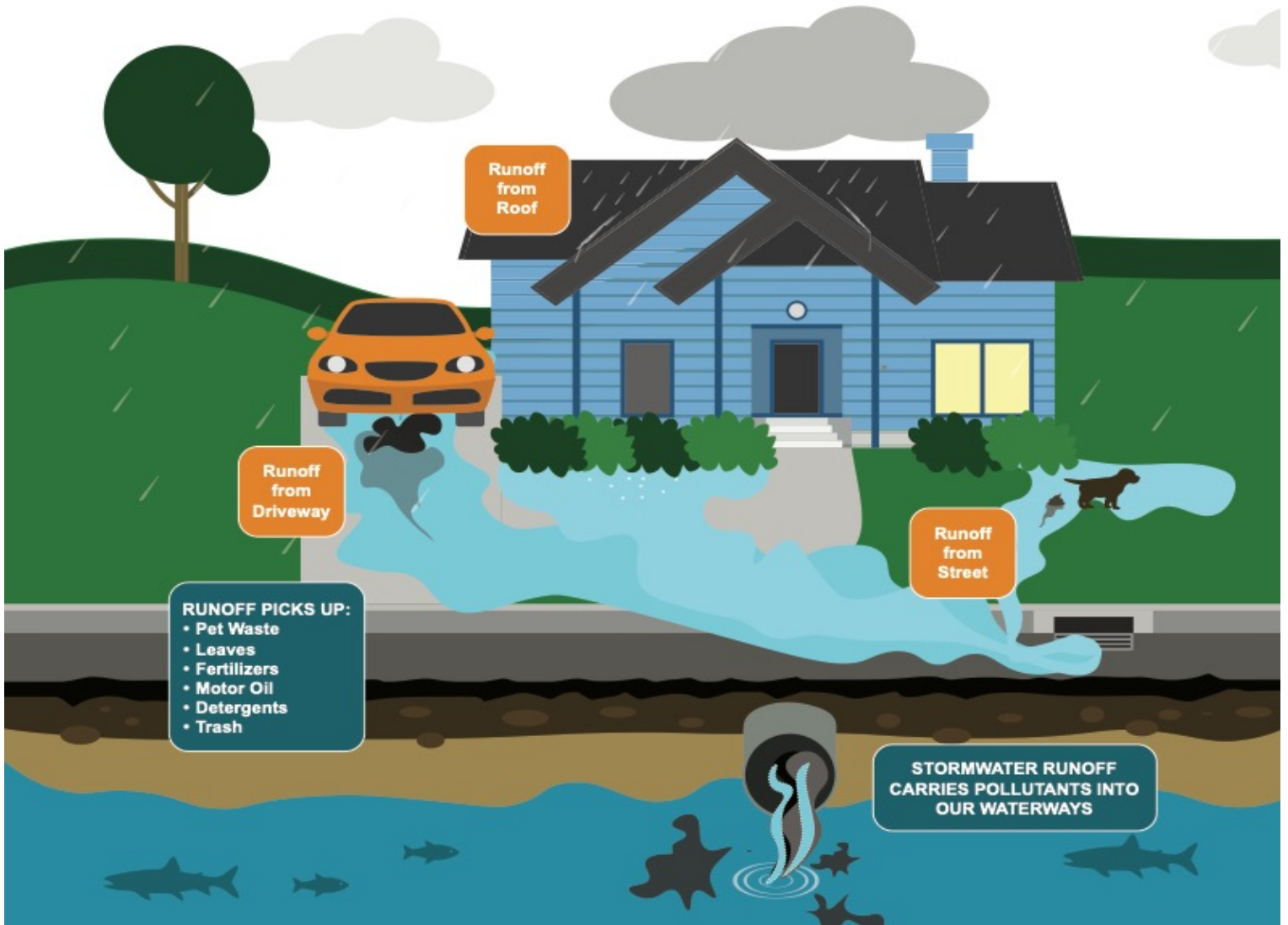




# Stormwater Runoff / Drainage Information

## What is stormwater runoff?

Stormwater runoff is generated when rain and snowmelt flows over land and especially impervious (hard) surfaces, such as paved streets, parking lots and building rooftops. Runoff that does not soak into the ground can harm the environment by picking up trash, chemicals, oils, or sediment and carrying it into our rivers, streams, lakes and coastal waters.



