Designing Stormwater Pond Filters for Phosphorus Removal

STONE ENVIRONMENTAL

Services / Expertise

Water Quality & Flow Monitoring Watershed Planning Phosphorus Removal TMDL Implementation Support

Markets Watershed Protection Organizations Municipal Government State Government

Project Location South Burlington, Vermont

Duration 2020-present

Project Owner Lake Champlain Basin Program

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Construction of the Dorset Park stormwater pond and outflow structure.

STORMWATER wet ponds can be ideal facilities for filter-based retrofits that enhance phosphorus (P) removal from pond outflow and thus reduce P loading to receiving waters. Sufficient land area to construct filters typically exists surrounding the pond. In addition, impoundment of runoff above the permanent pool during storm events provides enough hydraulic head to operate gravity-flow filters. The primary impediments to enhanced P treatment at stormwater ponds are that P concentrations in outflows tend to be low and peak outflow rates are often high.

Stone conducted a demonstration study for the Lake Champlain Basin Program (LCBP), in coordination with the City of South Burlington, to design a cost-effective filter that can retrofit existing stormwater ponds to remove P from pond outflow.

Stone hypothesized that filters containing appropriate P sorbing media could remove enough P from stormwater pond outflow to justify the cost of their installation and maintenance. Even if P removal efficiency is low (due to low influent P concentration), the mass of P removed over time could be significant due to the treatment of large volumes of stormwater. Thus, enhancing the P removal of stormwater ponds using reactive media filters could be a cost-effective management practice, mainly where dissolved P concentrations in pond outflow are high. In certain ponds, elevated P concentrations can occur in pond outflow due to release of P from pond sediment under anoxic conditions. There is increasing evidence that older stormwater ponds can become net sources of P.



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We worked with City stormwater personnel to design reactive media filters to remove P from the outflow of the Dorset Park stormwater pond. Dissolved P concentrations in outflow from this pond (mean=49 ug/L) were the second highest among 11 stormwater

ponds sampled between November 2020 and April 2021.

efficiency of the four types of media.

In December 2021, Stone constructed four pilot filters (each approximately 10 x 7 x 2 feet) containing media capable of sorbing dissolved P in the bank of the Dorset Park stormwater pond. Monitoring P concentrations and flow rates of the filter outflow is underway for 12 months to document and compare the P removal

In collaboration with the City of South Burlington and VTDEC, Stone will ensure this study's results are suitable for establishing P

removal credits for filter retrofit practices, which-if our

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Dorset Park stormwater pond and outflow structure.

demonstration is successful—should spur adoption in other communities in the Lake Champlain Basin.



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