The Joys and Pitfalls of Implementing a Phase II NPDES Stormwater Program at a Public University

Sharon Myers, L.G.
Environmental Compliance Officer
UNC Environment, Health and Safety

Jamie Smedsmo
Interim Stormwater Utility Manager
UNC Energy Services

Janet Clarke, MEA, CPESC
Stormwater Specialist
UNC Environment, Health and Safety

Sally Hoyt, P.E.
Stormwater Review Supervisor
City of Raleigh, Engineering Services Dept.

When you think of UNC…

Chris Jones-USA TODAY Sports

Jeffrey A. Camarati

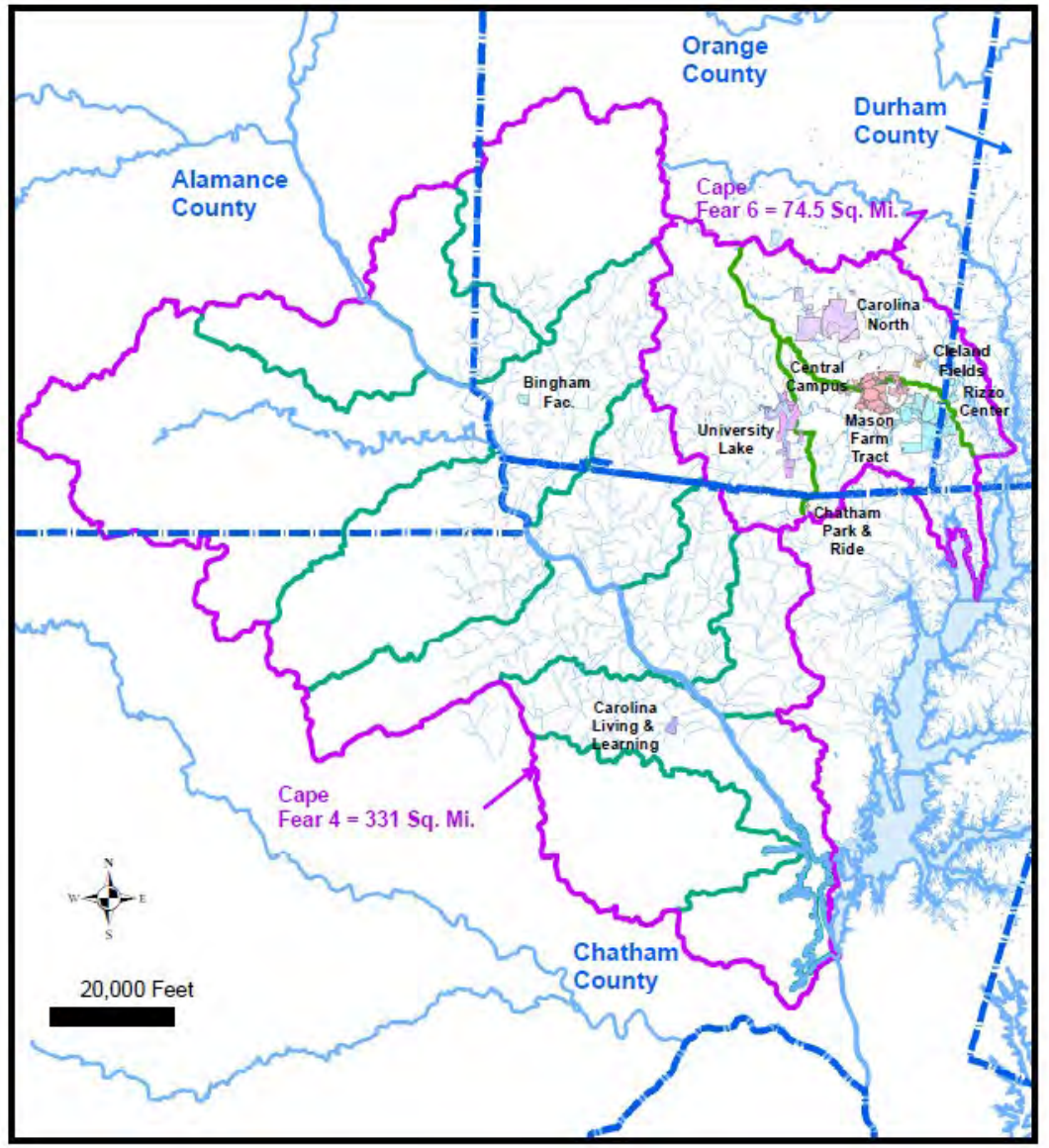
When you think of UNC…

Aziz Sancar – The Nobel Prize in Chemistry 2015

When you think of UNC…

A different way to think of UNC

- Population of ~40,000
- 6.5 mi^2 of property, ~2 mi^2 developed
- Central Campus is ultra-urban (>50% Impervious)
- MS4 Permittee since 2007
- TMDL for Nutrients



