



SEDIMENTS

STATE OF NORTH CAROLINA, DEPARTMENT
OF ENVIRONMENT AND NATURAL RESOURCES
William G. Ross, Jr. Secretary

Land Quality Section
Division of Land Resources
James D. Simons, Director and State Geologist

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Agencies will focus on construction site compliance

Officials of the N.C. Land Quality Section and the N.C. Division of Water Quality of the N.C. Department of Environment and Natural Resources said this fall that they will be placing new emphasis on groundcover, better erosion and sedimentation control plans, and seeing that erosion and sedimentation control plans and NPDES stormwater requirements are implemented on construction sites. In addition, they said that U.S. EPA Region IV has been checking construction sites in Charlotte for compliance with NPDES Phase I Stormwater requirements and could possibly show up at other Phase I cities in North Carolina.

Areas of Emphasis for Land Quality Section

Mell Nevils, Chief of the Land Quality Section, told engineers, surveyors, landscape architects, and others who attended erosion and sedimentation control design seminars in September and October, "If we don't start doing a better job designing and implementing erosion and sedimentation control measures, we're going to have to deal with stricter turbidity standards."

The stricter turbidity standards Mr. Nevils referred to is the State's water quality standard for turbidity, which currently allows construction sites to be in compliance with the standard if recommended erosion and sedimentation control measures are in place. The

standard has recently been successfully challenged in civil and administrative courts.

Mr. Nevils said that to improve erosion and sedimentation control practices, Land Quality personnel will be checking plans more carefully for specifications for both temporary and permanent groundcover and for appropriate sediment basin design.

"If there is one message I want you to take home, it is that we are serious about groundcover," said Mr. Nevils. "It is the best way to control erosion and thereby sedimentation."

The Sedimentation Pollution Control Act and rules require groundcover sufficient to restrain erosion within 15 working days or 30 calendar days of completion of any phase of grading (temporary groundcover). Also required is groundcover sufficient to restrain erosion within 15 working days or 90 calendar day of completion of construction or development (permanent groundcover). In addition, Division policy requires that erosion and sedimentation control plans include a long-term maintenance plan for groundcover.

"Groundcover doesn't have to be

vegetation, and if it's temporary groundcover, you may not want to seed," Mr. Nevils reminded seminar participants. "Research shows that straw mulch adequately tacked can reduce erosion from 95% to 99%."

"Groundcover can also be pavement," he said, "and one way developers could avoid a lot of problems is to pave their parking lots before they start construction of buildings. Don't just put in the curb and gutter and let the parking lot sit there bare."

Mr. Nevils said that to make sure permanent groundcover is adequately established, Land Quality personnel will not release projects until after one growing season. To accomplish better permanent groundcover, he recommended stockpiling topsoil, seeding the stockpile and saving it, then using it after completion of construction to provide a better growing environment for vegetation.

Mr. Nevils said that Land Quality personnel will also be checking erosion and sedimentation control plans more closely for compliance with recommended sediment basin design standards.

"Surface area is what determines

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November action of the North Carolina Sedimentation Control Commission

At its regular meeting on November 11, 2002, the N.C. Sedimentation Control Commission took the following action:

- Approved continuing delegation of authority to implement the Sedimentation Pollution Control Act to the N.C. Department of Transportation on its projects. Land Quality Section Chief Mell Nevils told the Commission that his review of the DOT Erosion and Sedimentation Control Delegation showed that DOT continues its commitment to maintaining and improving its delegation. Mr. Nevils did make several recommendations for continuing emphasis by DOT, including working with the Army Corps of Engineers, the North Carolina Wildlife Commission and the U.S. Fish and Wildlife Service to improve the design and construction of stream relocation restoration and mitigation projects.
- Set the Commission's meeting schedule for 2003. Meeting dates are February 5, May 14, August 6, and November 5, 2003.
- Approved using \$70,000 in Education Funds and Local Programs Assistance Funds to help meet a mandated 2002-2003 \$162,000 additional budget cut for the Land Quality Section.
- Agreed to put together a committee to work with stakeholders on proposed amendments to the Sedimentation Pollution Control Act for the next session of the General Assembly.

