

STORMWATER MANAGEMENT

What is Stormwater?

Stormwater is the flow of water that results from precipitation that occurs immediately following rainfall or as a result of snowmelt.

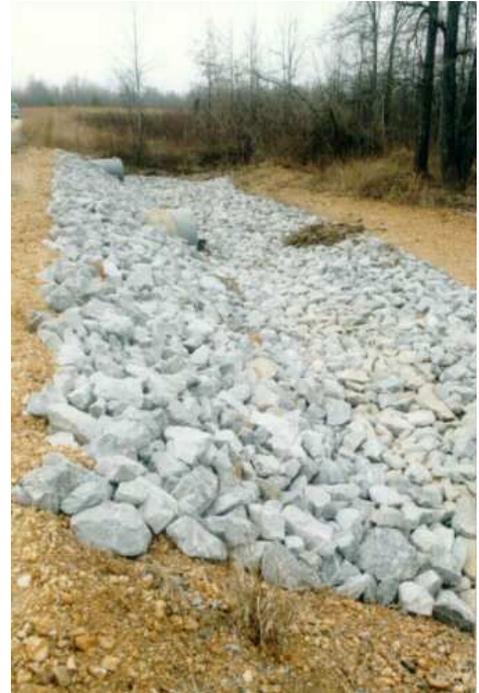
When a rainfall event occurs, several things can happen to the precipitation. Some of the precipitation infiltrates into the soil surface, some is taken up by plants, and some is evaporated into the atmosphere. Stormwater is the rest of the precipitation that runs off land surfaces and impervious areas.

Stormwater Runoff = Water Pollution

Runoff from rainwater will carry chemicals, nutrients, sediments and other forms of nonpoint source (NPS) pollution across impervious surfaces, such as roofs and parking lots, as well as over lawns and into local waterways (either directly or through storm sewers). This stormwater runoff is the most common way that NPS pollution reaches local rivers, streams, and lakes.

The major goal of stormwater management is to reduce impervious surfaces and increase absorption of rainwater by soil and vegetation, usually by reducing the speed of

flow or by retaining the water in basins or decentralized areas. This will reduce the amount of pollutants being carried off into storm sewers and streams, as well as reduce flooding. Increasing absorption by soil has the added benefit of helping to maintain ground water supplies in our aquifers, which are the source of many community drinking water supplies throughout the Nashua Region.



Stormwater Management Planning 101

Stormwater planning is required by federal agencies such as FEMA (flood control) and EPA (pollution reduction goals/Phase II program). Planning requires forethought, goals, coordinated efforts of many entities, and the efficient and strategic use of time and resources. The following are the principle objectives of Stormwater Planning:

- Protect human health and safety
- Minimize damage to private property and structures within the community
- Minimize damage to roads, bridges, parks, utilities and sidewalks
- Reduce expenditures of public money for constructing expensive flood control
- Preserve wetlands and waterways
- To wisely spend time, energy and resources of town employees and equipment in pursuit to best serve the interests of the community

Drainage in the Town of Hollis

When the Town of Hollis updated their roadway design guidelines they encouraged the use of open drainage whenever possible. The updated Road and Driveway Specifications Appendix states *“Open drainage is preferred in all subdivisions. In certain cases engineering data and standards may warrant a partially or fully enclosed drainage system.”*

The Town made this decision largely based on the following benefits:

- Disperses stormwater runoff throughout a development.
- Increased groundwater recharge.
- Reduced ice buildup and salt usage in winter months.

Open vs. Closed Drainage

Most local regulations require stormwater to be “directed to enter the nearest open stream channel.” This allows both open and closed drainage systems to be integrated into local stormwater management, but can still result in environmental impacts like flooding, aquifer depletion, stream channel erosion, and habitat destruction.

So what are the differences between open and closed systems and how can communities use both of them without impacting the environment or the community? First, let’s define the two systems. An open drainage system uses swales and open channels to convey stormwater and is often integrated with Low Impact Development techniques. Closed drainage systems use pipes, culverts and manholes to convey stormwater to detention basins or other centralized infiltration areas.



Open drainage system on Christmas Tree Lane in Milford.

So which one should you use? Open, Closed or BOTH! Stormwater management systems should be designed for the particular characteristics of the site in order to avoid environmental impacts and be the most cost-effective for monitoring and maintenance after the project is complete. Water will follow a natural path, so designing a system that respects the characteristics of your site and planning for a monitoring and maintenance schedule will go a long way towards successful stormwater management.

Benefits of Open and Closed Drainage Systems

Open

- Aquifer recharge and environmental protection
- Solution to Pollution is Dilution - open systems allow increased residency of water to break-down pollutants
- Less Maintenance Costs
- Inspections are easier to perform - they’re not buried
- Wicks the water off of the roadway (prevents overuse of deicing chemicals)

Closed

- Contains water on road en route to a catch basin
- Less surface area dedicated to conveying water
- May reduce erosion by limiting contact with erosive soils
- Conveyance systems reduce leakage in areas of denser development



Permeable Parking Lot Demonstration - Open Drainage
Seattle, WA
<http://depts.washington.edu/cwws/Research/stormwater.html>



Open and closed drainage - this bioretention swale (open) treats sidewalk runoff before it is directed into the storm water system (closed). Photo: Nevue Ngan Associates - www.gradingandexcavation.com/sw_0701_integrating.html