Stormwater by the Numbers

- **56** Miles of underground piping
- **4,818** Structures
  Inlets, Manholes, Trenches, Outfalls, etc.
- **283** Stormwater Control Measures
  Wetlands, Green Roofs, Bioretention Ponds, etc.
- **1,010** Miles of street sweeping annually
- **24.5** Million Sq. Ft. of impervious surface area

Battle Grove Regenerative Stormwater Conveyance

Regulatory background

Regulatory requirement for public university stormwater permits

Draft Federal Rule December 8, 1999 - Effective Date February 7, 2000

- How applies to UNC – own and operate small MS4 in urbanized area
- Apply for own permit or be a co-permittee with local municipality

EPA Stormwater Phase II Final Rule Fact Sheet 2.10

- “Responsibility for developing and managing a stormwater program that comprises the minimum measures lies with the operator of the Federal or State MS4.”
- https://www.epa.gov/sites/default/files/2015-11/documents/fact2-10.pdf

Federal and State Operated MS4s

- ✓ Military bases
- ✓ Office buildings/complexes
- ✓ Universities
- ✓ Prisons
- ✓ DOT
- ✓ Hospitals
- ✓ Parks

To Co-Permit or Not to Co-Permit?

Better suited to do our own training, recordkeeping, mapping, etc. Able to be more attentive and proactive. Collaboration with Town important!

Existing Programs 2003

EHS	Facilities Planning	Grounds	Facilities Services
• Env. compliance • Hotline • Website • Spill response team • SPCC plan • Two industrial sw permits • Training database • Inspection database • Hazardous waste management	• Design guidelines • Design to Town standards • Bond funded SCMs • Masterplan included SCMs • Facilities assessment team • Early GIS mapping	• Leaf collection • Tree protection • Integrated pest management • Mulching • Street/parking lot sweeping • Covered salt storage	• Plumbing shop • Solid waste management • Recycling • Sustainability office • Used oil recycling • Covered car wash • Work management system

Early history of UNC's permit

- Submitted sw permit application to NCDEQ March 2003
- Received first permit from NCDEQ in 2007
- Staffing - Only one stormwater person on staff
- Funding the program - Higher education bond in early 2000s
- Mapping stormwater infrastructure - Outside consultants
- Street Sweeper - Grounds maintenance

Which UNC Properties Subject to Permit?

Location	Ownership	Property ID
• Chapel Hill • Orange County • Other Counties • Affiliated university locations (IMS)	• University of NC • State of NC • Endowment • Leased (to Carrboro, Chapel Hill, Orange County)	• GIS • PIN • Tax records • UNC property office

Terminology

NPDES: National Pollutant Discharge Elimination System

MS4: Municipal Separate Storm Sewer System

NPDES = MS4 = Stormwater Permit

SWMP: Stormwater Management Plan

- The new UNC stormwater permit will be generated from the 2021 SWMP

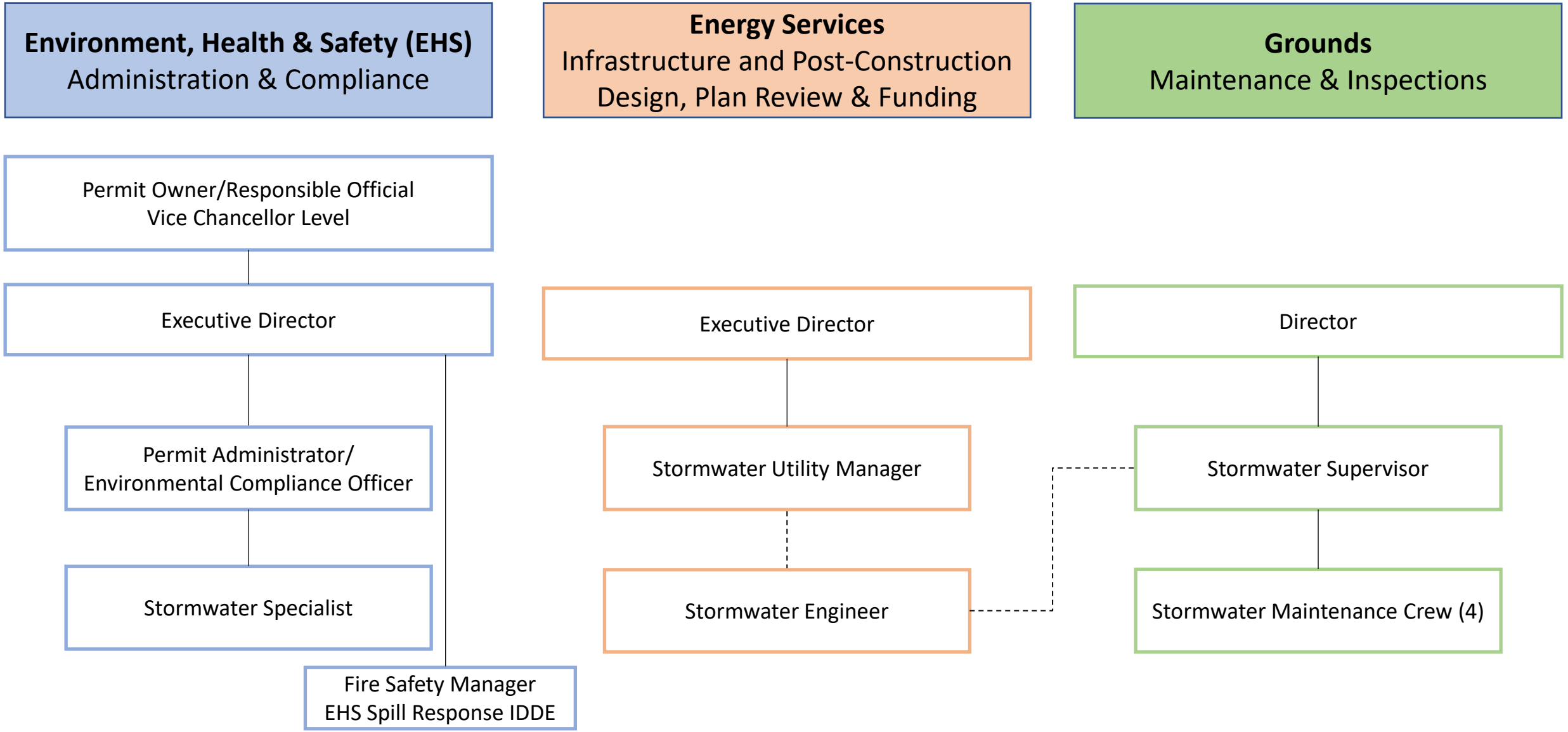
SWPPP: Stormwater Pollution Prevention Plan