Focus on compliance *continued*

trapping efficiency of sediment basins and traps, not depth," said Mr. Nevils. "A depth of two feet is adequate for most particulates to settle out. The rest of the depth is for sediment storage. You cannot improve the efficiency of a basin by making it deeper.

"Refer to the Erosion and Sediment Control Design Manual for the equation to calculate surface area ($A=0.01q$). Surface area calculation should be based on the total area draining to the basin. You cannot reduce the size of a basin just because you expect the site to be open for less than a year. If you reduce the size, you're reducing the efficiency."

According to Mr. Nevils, Land Quality staff will be checking more closely to see that basins are located where they can be accessed for cleanout during all phases of grading. "Don't think you can design to last the life of the project without maintenance," he said.

NPDES Stormwater Phase II requirements for construction sites

Bradley Bennett, head of the Stormwater and General Permits Unit of the N.C. Division of Water Quality, told seminar participants that federal NPDES Stormwater Phase II requirements for all construction sites larger than 1 acre become effective March 10, 2003.

As of March 10, 2003, all projects that must have an erosion and sedimentation control plan must also be covered by the General Permit to Discharge Stormwater under the National Pollutant Discharge Elimination System. Application for an erosion and sediment control plan, will be considered as Notice of Intent to be covered by the General Permit. When the applicant receives the approved erosion and sedimentation control plan, the NPDES General Permit for construction sites will be attached. The General Permit lays out what projects must do to be in compliance with the federal stormwater program.

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The North Carolina
Sedimentation Control Commission

The Sedimentation Control Commission (SCC) was created to administer the Sedimentation Control Program pursuant to the N.C. Sedimentation Pollution Control Act of 1973 (SPCA). It is charged with adopting rules, setting standards, and providing guidance for implementation of the Act. The composition of the Commission is set by statute to encompass a broad range of perspectives and expertise in areas related to construction, industry, government, and natural resource conservation and quality. All members are appointed by the Governor and serve three-year terms, except for the Director of the Water Resources Research Institute of The University of North Carolina, who serves as long as he remains Director. The chairman of the SCC is named by the Governor.

Chairman:
Kenneth H. Reckhow
Durham

Director of Water Resources Research Institute

Commissioners:

John R. Bratton
Knightdale
Rep. N.C. Mining Com.

Donnie W. Brewer
Greenville
Rep. Professional Engineers of N.C.

James Ferguson
Clyde
Rep. N.C. Soil and Water Conservation Com.

Phillip Ray Gibson
Cullowhee
Non-governmental conservation representative

J. Wendell Gilliam
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Rep. NCSU Dept. of Soil Science

Gregory D. Jennings
Raleigh
Rep. N.C. Environmental Management Com.

Ray B. Killough
Matthews
Rep. N.C. public utilities

Joseph A. Phillips
Raleigh
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Kyle Sonnenberg
Southern Pines
Rep. Association of County Commissioners/
N.C. League of Municipalities

Ralph Stout
Greensboro
Rep. Carolinas Associated General Contractors

F. Roger Watson
Asheville
Rep. N.C. Home Builders Association

Focus on compliance

continued

Requirements are as follows:

