SERIES #6:
SITE DESIGN & CONSTRUCTION

SERIES #6:
Site Design and Construction

Hands In for Healthy Streams is a cooperative effort between the City of Buford and the local business community.

HANDS IN FOR HEALTHY STREAMS

NOTE: This handbook is one in a series of handbooks that describe specific practices businesses can use to protect water quality. A complete list of all handbooks and fact sheets available through the *Hands In for Healthy Streams* program is provided on the back cover. To obtain other handbooks in this series, contact Buford City Hall at the address provided below.

City of Buford
2300 Buford Highway
Buford, GA 30518
www.cityofbuford.com

We hope you'll join with the City of Buford and other area businesses by participating in the *Hands In for Healthy Streams* program. Through this Program, you can help protect our local streams. To participate, review the enclosed Fact Sheets No. 6.1 through 6.3, and then fill out the self-assessment at the back of the Handbook. We appreciate your continued cooperation and stewardship in protection of our water quality.

This Program is modeled on the Community Partners for Clean Streams program created through a US EPA Clean Water Act Grant by the Office of Washtenaw County Drain Commissioner Janis A. Bobrin, Washtenaw County, Michigan. Portions of this Handbook are borrowed from the Community Partners for Clean Streams series, with designs and illustrations developed by David Zinn.

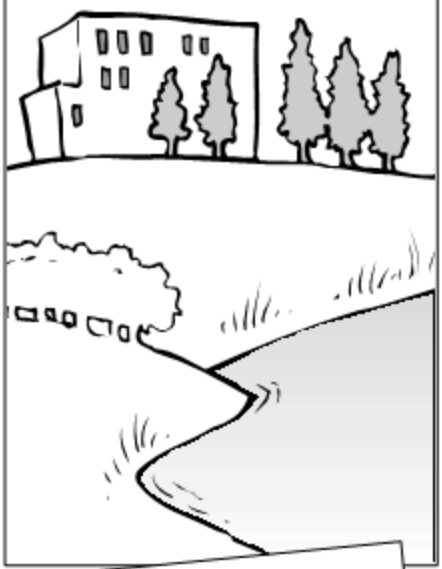
SERIES #6:
SITE DESIGN & CONSTRUCTION

Fact Sheet No. 6.1
Maintaining Healthy Lawns, Shrubs and Trees

Why be concerned?

One of the most important ways to protect our streams and rivers is to preserve existing features that naturally manage stormwater such as wetlands, floodplains, vegetated areas, and permeable soils. Each of these helps to slow and store stormwater, as well as filter out pollutants. Preserving natural features also makes economic sense by reducing the need for building and maintaining structural stormwater controls.

Choosing low-maintenance plantings reduces the need for irrigation and landscape chemicals.



Local environmental protection regulations vary. Contact the community where the property is located to find out if any existing features are considered environmentally sensitive.

Protecting Natural Features and Drainage Patterns

Before preliminary site design, identify the following:

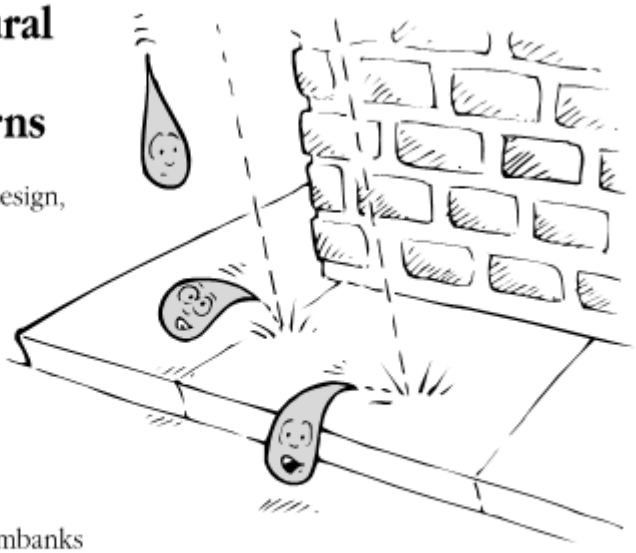
- wetlands
- woodlands
- floodplains
- permeable soils
- natural drainageways and depressions
- vegetation along streambanks

Once these have been delineated, provide for their protection and incorporation into drainage systems.