## Why is NCDOT concerned with stormwater runoff?

**IT'S OUR JOB!** In 2002, NCDOT formally adopted an Environmental Stewardship Policy requiring all employees to conduct their daily activities, whether they are designing or constructing roads, or maintaining them, in an environmentally responsible manner. NCDOT maintains approximately 80,000 miles of roads statewide. These impervious surfaces generate runoff after rainstorms. Also, road construction involves temporarily clearing land, which exposes soil to potential erosion and can lead to sedimentation in waterbodies. With such a large transportation system to manage, NCDOT is constantly concerned about stormwater runoff and minimizing any harmful impacts to our state's natural and human environments.

## Is NCDOT's stormwater runoff regulated?

**YES.** In addition to NCDOT's Environmental Stewardship Policy, runoff from transportation facilities is regulated under the federal Clean Water Act as well as various state of North Carolina regulations. These legally enforceable regulations allow NCDOT to discharge stormwater runoff from its roadways, maintenance yards, ferry terminals and other transportation facilities as long as the runoff is properly managed before it is discharged. This means NCDOT's runoff is not allowed to cause harm to the natural environment and requires the department to implement a wide range of stormwater management programs to ensure the environment is protected.

## What is NCDOT doing to manage stormwater runoff and protect citizens, property, and the environment?

### Field Reconnaissance and Surveys

You will likely see engineers walking the project site to identify existing drainage patterns and locate proposed drainage structures. Engineers also examine the condition of existing features such as ditches and streams to determine if they are stable and can accommodate any additional roadway runoff. On-site investigations also help determine if any modifications to existing drainage features are necessary.



## Hydraulic Design Studies and Impact Minimization

After gathering information and field data, NCDOT engineers will perform studies to evaluate stormwater impacts from the project, and will appropriately base their designs on these findings. When evaluating new location corridors or widening improvements, alternatives that avoid environmentally sensitive areas are preferred. Sensitive areas include habitat for protected, threatened and endangered species, and sensitive streams or wetlands. If avoidance of a sensitive area is not feasible, an alternative is selected that best minimizes impacts.

## Responsible Roadway Drainage Design

In considering roadway drainage, NCDOT strives to maintain existing flow patterns while safely moving water away from the road to a receiving swale, ditch, channel or stream that is adequately sized to accept and carry the water flow. If a natural means of conveyance is not substantial enough to carry the anticipated runoff, then curb, gutter, inlets and/or pipes can be utilized to move water safely and effectively away from a road.

## Erosion and Sedimentation Control (ESC) Measures

During construction of the project, erosion control measures are used to contain sediment, temporarily divert water flow, and minimize impacts to water quality. Sediment control fencing, sediment capture ponds, and temporary slope drains are examples of practices commonly used on projects.