1. Implement the approved erosion and sedimentation control plan and keep a copy of the plan on site. Deviation from the approved erosion and sedimentation control plan will be considered a violation of the federal NPDES General Permit.
2. Prevent spilling of fuels, lubricants, coolants, hydraulic fluids, and any other petroleum products onto the ground or into surface waters. Dispose of spent fluids appropriately.
3. Use herbicides, pesticides, and fertilizer in a manner consistent with the Federal Insecticide, Fungicide and Rodenticide Act and in accordance with label restrictions.
4. Control management and disposal of litter and sanitary waste from the site so that no adverse impacts to water quality occur.
5. Inspect all erosion and sedimentation control facilities every seven calendar days (twice in seven calendar days for stormwater discharges to streams on the latest EPA-approved 303(d) list**) and within 24 hours of any storm event of more than 0.5 inches of rain in a 24-hour period. Maintain a rain gauge on site and keep a record of the rainfall amounts and dates.
6. Observe stormwater runoff discharges and look for clarity, floating solids, suspended solids, oil sheen and other obvious indicators of pollution and evaluate the effectiveness of the erosion and sedimentation control measures. If sedimentation is leaving the disturbed area, take immediate action to control the discharge.
7. Keep a record of inspections. Record any visible sedimentation found outside the disturbed limit and record measures taken to clean up the

sediment. Make these records available to the Division of Water Quality or its authorized agent upon request.

8. Maintain erosion and sediment control measures to keep them operating at optimum efficiency.

(This is not a complete summary of the General Permit conditions and should not be relied upon for compliance purposes. A copy of the General Permit can be downloaded from the DWQ Stormwater and General Permits website at http://h2o.enr.state.nc.us/su/PDF_Files/SW_General_Permits/NCG010000.pdf)

Mr. Bennett told seminar participants that Water Quality is reshuffling resources to focus more on enforcement of stormwater rules, including on construction sites. He said that Water Quality and Land Quality have an agreement, under which Land Quality will notify Water Quality of NPDES stormwater violations noted during inspections. Violations of NPDES stormwater rules constitute a violation of the federal Clean Water Act and are subject to civil penalties of up to \$27,000 per day. Under state law, a daily civil penalty of \$10,000 per violation can be assessed for violation of terms of the permit.

Personnel changes

Sonya Avant, formerly with the N.C. Division of Water Resources, has joined the N.C. Division of Land Resources, Land Quality Section, as Assistant State Sediment Specialist.

Caroline Medlin, Sediment Education Specialist, has resigned her position to stay home with her two children. She will assist with education activities on a part-time basis from home through January.

James D. Simons, who had been serving as Acting Director and State Geologist, has been appointed to that position.

Georgia concludes there's no reason to tolerate mud

Since 1993, the State of Georgia has been examining the impacts of sedimentation on its waterways and conducting studies to determine if it is technically feasible to protect its waterways from sediment pollution in a cost effective manner. Last year the Georgia Environmental Protection Division published a number of reports resulting from studies funded by a \$400,000 grant to support the work of the Erosion and Sedimentation Control Technical Study Committee (known as "Dirt II"). The committee sponsored cutting-edge technical research and policy analysis by the National Academy of Public Administration and reached the conclusion that it is possible to prevent sediment pollution without imposing huge costs on development by changing the "mud happens" attitude of developers, regulators, and citizens alike.

According to the Dirt II Panel, "we now know how to build homes and schools, roads and utility corridors, shopping centers, offices, hospitals, and churches without significant erosion,

without loosing mud-choked water on downstream homeowners and without generating the enormous financial and environmental costs that spread with sedimentation." Based on the results of actual construction projects, the panel concluded that simply by using proven state-of-practice techniques, developers can conduct construction that "does virtually nothing to accelerate the natural process of erosion."

Big Creek School Project

One of the projects that led the Dirt II Panel to its conclusions was the Big Creek School project in Fulton County near Atlanta. Building the elementary school would require disturbing the soil on 22.5 acres of a 50-acre lot in an affluent suburban area abutted by residential properties. The neighbors were protective of property values and would be on guard against muddy runoff. The site was fairly steep and wooded, and clearing and grading would risk sending tons of mud downhill toward the neighbors and adjacent streams. The Fulton County School Board wanted to manage a serious business risk and at the same time keep design and construction costs as low as possible. The Fulton School Board decided to collaborate with the Dirt II Panel as the test site for demonstrating state-of-practice erosion prevention and sediment control measures in Georgia.

