

Performance Assessments of Various Stormwater Management Facilities – Toronto, Canada

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Since 1995, a number of different stormwater management technologies in the Toronto area have been monitored and evaluated through the Stormwater Assessment Monitoring and Performance (SWAMP) Program, a cooperative initiative of federal, provincial and municipal agencies. Technologies monitored include wet ponds, constructed wetlands, conveyance exfiltration systems, oil grit separators, underground storage tanks and a flow balancing system. A comparison of monitoring results from several facilities indicated good removal of total suspended solids (TSS), with average wet weather effluent concentrations of TSS consistently below 50 mg/L. There was no significant difference between cold and warm season effluent concentrations of TSS. As shown in other studies, removal efficiencies of TSS for individual storm events were strongly correlated with influent concentrations. Lower removal efficiencies were typically associated with influent concentrations less than approximately 160 mg/L TSS, indicating that removal efficiency is a biased indicator of facility performance.

The second part of the presentation focused on a study investigating chloride pathways in stormwater ponds. The monitoring study included water sampling and depth profiles of conductivity conducted at 15 locations in the Rouge River highway stormwater pond in Toronto. Conductivity was converted to chloride through regression analysis. The profiling showed distinct chloride stratification, with concentrations greater than 3000 mg/L persisting in deep parts of the pond throughout the summer and fall. Continuous monitoring of flow and chloride at the inlet and outlet of the facility showed chloride accumulation during the road salting season, followed by a gradual flushing of chloride out of the facility during the spring, summer and fall. The stratified layer corresponded with low dissolved oxygen levels during both the winter and summer. Reduced vertical mixing associated with the dense saline layer in the pond was proposed as a contributing factor to observed dissolved oxygen levels. Low dissolved oxygen

facilitates the release of toxic metals and other pollutants from bottom sediments and density layering may reduce hydraulic retention times, both of which can negatively impact treatment performance.