For help identifying the natural features on a site, contact the government offices where the property is located or one of the agencies under "Getting Help."

Buffering Waterways

Maintain a variety of plantings (preferably, native) along pond and stream banks to help reduce the volume, velocity and pollutant loading of stormwater before it flows into the receiving waterway. Vegetated buffer areas should be as wide as possible since, the wider the buffer, the greater the opportunity for plants to slow and filter stormwater.



The Impact of Impervious Surfaces

Impervious surfaces (such as buildings, pavement, and compacted soils) prevent stormwater from filtering into the ground, increasing the volume and velocity of runoff. Since infiltration removes pollutants from stormwater, impervious surfaces also impair water quality.

- Minimize the use of concrete, asphalt and other impermeable surfaces. Consider alternatives such as modular pavers, grass block pavers or gravel.
- Design roads and pathways to reduce runoff velocities and increase stormwater infiltration. (For example, by reducing width and straightaway design.)
- Keep parking spaces to a minimum. Consider parking space banking for future expansion.
- *Convey stormwater through grassed swales instead of enclosed pipes, whenever possible.*

(continued on other side)

(continued from other side)

"Disconnecting" Impervious Areas

Avoid directly discharging drainage pipes onto pavement and other impervious surfaces. Direct runoff from roofs, streets and parking lots to lawns, vegetated swales or other areas where stormwater can filter into the ground.

Designing Irrigation Systems

Design irrigation systems to prevent overwatering. Incorporating separate irrigation zones saves water and minimizes runoff by applying the appropriate amount of water in each zone.

Select systems that are easy to adjust and reschedule as weather patterns change. Place and adjust sprinkler heads to ensure comprehensive coverage, instead of watering longer to irrigate areas that are just out of reach.

Improving Pond and Stream Banks

Stream bank erosion, limited planting types and channel straightening degrade water quality. The first two problems may be improved by planting pond and stream banks with a variety of native plantings. For more information about planting pond and stream banks to improve water quality, contact one of the agencies listed under "Getting Help."

If you replant a pond or stream bank, replace unwanted plants gradually, so that their roots can hold the soil in place until the desired plants are established.

For more information about how to prevent soil erosion when replacing plants, contact the local UGA Extension office.

If stream improvement plans involve more than installing plants, a permit may be required.

SERIES #6: SITE DESIGN & CONSTRUCTION

GETTING HELP

UGA Cooperative Extension Service
for Gwinnett County
(678) 377-4010.

City of Buford, City Hall
(770) 945-6761.

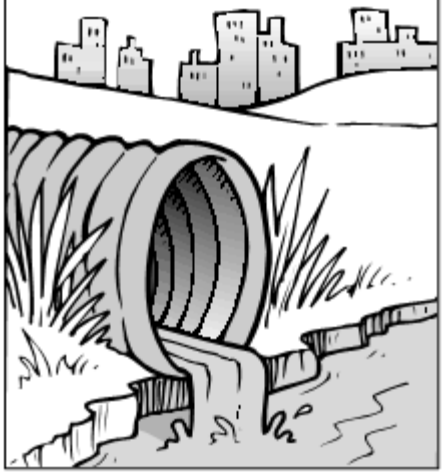
SERIES #6:
SITE DESIGN & CONSTRUCTION

Fact Sheet No. 6.2
Designing Stormwater Management Systems

Why be concerned?

In the past, stormwater was often transported off-site as quickly as possible. Today, this quick off-site transfer of stormwater is known to deliver pollutants to receiving waters much more efficiently, as well as to seriously erode pond and stream banks.

Current stormwater management practice is much more comprehensive. Objectives now include controlling bank erosion and water quality, as well as flooding. To achieve these objectives, the volume, velocity and pollutant load of runoff leaving a site after development must be similar to that which occurred under natural conditions. This can be accomplished by putting in place a coordinated network of both natural and engineered "best management practices" (BMPs) that work together to reduce, convey and treat stormwater runoff. In such a system, each BMP by itself may not provide major benefits but, when combined with others, becomes very effective.