The team put together to design and execute the demonstration project included landscape architect Mike Breedlove of Breedlove Land Planning and Dr. Richard Warner of the University of Kentucky, creator of the SEDCAD4* erosion and sedimentation control modeling software. Breedlove and Warner designed a comprehensive erosion prevention and stormwater and sedimentation control system to achieve a performance goal both in the short and long term. The system used standard, economical erosion prevention and

sedimentation control practices with some innovative modifications. The contractor, Beers-Moody, became a critical part of the system by committing to daily site walk-throughs with attention to runoff paths changed during the course of the day's construction and quick attention to potential problems.

The Big Creek School erosion prevention and sediment control system was designed to ensure that the hydrology of the site would replicate pre-development conditions and take advantage of the functioning forested stream buffers. Rather than determining the volume of water that needed to be managed and designing structures to manage that volume, the designers evaluated overall flows and infiltration capacity of the site and used energy-reduction devices and materials to reduce runoff and promote infiltration.

From the very beginning of the project, erosion prevention was a goal. Salable timber was removed from the site and all remaining woody material (about 60% of the total removed wood) was fed through a tub grinder, generating two 30 to 35-foot-high piles of roughly ground mulch. Mulch was used generously throughout the site for immediate erosion prevention, dissipating rainfall energy and reducing velocity of overland flow. As a primary erosion prevention measure, the designers paid a great deal of attention to exposed slopes, successfully using the simple techniques of top-of-slope berms and temporary slope drains feeding to sediment basins.

Before grading began, an 800-foot rock construction entrance was completed and perimeter control measures were stabilized. One of the newer system components that went in early and proved extremely effective was a seep berm—a 1,275-foot-long channel with check dams and multiple side outlets encircling one quarter of the site. A seep berm extends the functionality of a simple, everyday diversion used to carry

Local Program Assistance Grants available

The North Carolina General Assembly is currently providing funds for cost sharing with local governments to start new erosion and sedimentation control programs or to help existing programs improve their effectiveness.

Interested local governments may obtain an application package by calling the Land Quality Section Central Office at (919) 733-4574.

The application package is also available in pdf format at website: <http://www.dlr.enr.state.nc.us/forms/lpgrant.pdf>.

The deadline for applications for the 2003 grant cycle is January 15, 2003.

runoff to a basin. Check dams along the diversion back up runoff, allowing sediment to settle. Runoff from smaller storms was completely contained and seeped through the berm to the down gradient forest buffer, which provided secondary treatment. The seep berm vastly reduced the quantity and timing of runoff going to the site's largest sediment basin. The seep berm was sized to be wide enough for a trackhoe and small dump truck for ease of cleanout.

The basin fed by the seep berm was a multiple-treatment system. It consisted of a partially cemented riprap plunge pool and an inlet channel, a 950-cubic-yard first-flush sediment basin, an internal earthen dike with a rock drain, a 7,800-cubic-yard primary sediment basin with a floating siphon (skimmer), a drop-inlet combination principal and emergency spillway, a rock riprap outlet channel and level spreader, and a sand filtration system. The bottom of the first sediment basin was two feet higher than the principal basin, affecting complete dewatering and leaving dry sediment that was easy to remove. The first basin was sized for easy cleanout.

All four sediment basins on the site were designed to completely contain the 1-1/2-year design storm (about 3 inches). Three of the four basins on site had external sand filters to provide secondary treatment. The sand filters were simple controls fabricated from rock and sand, and perforated pipes to distribute and collect water. They were designed to further remove fine sediment.

Extensive monitoring of volume, sediment concentration, and turbidity of stormwater was performed during construction. A series of monitors tracked the progression of stormwater flow through a series of system components. The performance of the system was exemplified by a high intensity storm that occurred while the site was near its peak level of disturbance. Total precipitation was 1.07 inches, with 0.70 inches occurring in 27 minutes near the end of the storm. Peak sediment concentration monitored at the plunge-pool energy

dissipater of the largest basin was measured at 160,000 mg/L. By the time the water emerged from the sand filter at the end of the treatment train, sediment concentration had been reduced to 168 mg/L. Modeling of the storm event for this basin showed that all flow exiting the site infiltrated into the riparian buffer zone. Therefore no sediment reached surface waters from this basin, which drained over half the site. Monitoring of larger storms showed comparable performance for all controls.

