STORMWATER FACT SHEET

Stormwater Control Goal

The goal of stormwater control in urban and suburban watersheds is **restoration or preservation of predevelopment hydrology** in the watershed (and sub-watersheds of small tributary streams). In **un**developed areas, stormwater soaks into the ground where it replenishes groundwater, restores stream base (low) flow, and, under high flows, prevents stream erosion and destruction of stream bed habitat and washout of benthic aquatic life. In developed areas, reestablishment of the more natural range of streamflows is accomplished by *reducing* impervious cover (hard compacted surfaces, pavement, roofs), or reducing the *effect of impervious cover* by routing excessive stormwater runoff to natural areas where runoff will soak into the ground, or to infiltrating structural best management practices (BMPs) like bio-infiltration basins.

Useful Facts

- The first overland flow of stormwater (sometimes called first flush), has the highest concentration of pollutants (such as dirt, heavy metals, oil & grease, nutrients from automobiles on roads and parking lots);

- Stormwater bacteria pollutant load is important almost everywhere, and nutrient loads of both phosphorus and nitrogen are important to waters that retain pollutants like lakes/ponds, river impoundments behind dams, and estuaries;

- All but the smallest storms (less than 0.2") generate significant stormwater volume but relatively low concentration of pollutants (compared to sewage). But high volume times low concentration still equals a large mass load of pollutants to a waterway;

- Flow volume and frequency of discharge is as important as pollutant load, and even more important for small streams subject to frequent scouring and aquatic community washout during almost every rain storm;

- Small tributary streams with an impervious cover greater than 12% almost always violate aquatic life water quality standards; streams with impervious cover over 1.5-3% show significant detrimental impacts on sensitive aquatic life species;

- Healthy small tributary streams are vitally important to the overall ecological health of watersheds, with floodplains that accommodate ranges of natural streamflows, water quality and stream bank stability that protect habitat for aquatic life, refuge for sensitive species of aquatic life during stressful times of drought, and benthic habitat/food sources necessary for spawning/reproduction/juvenile growth of almost all recreational and commercial fish species (or their critical food sources);

- There are more small storms than large storms in New England (e.g., 50% ≤ 0.3 in.; 70% ≤ 0.6 in.; 80% ≤ 0.8 in.; and 90% ≤ 1.2 in.). For this reason, widespread use of small-scale rain gardens in urban/suburban areas can be very effective in capturing and infiltrating stormwater runoff in this region;

- Average annual rainfall in the Taunton River and other eastern MA/RI watersheds is 43 inches per year. Storms between 0.1 and 1.0 inches are the most significant in terms of urban pollutant loading, both because of the frequency of these sized events, and because they generate sufficient runoff to wash off the pollutants that have accumulated on impervious surfaces since the last storm. Only 10% of storms are greater than 1.2 inch, and most of the larger storm pollutant washoff occurs early in the storm, which would be treated by a 1 inch design storm BMP before it bypasses treatment. The major concern for the infrequent, large storms greater than 1 inch is flooding and stream bank erosion which can be managed by storage facilities and controlled release, if necessary, rather than by pollutant control technologies;

- The most cost effective stormwater measures include: reducing *source volume* by eliminating unnecessary pavement, and by routing stormwater for natural infiltration, stormwater storage and reuse; controlling *pollutant sources* with pet waste pick-up, and well-timed collection of leaf litter, sand and fine particulates (e.g. high efficiency road/parking lot vacuum sweeping) to reduce the amount of pollutant removal required by more expensive structural BMP controls;

- Recent studies have demonstrated that source reduction along with optimized watershed-wide use of smaller infiltrating structural BMP systems are 2-3 times less costly (and are more effective at restoring base flow to streams) than more traditional large stormwater detention systems.
  http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/StormwaterBMPCostOptimization.pdf

- EPA Region 1 has developed several tools for estimation of BMP removal efficiency based on the local New England rainfall record, see the summary report at:
  http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/BMP-Performance-Analysis-Report.pdf
  A simple spreadsheet model for evaluating a single BMP called BMP-PET can be found for download at the bottom of the EPA stormwater page at:
  http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/BMP-Performance-Analysis-Report.pdf
  The instructions for the model are at:
  http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/BMPPETInstructions.pdf
  EPA Region 1 is developing a spreadsheet-based Optimization Tool (Opti-Tool) which should be available in June 2016 to help SW managers.

- The most difficult to control stormwater pollutants are soluble pollutants that don't adhere to the fine particulates removed by soil filtration. These pollutants can flow with groundwater to surface waters. Examples of soluble pollutants are chlorides that can only be controlled by careful source control (balancing public safety and aquatic life impact) and nitrogen which is most effectively controlled by source control and structural BMPs with an anaerobic zone like a gravel wetland (see UNH 2012 Report at: http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/UNHSC.2012Report.10.10.12.pdf page 18 of 36 for a schematic of a gravel wetland.