper-eutrophic state (excessive nutrient concentration such as P & N) which causes algae bloom and periods of oxygen deficiency,
2. The level of the nutrients exceeds Health Canada & MOE guidelines,
3. The main source of the high nutrients in the lake is from internal loading (from lake bottom sediment). External loading from the subdivision is very minimal,
4. Two (2) species of the Cyanobacteria (which can produce the toxic blue-green algae) were found in the lake water,
5. Current nutrient concentration will continue to sustain a flourishing environment for the toxic blue-green algae (Cyanobacteria). Climate change will make it worse,
6. Application of Phoslock (3-5 tonne/ha) could significantly reduce the P concentration, and therefore, reduce algae bloom and increase oxygen in lake water.

MOE was involved in the one year monitoring of the lake and is supportive of the recommendations of Dr. Nurnberg regarding the Phoslock application.

Asset Management Staff have met with representative from Phoslock to discuss the suitability of this product for reducing the Phosphorus level and the algae bloom in the lake. Recent treatments of algae bloom using the Phoslock in Canada and Europe have shown great success in achieving good results (lowering P levels and algae bloom). Phoslock is one of the very few acceptable products available in Canada for controlling P level and reducing algae bloom in isolated water bodies such as Swan Lake (which is a kettle lake) without negative impacts to the surrounding environment. Asset Management Staff are satisfied that Phoslock application is a suitable treatment for reducing P and algae bloom in Swan Lake. If the funding is approved by Council, the Phoslock application can commence as early as April 2013. Staff will monitor and measure Phosphorus level in the lake water in the summer of 2013 and 2014.

**FINANCIAL CONSIDERATIONS AND TEMPLATE: (external link)**

Phoslock application to lower the phosphorus level in Swan Lake will cost approximately \$150,000.

<b>Details</b>	<b>\$'s</b>
<b>Budget Available</b>	
Project #8445, 'Pond 2D Buttonville'	62,632
Project #9241, 'Storm Water Mgmt - Pond Maintenance (ID #10 Galleria)	103,299
<b>Current Budget Available</b>	<b>165,931</b>
Phoslock Application	-150,000
<b>Remaining Budget available</b>	<b>15,931</b>

Maintenance work in Project #8445 and #9241 has been completed. Staff recommends that the remaining budget of \$165,931 be used for the Phoslock application at Swan Lake. The remaining budget of \$15,931 will be returned to the original funding source.

**HUMAN RESOURCES CONSIDERATIONS**


Not applicable

**ALIGNMENT WITH STRATEGIC PRIORITIES:**

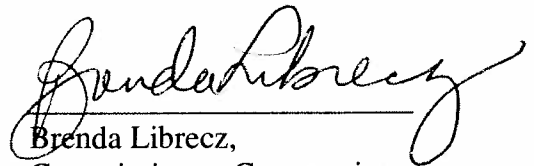
The proposed application of Phoslock in this report supports Markham Council's goal of *Environmental Focus*, as it relates to the protection and management of Swan Lake and ensures public health and safety are top priority.

**BUSINESS UNITS CONSULTED AND AFFECTED:**

This report has been circulated to the Legal, Engineering and Finance Departments for their input.

**RECOMMENDED****BY:**


Gary Adamkowski, P.Eng.  
Director, Asset Management



Brenda Librecz,  
Commissioner, Community  
& Fire Services

**ACTING DIRECTOR****ATTACHMENTS:**

- Attachment 'A': Location Map - Swan Lake
- Attachment 'B': Ownership Map - Swan Lake