- Does not apply to University MS4 permit
- Does apply to UNC's industrial permits (Hazardous Materials Facility, Cogen Power Plant)

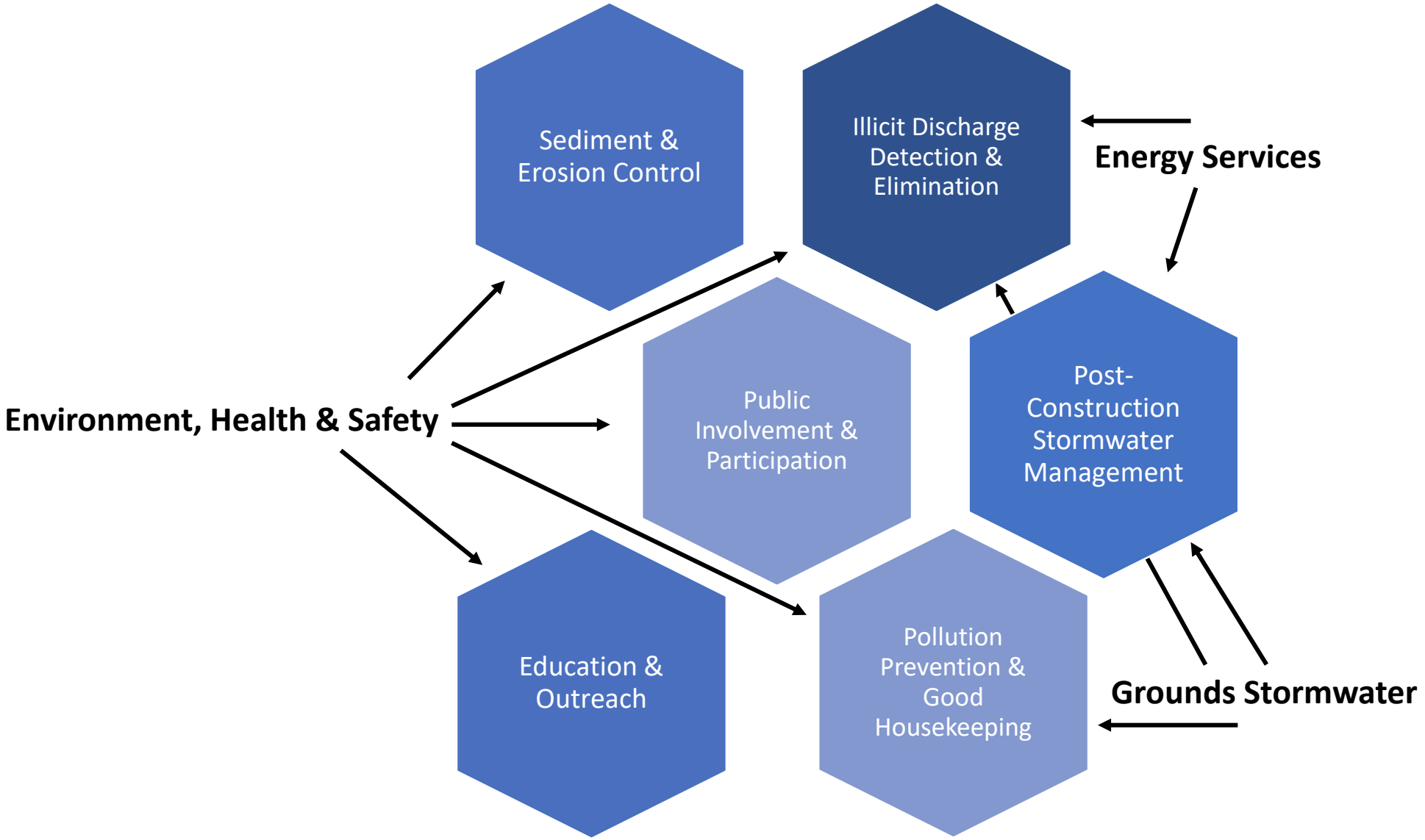
SPCC: Spill Prevention Control & Countermeasure Plan