Cost data provided by the contractor showed that erosion prevention and sedimentation control on the site accounted for \$265,000 of the \$3,015,000 sitework package, which works out to about 8.5%. This is more than the average 3-5% spent on traditional erosion and sediment control in Georgia. However, a number of features—including stabilization with coir logs of a severely eroded stream onsite, construction of a permanent level-spreader, and special accommodations for monitoring equipment—would not be part of a typical project. When these costs are subtracted, the total for erosion and sediment control is reduced to \$175,000 or 5.8% of the total sitework cost.

The Georgia Dirt II Panel says its research shows that “the people of the Atlanta metropolitan area need no longer tolerate the kind of building practices that have allowed uncounted tons of mud to be scoured from the landscape and flushed into our streams.

“There is no reason to tolerate the status quo when we already know what practical steps to take to greatly reduce our costs and clean up our water.”

No Muddy Water Essay Contest

Due to budget cuts and lack of staff resources, the Muddy Water Essay Contest, for which essays are usually solicited this time of year, will not be conducted this year.

Resources

Building Metro Atlanta's Economy by Building Systems to Prevent Erosion. ND. Dirt 2: The Erosion and Sedimentation Control Technical Study Committee, P.O. Box 1600, Franklin, GA 30217.

Warner, Richard C. and Francis X. Collins. 2001. Erosion Prevention and Sediment Control Computer Modeling Project presented to the Chattahoochee-Flint Regional Development Center Dirt II Committee.

National Academy of Public Administration. January 2001. Policies to Prevent Erosion in Atlanta's Watersheds: Accelerating the Transition to Performance.

All available at <http://www.ganet.org/dnr/enviro/>. Click on Technical Guidance and scroll down to Erosion and Sediment Control.

** SEDCAD4 for Windows was developed specifically for the design and evaluation of alternative erosion prevention and sediment control systems with a focus on earth-disturbing activities. It is a comprehensive program that includes hydrology, hydraulics, and design and evaluation of the effectiveness of both individual and an integrated system of erosion prevention and sediment control measures with respect to sediment trapping efficiency and effluent sediment concentration. Based on research conducted at the University of Kentucky, SEDCAD4 can also predict the effectiveness of sediment basins, sediment traps, silt fences, porous rock silt checks (check dams), and grass filters. Evaluation of SEDCAD4 predictive abilities on the Big Creek project is included in the modeling paper referenced above. For information about SEDCAD contact Dr. Richard Warner at the University of Kentucky (859-257-3000 ext 217 or warnerhofc@aol.com).*

A toll-free hotline
has been
established
statewide for
concerned
citizens to
report possible
violations of the
North Carolina
Sedimentation
Pollution
Control Act.
To report problems
call
**1-866-
STOPMUD
(786-7683)**

ADVANCED EROSION AND SEDIMENT CONTROL FOR CONSTRUCTION SITES SEMINAR

February 18-19, 2003
Jane S. McKimmon Center
Raleigh NC

March 19-20, 2003
Holiday Inn Select
Hickory, NC

Purpose: This seminar is presented to familiarize design professionals who develop erosion and sedimentation control plans—including engineers, landscape architects, and surveyors—with erosion and sedimentation control principles and practices. Eleven (11) PDHs are available to professional engineers and land surveyors, and 10 continuing education units are available to landscape architects for completion of both days.

Fee: \$125.00. Covers materials, breaks, and lunches.

Deadline: Registrations will be taken on a first-come, first-served basis, but no registrations will be taken after February 11, 2003, for the Raleigh seminar, and March 7, 2003, for the Hickory seminar.

For additional information and a registration form go to website:

<http://www2.ncsu.edu/ncsu/CIL/WRRI/erosionseminars.html>

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