*Perimeter Silt Fence*

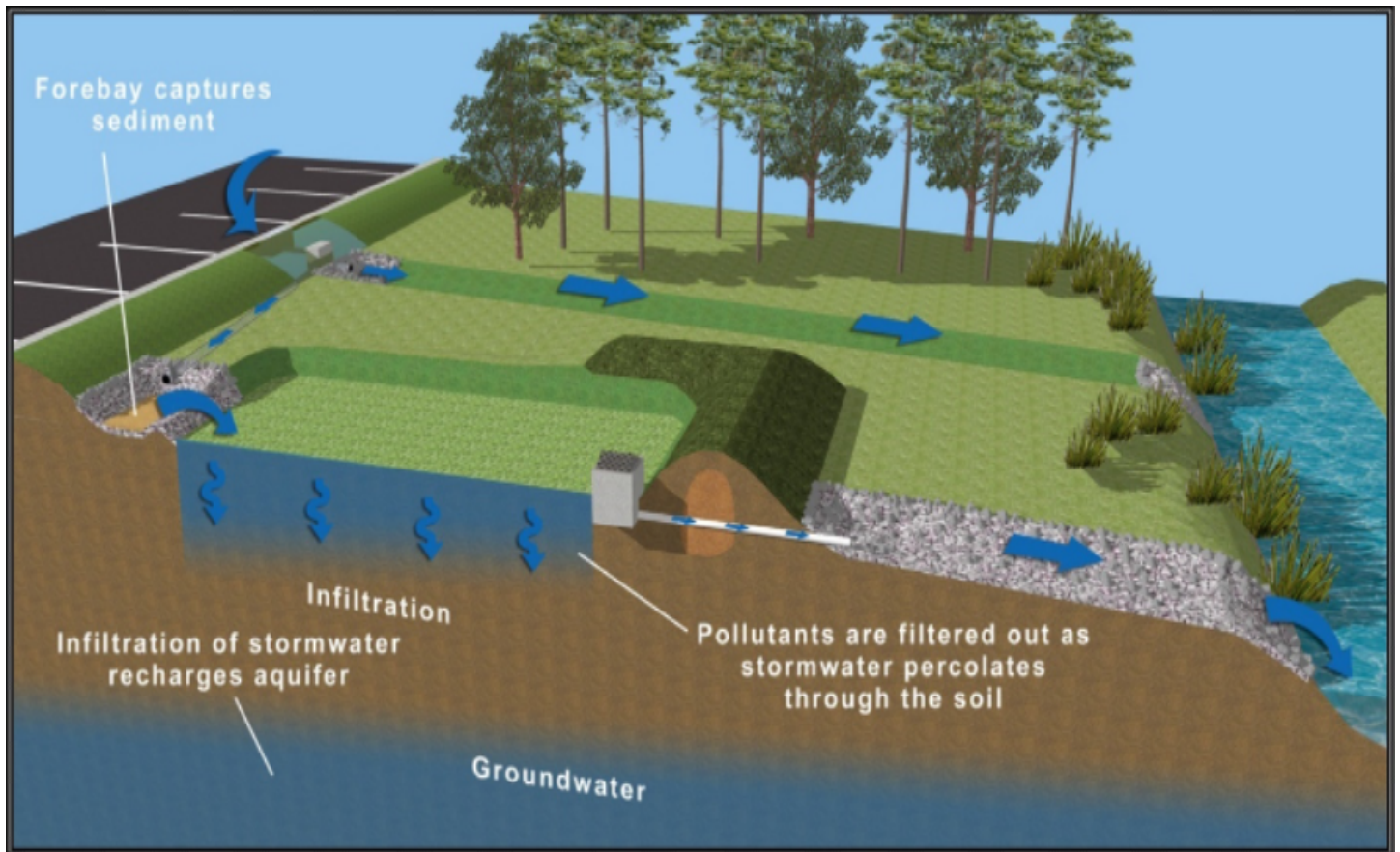
## Managing Stormwater Runoff Quality

If the engineering evaluation indicates that the stormwater runoff needs to be cleansed of any pollutants prior to discharge from the right-of-way, NCDOT has numerous tools at its disposal. Research has proven that grass shoulders and vegetated ditches along a roadway are effective tools for treating pollutants in runoff. In addition to being simple to construct, grass shoulders and ditches are also easy to maintain with routine mowing, making them a practical choice for treating stormwater runoff on many projects.



*Grass Shoulder and Ditch*

When site constraints or the engineering evaluation indicate that grass shoulders and ditches are not the best choice, then NCDOT has other tools it can use such as bioretention basins or infiltration basins. All of these measures help improve water quality by way of sedimentation and filtration of stormwater through natural, vegetative or man-made means.



Typical infiltration basin and pollutant removal process

When making decisions on the best approach for treating stormwater runoff, engineers consider many factors such as what is needed to protect aquatic life, how much right-of-way is needed for construction, and long-term operation and maintenance costs.