- Fuel storage exceeding 1,320 gallons above ground or 42,000 gallons below ground

UNC-CH Stormwater Permit Organizational Chart



Six Minimum Measures



Education and Outreach

The joys!

- Most people who need training work for UNC
- Employees and students call the hotline to report pollution
- Good website and database support
- Lots of visitors to share message with
- Students care about water quality
- Great UNC sign shop

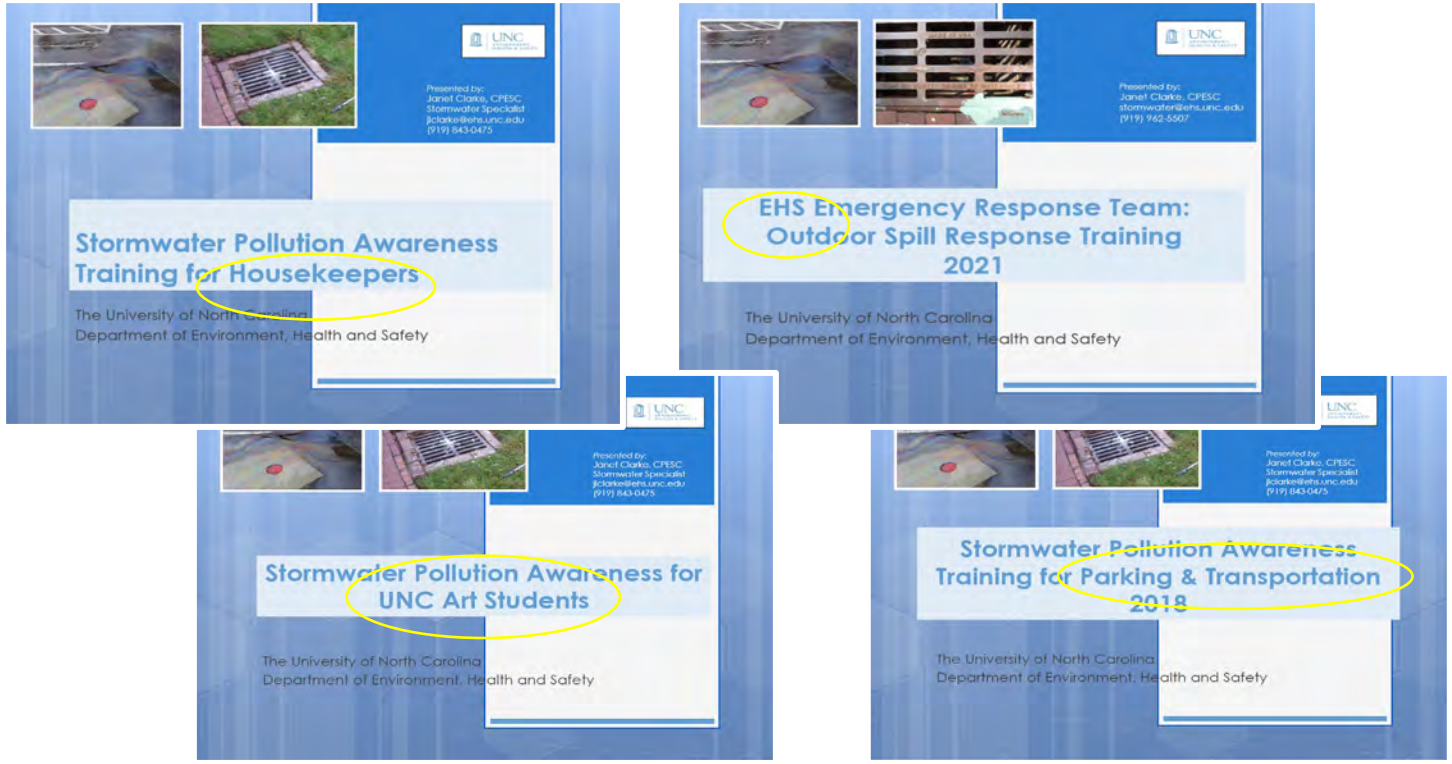
The pitfalls

- 1000s of people work at UNC and there is a fair amount of turnover
- Contractors don't work directly for UNC
- Visitors can create a lot of trash (football games)
- Students turnover frequently
- Storm drain marking challenging

