



Stormwater Control for Development



Stormwater Fact Sheet No. 5

This fact sheet is No. 5 of an eight-part series focused on stormwater runoff problems and control strategies. The series covers:

- 1) Stormwater Impacts
- 2) Human Health Impacts
- 3) How Citizens Can Help
- 4) Prevention and Control
- 5) Control for Development
- 6) Rules and Regulations
- 7) "How to" for Local Officials
- 8) Municipal Prevention



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Introduction

When development occurs, there is usually an increase in impervious surfaces. This causes a significant increase in the volume and rate of stormwater runoff leaving the developed site. Unmanaged stormwater runoff causes downstream flooding, stream bank erosion and pollutes our valuable streams, rivers, lakes and coastal waters.

The cumulative effects of stormwater runoff on water bodies are evident across the state. Streams draining urbanized areas have fair to poor water quality. Some historical trout waters are contaminated by pollutants such as petroleum products, bacteria, and increased temperature. Trout, as well as the food they eat, are highly sensitive to these and other pollutants. Some shellfish waters along the North Carolina coast have been contaminated and closed due to stormwater runoff and other pollution sources. In response, local, state and federal governments have enacted various regulations to address this problem.

The US Environmental Protection Agency regards most stormwater discharges as point sources of pollution and requires coverage by a National Pollutant Discharge Elimination System (NPDES) permit. The primary method to control stormwater discharges is through the use of best management practices. The North Carolina Division of Water Quality is the regulatory agency that manages the state's Phase II Stormwater Program. Phase II communities are required to develop an ordinance that defines how they will implement the six minimum measures outlined in the federal law. These are 1) Public Education; 2) Public Outreach; 3) Illicit Discharge Detection and Elimination; 4) Construction Site Runoff Control; 5) Post-Construction Runoff Control; and 6) Pollution Prevention/Good Housekeeping.

Today's regulations (Phase II) expand the existing NPDES stormwater program (Phase I) to address stormwater discharges from small municipal separate storm sewer systems (MS4s) (those serving fewer than 100,000 persons) and construction sites that disturb one to five acres. While it is the requirement of the landowner or person financially responsible for the development to comply with the Phase II stormwater program, it is not uncommon for the landowner to defer to the developer for compliance.

Suggestions for Effective Stormwater Planning

Effective stormwater management requires early consideration and planning for stormwater runoff. Unfortunately, stormwater management is often considered too late in the development planning process. This wastes the developer's valuable time and money and causes unnecessary impacts from unmanaged runoff. Several suggestions for effective stormwater planning are listed below.

1. Understand the Impacts and Rules

- Be aware of the water quantity and quality impacts of unmanaged stormwater runoff. For example, stormwater runoff is a significant source of water pollution and can destroy the aesthetic value of water bodies and impair their various uses, including fishing, boating, swimming, drinking water supply, and shellfishing. To minimize these impacts, the state and some local governments have adopted stormwater management regulations that apply within certain areas of the state, outside phase I and II regulations. For example, developments affecting sensitive waterways (for example wetlands, water supply watersheds, high quality waters, outstanding resource waters, coastal waters) may be subject to state and/ or local stormwater management rules. Know the classification of waters (such as trout waters) affected by your development and consult state and local officials to verify this classification. Water classifications can be viewed using the RiverLink web based map found at www.riverlink.org.
- Be aware of all other existing development regulations (for example state/local erosion control, Army Corps of Engineers wetland/dredge and fill, local floodplain/zoning/subdivision/open space/recreation/landscaping rules, state building/plumbing codes, chemical spill containment requirements, etc.) and consider these requirements in planning your development and stormwater management system.
- Hold early predevelopment meetings with appropriate agency personnel. Regardless of any regulations, always incorporate good stormwater management practices into the design and construction of your development to minimize any impacts on downstream waters.

Mountain Stream Classifications

Stream classifications are based on the primary human use

C	Secondary Recreation
B	Primary recreation
WS	Water Supply
Tr	Trout Waters
HQW	High Quality Waters
ORW	Outstanding Resource Waters

Want to know what each means?
<http://h2o.enr.state.nc.us/csu/swc.html>

Or call 828-296-4500.

2. Good Site Planning and Design

- Good site planning and design is the key to effective stormwater management. First, study your site characteristics (soils, topography, hydrology, and other physical features) and identify development limitations and opportunities. Plan stormwater practices so they serve as amenities within your development. One example of beneficial stormwater planning would be to incorporate greenways and trails along stream corridors. Delineate and protect all environmentally sensitive such as floodplains and wetlands. Retain vegetative stream buffers and establish development setbacks. Retain or plant tree cover especially along waterways to shade the water and maintain cooler water temperatures.
- Minimize the amount of impervious surface to the greatest possible extent.
- Phase your development so to minimize the amount of bare soil at any one time. This will lessen the chances of creating sediment and erosion problems.
- Cluster development in to minimize roads and retain natural areas.
- If possible, use angled and smaller parking spaces and narrower road widths to reduce impervious area.
- Consider using pervious construction materials that allow water to soak through in seldom used parking areas.