## Managing Stormwater Runoff Quantity

In addition to treating runoff for pollutants, engineers also carefully evaluate the amount of runoff draining from the project to ensure it does not negatively affect adjacent downstream properties. Due to size, physical constraints, complexity, or topography of a project, it is not always possible to keep runoff at or below pre-construction conditions. In these cases, NCDOT may need to institute additional drainage measures to mitigate or redirect peak flows to protect against erosion, ensure stream stability, and protect downstream property owners from increased flooding concerns. Some examples of these measures include rock aprons, pre-formed scour holes at pipe outlets, rock armoring for stream banks, stream relocation, and dry detention basins. Additional right of way acquisition may be required to construct and maintain these features.



Rock Stabilization

## Research

NCDOT is actively conducting and funding research to investigate and evaluate suitable methods for treating pollutants associated with NCDOT activities. The Stormwater Research Program develops new and innovative ways to manage stormwater runoff and better protect the human and natural environment. NCDOT stormwater research findings are published and shared with professionals around the state and nation so that everyone can benefit from new discoveries.

## What can I do as a citizen?

There are many actions you can take to help protect our water resources such as:

**DO** wash your car on gravel, grass, or other permeable surfaces to keep soap and dirt from polluting waterways. You can also use a carwash.

**DO** properly dispose of chemicals, paint and petroleum products.

For disposal locations, visit: <https://deq.nc.gov/about/divisions/waste-management/hhw>

**DO** report illegal dumping on the NCDOT's Illicit Discharge Program's website at: <https://www.ncdot.gov/initiatives-policies/environmental/stormwater/Documents/illicit-discharge-detection-elimination-report.pdf>

**DO** notify a member of the NCDOT project team if you are aware of degraded streams or existing erosion problems.

**DO** become involved. North Carolina has more than 200 environmental education centers statewide. These centers are a great way to learn more about the natural environment in your area and how you can become involved protecting our natural resources. To find an environmental education center near you, please visit:

<https://www.eenorthcarolina.org/visit/environmental-education-centers>.



**DON'T** overfertilize. This can damage shellfish, and natural swimming areas.

**DON'T** place animal pens near streams and water resources. Pet and animal waste are primary culprits of coliform bacteria.

**DON'T** allow trash to wash into storm drains; this includes blowing or raking leaves into streets and down drains.



## Where do I find more information?

General information about stormwater runoff and educational resources for children and adults can be found here: <https://nc-cleanwater.com>

Information on National Pollutant Discharge Elimination System can be found here: <https://www.epa.gov/npdes/npdes-stormwater-program>

Information on stormwater topics can be found on the EPA's website: <https://www.epa.gov/environmental-topics/water-topics>

Information on the Stormwater Association of North Carolina can be found at: <https://swanc.org/>

NCDOT's Best Management Practices toolbox: [https://connect.ncdot.gov/resources/hydro/HSPDocuments/2014\\_BMP\\_Toolbox.pdf](https://connect.ncdot.gov/resources/hydro/HSPDocuments/2014_BMP_Toolbox.pdf)

NCDOT'S Guidelines for Drainage Studies and Hydraulic Design are at: [https://connect.ncdot.gov/resources/hydro/Hydraulics%20Memos%20Guidelines/ Guidelines\\_for\\_Drainage\\_Studies\\_and\\_Hydraulic\\_Design\\_2016.pdf](https://connect.ncdot.gov/resources/hydro/Hydraulics%20Memos%20Guidelines/ Guidelines_for_Drainage_Studies_and_Hydraulic_Design_2016.pdf)

Information about stormwater-related research can be found on the NCDOT's Research and Analysis Program website: <https://connect.ncdot.gov/projects/research/Pages/default.aspx>

Many of the websites and resources mentioned above can also be found on the NCDOT's Hydraulics Connect site: <https://connect.ncdot.gov/resources/hydro/Pages/default.aspx> or by scanning the QR code shown to the right:



## N.C. Department of Transportation Contacts

To report problems such as drainage issues, potholes and culvert blockages, visit the NCDOT Contact Us page at: <https://www.ncdot.gov/contact/Pages/default.aspx>.

You can also post a comment directly to NCDOT's Hydraulics Unit by visiting: <https://apps.ncdot.gov/ContactUs/Home/PostComment?Unit=Hydraulics>.