Education and Outreach

Six Minimum Measures

Stormwater awareness training for staff, faculty, students

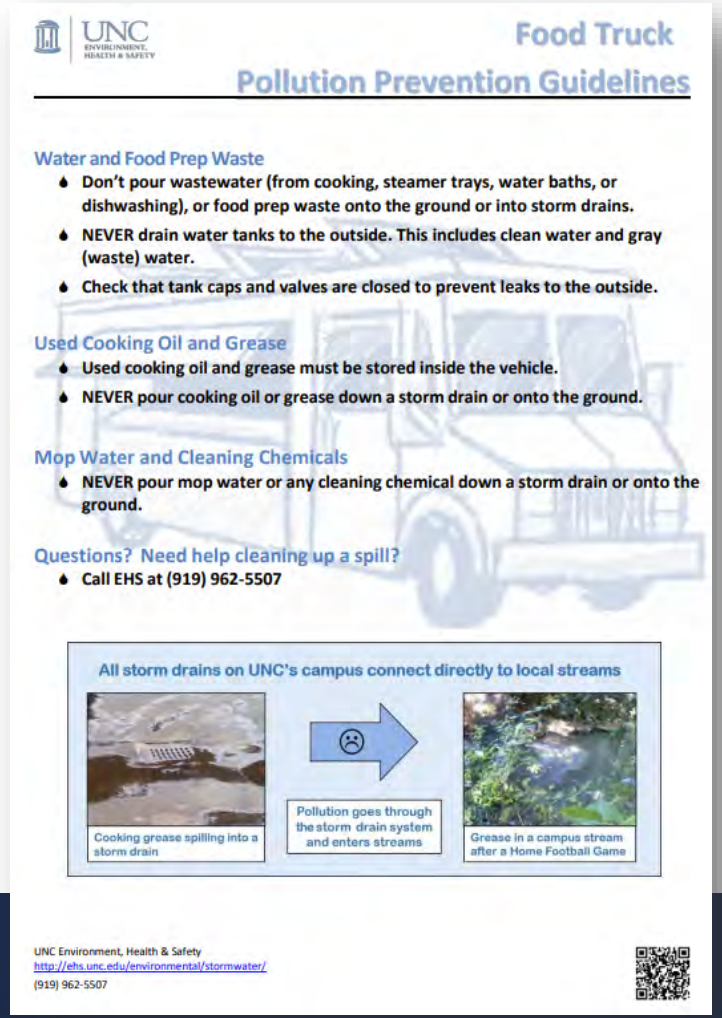


Education and Outreach

Six Minimum Measures

Pollution prevention awareness materials

https://ehs.unc.edu/stormwater/program/public-education-and-outreach/

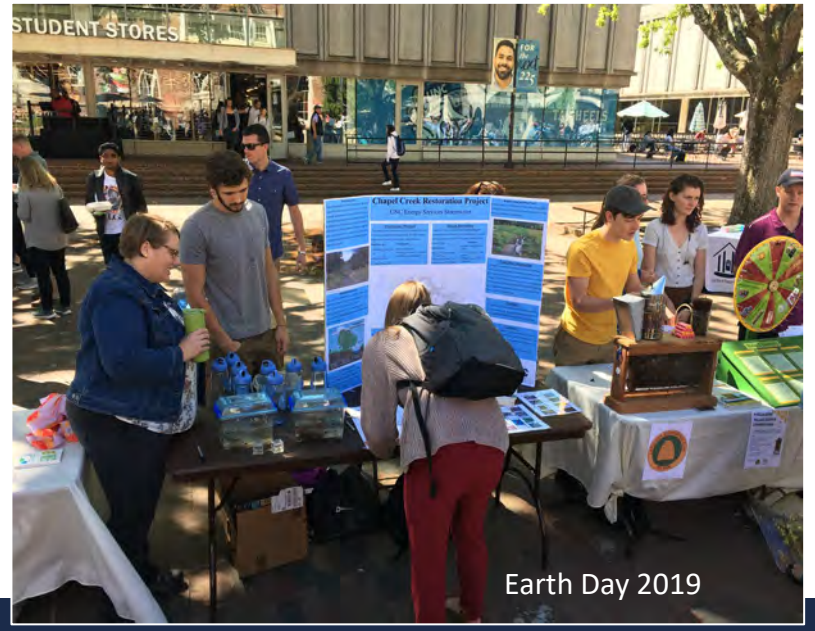


Education and Outreach

Six Minimum Measures

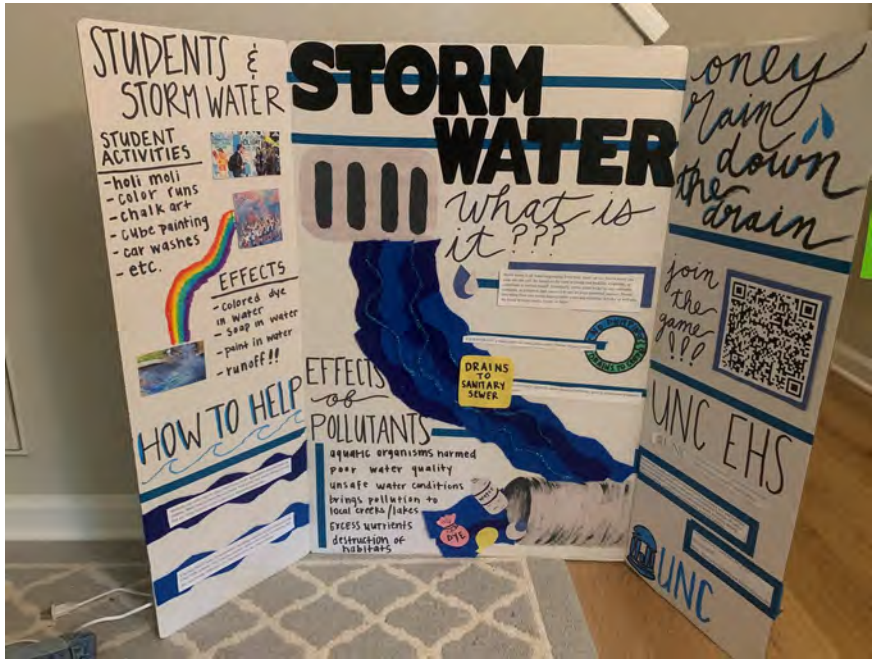
Participate in campus educational events

- Sustainability Day
- Earth Day
- Three Zeros Day
- Orange County Creek Week



Earth Day 2019


Orange County Creek Week educational event coordinated by Logan Timm