- Eliminate direct discharges of stormwater to waterways.
- Minimize the use of curb and gutter and maximize the use of vegetated swales. If curb and gutter is necessary, consider curb cuts to divert runoff into stable areas for infiltration.
- Develop a landscaping plan that uses landscaped areas like parking islands as infiltration or detention/retention areas. Instead of grass or turf that requires chemical applications, use trees, shrubs, mulch or other materials that require little or no chemical applications.

3. Infiltrate What You Can

- Retain vegetated areas to the maximum extent possible and utilize them fully to infiltrate, detain, filter, and evaporate stormwater runoff. Design parking areas, roads, driveways, patios and other impervious areas to drain in a sheet flow into vegetated areas. Discharge downspouts to stable vegetated areas. Consider including rain gardens or other similar wetlands in your construction.

4. Reduce Your Pollution Load

- There are many source reduction and pollution prevention techniques you can use, especially in the design of commercial and industrial developments. It begins with soil erosion and sedimentation control on your site. Sediment is the number one pollutant in stormwater runoff. Restrict clearing and grading on highly erodible slopes and minimize the total area disturbed. Install and maintain all necessary practices for stabilizing disturbed areas.
- Cover all machinery, storage tanks, waste and raw material piles, dumpsters, recycle bins and other structures that can leach, leak or spill contaminants into stormwater runoff.
- Provide spill containment structures and develop an effective spill response plan. Make sure that floor drains and other outlets exposed to contaminants discharge to the wastewater treatment plant, sanitary sewer or other appropriate facility and not to surface waters.
- Stencil storm drain inlets in your development with “Don’t Dump – Drains to Stream” warnings.
- Educate homeowners/tenants on pollution prevention measures to avoid problems. Develop an environmentally sensitive lawn care maintenance program that minimizes the use of chemicals and uses safe application methods.

5. Structural Controls as a Last Resort

- If necessary, use structural controls to reduce peak flows and pollutant loadings. Examples of such controls include detention/retention basins, artificial wetlands, bioretention areas, infiltration basins/trenches, sand filters and porous pavement/blocks, and silt fences. If properly sited, designed, constructed and regularly maintained, these devices can be very effective. See fact sheet number #4 Prevention and Control for a more complete explanation.
- Each practice has different advantages and disadvantages, making it suitable or unsuitable for use in different situations taking into account land requirements, size of drainage area, soils, and topography. An effective stormwater management plan will utilize a number of practices in an integrated system. Early planning for these systems is critical.

6. Have a Good O&M Program

- Develop a good operation and maintenance (O&M) plan/program with clear responsibilities and adequate funding. Frequent inspections should be made of all stormwater practices to ensure they are functioning as designed. Failure to implement and O&M program can cause offsite impacts and possible fines.
- Make sure there is adequate space and access to detention basins and other practices to allow proper maintenance.
- Designate onsite areas for sediment disposal to lower maintenance costs. Inform property buyers/tenants of the location, purpose, and O&M responsibilities in relation to legal structures, such as deed restrictions and lease agreements.
- If necessary, establish an O&M fee to fund necessary maintenance. Encourage all parties to use good housekeeping practices to prevent and manage stormwater runoff impacts.

4 - Plan Early For Stormwater In Your New Development

Construction Activities

Construction activities (including other land-disturbing activities) that disturb one acre or more are regulated under the NPDES stormwater program. On March 10, 2003, new regulations came into effect that extended coverage to construction sites that disturb one to five acres in size, including smaller sites that are part of a larger common plan of development or sale. Sites disturbing five acres or more were regulated previously.

Operators of regulated construction sites are required to develop and implement stormwater pollution prevention plans and to obtain a permit from North Carolina Division of Water Quality or the appropriate local government.

North Carolina is authorized to implement the NPDES permit program, including the stormwater program. Please contact your permitting authority to determine the specific requirements that apply to you and also what local government requirements exist.

Where Environmental Protection Agency (EPA) is the permitting authority, the Construction General Permit (CGP) outlines a set of provisions that construction operators must follow to comply with the requirements of the NPDES stormwater regulations. The CGP covers any site one acre and above, including smaller sites that are part of a larger common plan of development or sale, and replaces and updates previous EPA permits.

Remember that the NC Division of Land Resources or your local sediment and erosion control program issues NPDES permits for construction activities. Post-construction NPDES permits are managed by the NC Division of Water Quality or your local government.

Contacts

- Appropriate Local Government Officials seris.info/RiverLink/techinfo.shtml
- Land of Sky Regional Council 828-251-6622.

For more information

- Appropriate Local Government Officials www.seris.info/RiverLink/techinfo.shtml
- Land of Sky Regional Council 251-6622.
- Center for Watershed Protection. www.cwp.org.
- North Carolina Division of Water Quality Stormwater Unit: Manuals and Factsheets
- www.h2o.enr.state.nc.us/su
- North Carolina Division of Water Quality Stormwater Permitting Unit: Stormwater Permitting Unit Home h2o.enr.state.nc.us/su/stormwater.html
- North Carolina Phase II Stormwater www.ncphase2sw.org/
- North Carolina State University www.bae.ncsu.edu/stormwater/
- RiverLink www.seris.info/RiverLink/techinfo.shtml or www.riverlink.org
- NC Division of Land Resources - Asheville Regional Office - 828-296-4500