What Is Green Infrastructure?

Green infrastructure is the utilization of natural processes to help control rain runoff. This can include constructed systems such as raingardens or buffers along streams that treat runoff by filtering the water.

There are also non-structural strategies such as incentives or education to encourage homeowners to protect water quality, and regulations that require better stormwater control for new construction.

A complete community approach uses green infrastructure throughout all aspects of community planning.

The Peirce Island Municipal Snow Dump Project

The Peirce Island snow dump site in Portsmouth, NH covers approximately 0.54 acres and serves as the dumping location for snow removed from the urban core of the city.

This is a known high load contribution site or pollution “hot spot” and is a frozen monument to the brew of salt, trash, nutrients, oil and sediment that are deposited on urban city streets. Snow plowing activities collect, convey and concentrate these pollutants into a single large location.

THE PROJECT

The Peirce Island Snow Dump Project was developed to address this issue. The project’s objectives:

1. Research a Low Impact Development/Green Infrastructure (LID/GI) solution to mitigate water quality impacts associated with snow removal.

2. Quantify the pollutant load and future reductions associated with LID/GI implementation.

3. Recommend a design for a LID/GI system for this location.

UNHSC staff developed a sampling plan over the course of the 2013-2014 and 2014-2015 winter seasons to quantify the pollutant load potential from snow dump facilities. A series of grab samples...
were collected from December 2013 through April 2014 and January through April 2015 from the snow dump site. Grab samples were taken from snow that was recently delivered to the snow dump facility (i.e. new snow) and of the snow that had been stored for an extended period of time (i.e. old snow). During each sample event the snow pile was measured to provide an estimation of the total volume of snow. The density of the snow pile was calculated using the snow to water equivalency ratio (SWE), which is a percentage of the volume of water contained within the snow pile. This SWE ratio was then multiplied by the measured snow volume to generate the volume of water (gallons) tracked over two winter seasons (Figure 1).

To quantify this pollutant removal potential, an assessment of the annual pile volume, the total pollutant mass delivered to the snow dump area, the exported pollutant mass, and the pollutant removal potential by a properly designed GI system were quantified and modeled. The results of this assessment are shown in Table 1 and Figure 2.

In addition to standard practices associated with snow dump activities, it was proposed that an appropriately sized bioretention system could be installed to manage the exported mass from rain and melt events.

CONCLUSIONS

This study demonstrated that standard snow dump facilities by themselves remove a large mass of pollutants from the urban core. The process of collecting, trucking, and dumping snow into a dedicated location dramatically reduces pollutants otherwise exported to receiving waters by up to 87%. This practice itself should be considered a best management practice (BMP) for urban stormwater pollution.

These pollutant removal potentials can be increased even further, by up to 98%, through the design and installation of appropriately sized GI systems. (The lone exception is with respect to chloride loads, which may be an issue if discharging to freshwater areas.)

As a result of this project, a bioretention system has been designed for this location in Portsmouth. The total cost estimates for the materials and installation of the facility are between $13,500 - $17,400, and the City has committed to installing the system within the next two to three years.