Educational display board by Kayla Fiser

Education and Outreach

Six Minimum Measures

Install educational signs at stormwater control measures

Rams Head Recreation Center
Green roof & cistern

Outdoor Education Center
Stormwater wetland pond

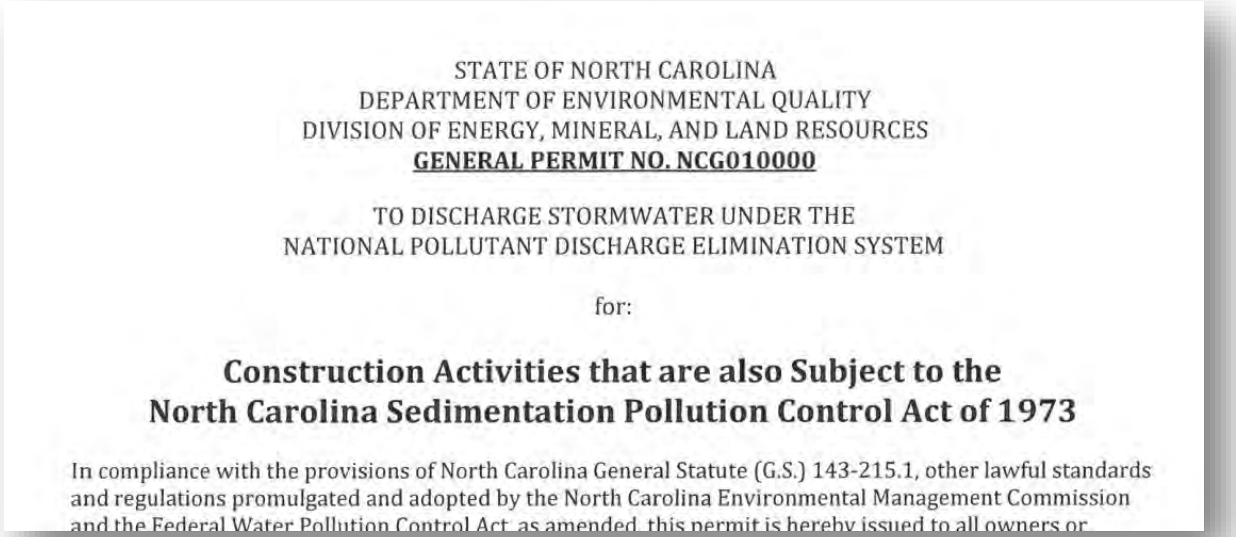
Battle Grove
Regenerative Stormwater Conveyance/Stream Restoration

Education and Outreach

Six Minimum Measures

Pre-construction contractor training

- Include stormwater requirements in project planning
- Project manager incorporates stormwater requirements
- Attend pre-construction meeting with project team