Reducing Runoff and Pollutants at their Source

Source controls reduce the volume of runoff and eliminate opportunities for pollutants to enter the drainage system. By working to *prevent* problems, source controls are the best option for controlling stormwater and include:

- preserving wetlands, swamps, bogs, vegetation and other natural features that manage stormwater
- promoting stormwater infiltration by minimizing roads, parking lots and other impervious surfaces
- directing stormwater to open lawns and swales rather than to pavement or underground conveyances
- controlling soil erosion

Designing Ponds to Capture and Treat the "First Flush"

Most pollutants that accumulate on urban surfaces are washed off by the first half inch of runoff, which then carries a shock loading of these pollutants into receiving rivers and streams. The term "first flush" is used to describe the more heavily polluted runoff that this washing action initially generates. By capturing and treating the first half inch of runoff, up to 90% of pollutants can be removed from stormwater before it enters the drainage system.

Designing Systems to Protect Water Quality

After all practical source controls have been implemented, controls will still be needed to manage runoff. These will be dictated, to some degree, by the soils, topography, and other conditions on-site, as well as the receiving waterway and local government standards. While each are some universal guidelines for controlling stormwater quantity and information on designing stormwater management systems to reference the Gwinnett County Stormwater Design Manual.

Designing Ponds to Control "Bankfull" Flooding

Studies show that pavement and other impervious surfaces increase the frequency of smaller, flashy, "bankfull" floods that fill stream channels but don't overflow them. These smaller floods – associated with storms that occur every 1.5 years or more often – seriously erode stream channels and destroy aquatic habitat. Designing ponds to capture and detain the 1.5-year storm will help avoid the negative impacts associated with "bankfull" flooding.

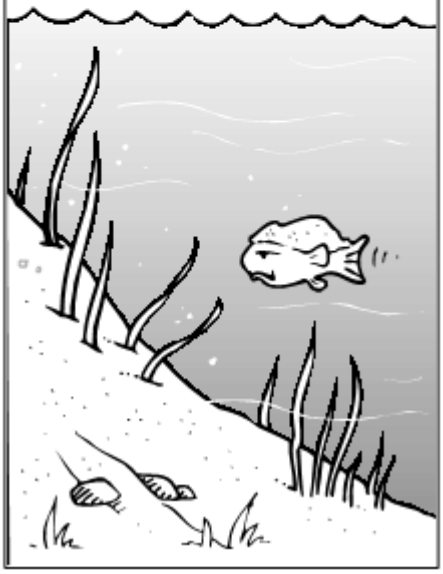
SERIES #6:
SITE DESIGN & CONSTRUCTION

Fact Sheet No. 6.3
Clearing and Grading Land

Why be concerned?

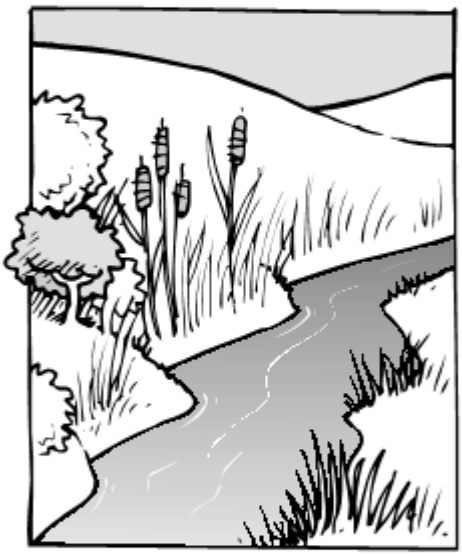
As eroded soil settles in streams, sediment can smother fish eggs and bottom-dwelling organisms and destroy aquatic habitat. Suspended sediment can interfere with the respiration and digestion of aquatic animals. Other pollutants such as metals and nutrients are often attached to soil particles. Finally, uncontrolled sediment can clog stormwater management systems, leading to higher maintenance costs and flooding.

Construction activities can also cause soils to become seriously compacted. Compacted soils prevent stormwater from filtering into the ground, increasing the volume and velocity of runoff. Since infiltration removes pollutants from stormwater, compacted soils also reduce water quality.



Preventing Soil Compaction

Removing, storing and replacing the original topsoil on-site can destroy the natural soil structure, increasing compaction and lowering the soil's infiltration capacity. Mixing mulch into the sub-soil before replacing the topsoil can dramatically improve the soil's ability to store and filter stormwater. Be sure to mix mulches into the soil thoroughly. To help *prevent* soil compaction, concentrate construction traffic patterns as much as possible and indicate the designated traffic areas.



