BaySaver Enhanced Media Cartridge Total Phosphorus Testing in Grandview

Objective:

The Grandview site in Washington State was a field test location for the BaySaver Enhanced Media Cartridge (EMC). Many parameters, including total phosphorus were analyzed from the influent and effluent samples to determine the efficiency of the system in the field.

Setup:

The Grandview site is located at 19420 Southeast 20th Street in Vancouver, Washington. Stormwater runoff from a 1.35 acre area, which is primarily a paved parking lot, drains to the BayFilter system via an underground conveyance system. Five catch basins collect the stormwater runoff from the site and convey the stormwater runoff to the BayFilter system for treatment prior to discharge. The BayFilter system includes a 4 foot diameter pre-cast concrete manhole.

The influent stormwater enters via a 12-inch diameter high density polyethylene (HDPE) influent pipe and fills the influent chamber of the influent manhole. The influent manhole contains a bypass component, a 3-inch thick concrete weir, which divides the influent manhole into two chambers. In the event of a high volume flow, the influent chamber fills to the top of the concrete weir and the stormwater overflow fills the effluent chamber, which discharges via a 15-inch diameter outlet pipe. High intensity rainfall events bypass the manhole containing the filter cartridges.

During non-bypass events, the influent chamber discharges stormwater through the 4-inch diameter inlet pipe to a 6-foot diameter pre-cast concrete manhole. Stormwater fills the filter manhole until the water surface rises to the operating level of the two EMC cartridges. The stormwater is driven by hydrostatic pressure. A 4-inch diameter poly-vinyl chloride (PVC) pipe manifold connects the outlets from the two EMCs to the 4-inch diameter filter manhole outlet pipe. The outlet pipe drains from the filter manhole through the influent manhole, downstream of the weir, and discharges into the 15-inch diameter outlet pipe.

Samples were collected by two ISCO automated samplers at the influent and effluent sampling locations. The samplers collected flow-paced samples by withdrawing a 230 mL discrete sample for a pre-programmed volume of flow. Pacing was determined by the expected total volume of the rainfall event. Samples were collected by field personnel and sent to a laboratory to be analyzed.

Results:

Over the course of six storm events, beginning in April 13, 2011 and ending on November 1, 2011 there was an average of 62.9% total phosphorus removal. Removals reached as high as 82.2% (Table 1).

Date	IN (mg/L)	EFF (mg/L)	Removal
04/13/11	0.055	0.017	69.1%
04/24/11	0.072	0.019	73.6%
05/25/11	0.376	0.067	82.2%
07/17/11	0.051	0.030	41.2%
09/26/11	0.117	0.055	53.2%
11/01/11	0.096	0.040	58.3%
Average	**0.128**	**0.038**	**62.9%**

Table 1: Summary table of EMC Total Phosphorus data

Analysis of Results:

Removal percentage varied according to the load of phosphorus in the influent. The highest removal percentage was achieved with the heaviest influent concentration, which suggests a correlation between the influent concentration and the capability of the system to remove the total phosphorus content.

Summary:

The EMC was able to remove over 62% of the total phosphorus on average over a course of six (6) events. Event removal percentages appear to correspond with the influent load of total phosphorus, which indicates that removal could be higher in events with extreme loads of phosphorus.