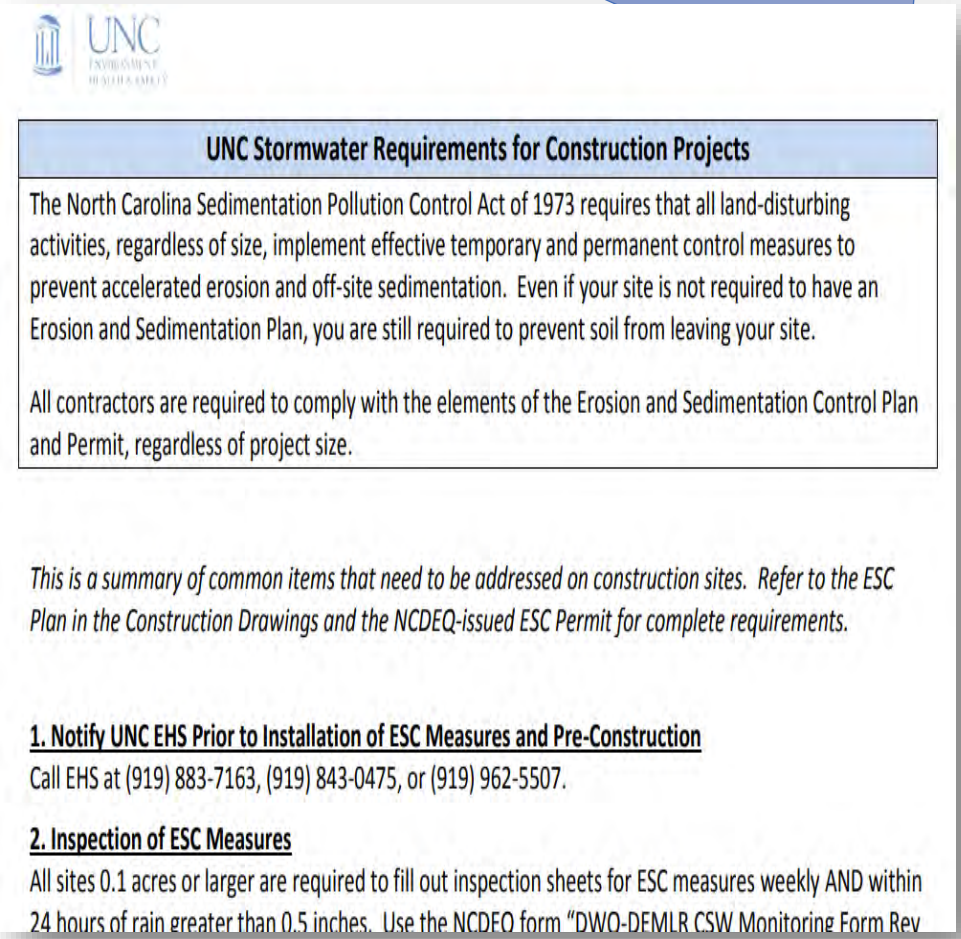
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES
GENERAL PERMIT NO. NCG010000

TO DISCHARGE STORMWATER UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

for:

Construction Activities that are also Subject to the North Carolina Sedimentation Pollution Control Act of 1973

In compliance with the provisions of North Carolina General Statute (G.S.) 143-215.1, other lawful standards and regulations promulgated and adopted by the North Carolina Environmental Management Commission and the Federal Water Pollution Control Act, as amended, this permit is hereby issued to all owners or



UNC

UNC Stormwater Requirements for Construction Projects

The North Carolina Sedimentation Pollution Control Act of 1973 requires that all land-disturbing activities, regardless of size, implement effective temporary and permanent control measures to prevent accelerated erosion and off-site sedimentation. Even if your site is not required to have an Erosion and Sedimentation Plan, you are still required to prevent soil from leaving your site.

All contractors are required to comply with the elements of the Erosion and Sedimentation Control Plan and Permit, regardless of project size.

This is a summary of common items that need to be addressed on construction sites. Refer to the ESC Plan in the Construction Drawings and the NCDEQ-issued ESC Permit for complete requirements.

1. Notify UNC EHS Prior to Installation of ESC Measures and Pre-Construction

Call EHS at (919) 883-7163, (919) 843-0475, or (919) 962-5507.

2. Inspection of ESC Measures

All sites 0.1 acres or larger are required to fill out inspection sheets for ESC measures weekly AND within 24 hours of rain greater than 0.5 inches. Use the NCDEQ form "DWQ-DEMLR CSW Monitoring Form Rev

Education and Outreach

Six Minimum Measures

EHS website

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Environment, Health and Safety

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Home / Stormwater / Stormwater Program / Public Education and Outreach

Stormwater

Stormwater Program

- **Public Education and Outreach**
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination (IDDE)
- Post-Construction Stormwater Control Measures
- Stormwater System Mapping
- Stormwater Maintenance
- Water Quality Monitoring

Public Education and Outreach

Staff Training

Stormwater Awareness Training is conducted in person and online.

UNC-Chapel Hill has over 50 staff members trained in Stormwater SCM Inspection and Maintenance through the North Carolina State University Extension. Participation is funded for UNC-Chapel Hill employees whose jobs are related to stormwater and landscape maintenance.

To schedule training for your group, email stormwater@ehs.unc.edu or call 919-962-9752.