Preserving Vegetation: the First Step

Vegetation prevents erosion. It also helps to slow and filter pollutants from stormwater. Therefore, it's important to preserve existing vegetation, wherever possible. Maintaining a vegetated buffer zone along pond and stream banks is especially important. Vegetated buffers should be as wide as possible since more plants will slow and filter stormwater before it enters the receiving waterway.

SOILS EXPOSED!

In areas that must be cleared, limit the amount of disturbed area and the length of time that soils are exposed. This can be accomplished by:

- designing projects to retain as much open space as possible.
- phasing construction and, in general, clearing no sooner than necessary for construction activities.
- prohibiting clearing and grading along streambanks.

Once soils have been exposed, take steps to stabilize them *as soon as possible* with vegetation (such as sod laid perpendicular to the slope) or another type of cover (such as seed, straw, mulch or netting). See your local regulatory agency about stability time requirements.

Directing Stormwater

Erosion can be further reduced by slowing stormwater and diverting it from exposed soils. Runoff can be diverted using vegetated berms or ditches. Runoff can be slowed by roughening surfaces, planting grass, terracing or contouring the site, installing filter fabric fencing, and installing stone check dams.

Controlling Sediment

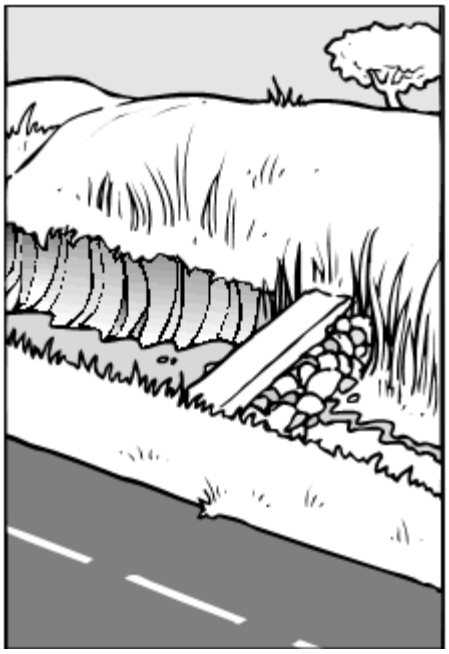
Settling ponds, filter fences and other sediment control devices are used to keep eroded soil on site. Sediment controls filter soil from stormwater and/or reduce its velocity, allowing particles to settle out. For more information about how to choose and install sediment controls, contact one of the agencies listed under "Getting Help."

(continued on other side)

(continued from other side)

Maintaining Erosion and Sediment Controls

Erosion and sediment controls must be inspected frequently to assure function. This is especially important before and after rainstorms. Specific monitoring and maintenance activities may be required to comply with NPDES or municipal permit conditions. Again, check with relevant county, state and local agencies to find out more about permit requirements.



Local and State Permits

• Local land clearing and grading laws vary. Before clearing *any* land, check with the local government agency to find out about local restrictions and permit requirements.

GETTING HELP

City of Buford, Planning & Zoning, City Hall
(770) 945-6761

This concludes Fact Sheets 6.1, 6.2, and 6.3 of the Housekeeping Practices series. To create your own Water Quality Action Plan, please complete the Water Quality Assessment provided on the following page.

SERIES #6 Assessment

The following Assessment and Action Plan asks you to evaluate your current activities and identify any specific actions needed to prevent pollution. For each question, check the appropriate box in the Assessment column. Next, in the corresponding box in the Action Plan column, fill in the proposed *date* by which the activity will be completed. Thank you for your good faith commitment to water quality.

Series #6, Housekeeping Practices: Site Design and Construction	ASSESSMENT			ACTION PLAN	
	Not Applicable	Needs Improvement	Always	Plan to Improve	Plan to Continue
1. Natural features are identified and protected during both site design and construction.					
2. Opportunities to reduce impervious surfaces are investigated and pursued whenever possible.					
3. Drainage systems are designed to promote infiltration and to otherwise protect water quality.					
4. Vegetated buffer strips (as wide as possible) are maintained along all water bodies.					
5. Irrigation systems are designed to minimize runoff.					
6. Soil erosion and sedimentation are prevented during construction (e.g. clearing is phased, exposed soils are immediately covered, and controls are rigorously maintained).					