Nutrient Capture With Hydro-Variant Technology™

The numeric nutrient criteria proposed to be imposed by the Environmental Protection Agency (EPA) have many municipalities throughout Florida looking for solutions to meet this mandate. For new construction, the design technology to reduce nutrient loading is a simple matter of incorporating treatment trains with established removal efficiencies. However, the most difficult task lies in retrofitting existing developed areas. Developed and altered watersheds represent a significant source of stormwater pollution. Treatment trains that treat the entire flow and that include media filtration are one solution to meeting the requirements of the NNC. One such treatment train is the Suntree® Nutrient Separating Baffle Box™ (NSBB) and the SkimBoss™ upflow filtration system. This treatment train includes a hydraulic management method known as Hydro-Variant Technology™. This allows for the headloss of the treatment system to be reduced as the flow rate increases, which enables a very high level of treatment during low and medium flows, and also has the capacity for large flows without causing flooding upstream.

Treatment Train

For a project located in Mount Arlington, NJ, the objective was to provide full treatment to the flow discharging from a 24" pipe into Lake Hopatcong with nutrient reduction being a primary concern. The local engineer selected the NSBB as pretreatment for the SkimBoss™ filtration system. Both the NSBB and SkimBoss™ filtration system contribute to nutrient reduction as well as gross pollutant removal. The NSBB is a hydrodynamic separator that is orientated to treat the entire flow and can be retrofitted to existing watersheds with minimal headloss. As water enters into the NSBB, the flow is sieved through a screen system that captures the floatables such as leaves and litter. Sediments pass through the screen system and settle into the lower collection chambers. Turbulence deflectors are strategically placed in the sediment chambers to help create calm and allow ultra fine particles to settle without re-suspension. After the rain event, the NSBB water level within the vault drops below the screen system, and the captured organic matter is stored in a dry state between rain events. The nutrient load does not leach into the water level below and credit can be given for having captured it. Adjacent to the outflow of the NSBB is the SkimBoss™ floating skimmer system, which acts to prevent the passage of floatables that escape the screen system, including hydrocarbons. It effectively performs the job of a very tall skimmer without the headloss of a tall skimmer. Given enough vertical space within the vault, the Skimboss™ can travel completely above the outflow pipe and have no impact on headloss.

In early fall of 2009, the retrofit project was begun and the installation crew took only 3 days to perform the entire retrofit installation. On the first day, the excavation and setting of the treatment systems was performed, including grouting the pipes. The existing pipe was cut and used to connect the NSBB to the SkimBoss™ filtration system, and there was no need to purchase new pipe. Being able to excavate and install the treatment systems quickly reduces the likelihood that the excavation could be washed out by rain. On the second day, the vaults were mostly backfilled and risers with access hatches were cast. Typically, service crews prefer easy access when servicing treatment systems so large aluminum hatches were selected for the project. On the third day, backfilling was completed, the area was graded, and sod was placed.

Projects similar to this have also been constructed all over Florida and have the potential to assist local governments in meeting future numeric nutrient requirements by retrofitting existing developed areas.

For more information about Nutrient Separating Baffle Boxes™ and the SkimBoss™ Filtration System, contact Tom Happle with Suntree Technologies via email at happel@suntreetech.co.