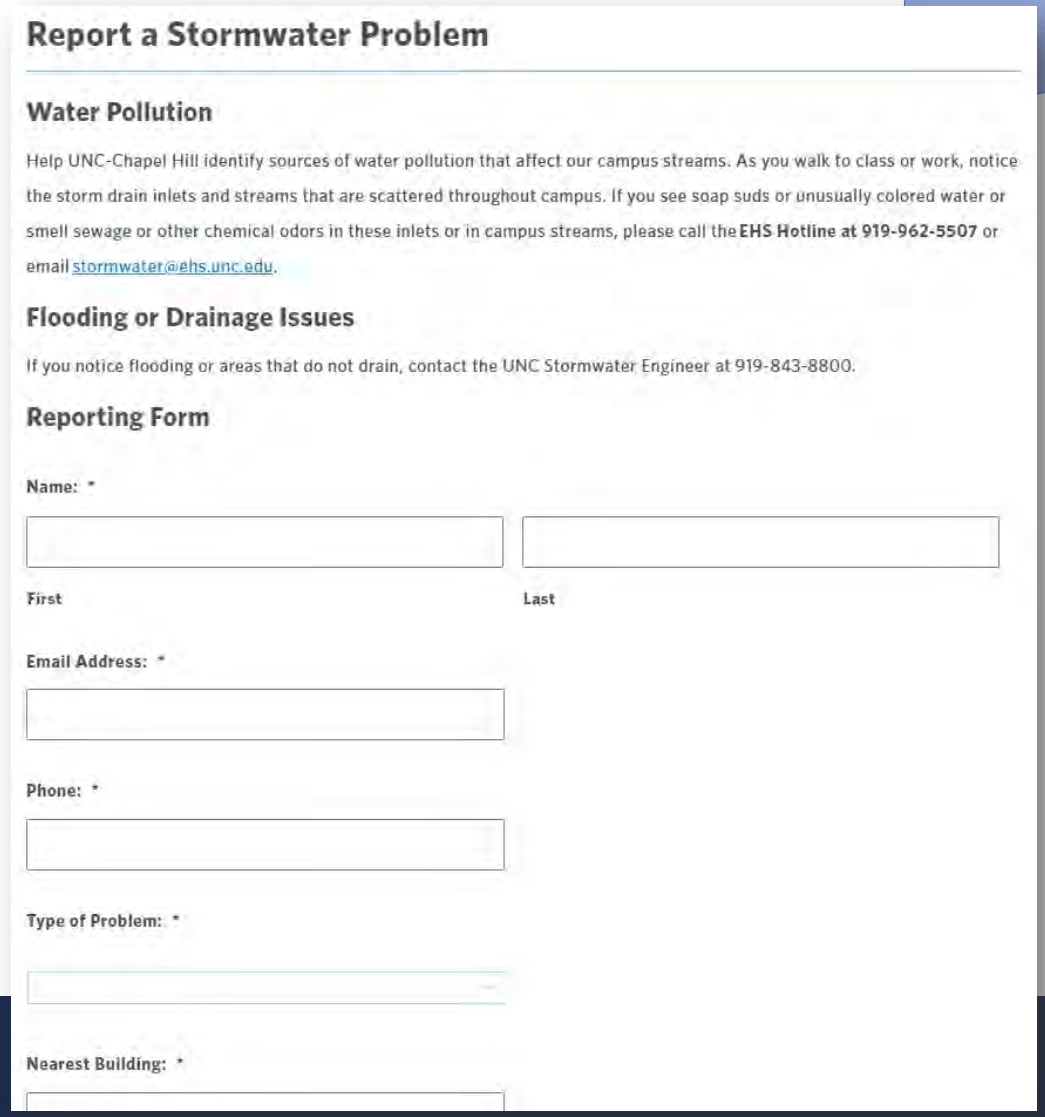
Workshops, Guest Lectures, and Tours

Education and Outreach

Six Minimum Measures

Hotline

- EHS website form
- Direct call to EHS main number
- 911 operators route water quality and spill calls to EHS
- Calls tracked in database



Report a Stormwater Problem

Water Pollution

Help UNC-Chapel Hill identify sources of water pollution that affect our campus streams. As you walk to class or work, notice the storm drain inlets and streams that are scattered throughout campus. If you see soap suds or unusually colored water or smell sewage or other chemical odors in these inlets or in campus streams, please call the **EHS Hotline at 919-962-5507** or email stormwater@ehs.unc.edu.

Flooding or Drainage Issues

If you notice flooding or areas that do not drain, contact the UNC Stormwater Engineer at 919-843-8800.

Reporting Form

Name: *

First Last

Email Address: *

Phone: *

Type of Problem: *

Nearest Building: *

Public Involvement & Participation

The joys!

- Students like to volunteer
- Employees like to volunteer
- Great interns
- Stormwater staff works with classes to incorporate stormwater content

The pitfalls

- Students don’t stay long
- Faculty might not be interested in stormwater

Public Involvement & Participation

Six Minimum Measures

Support student volunteer events

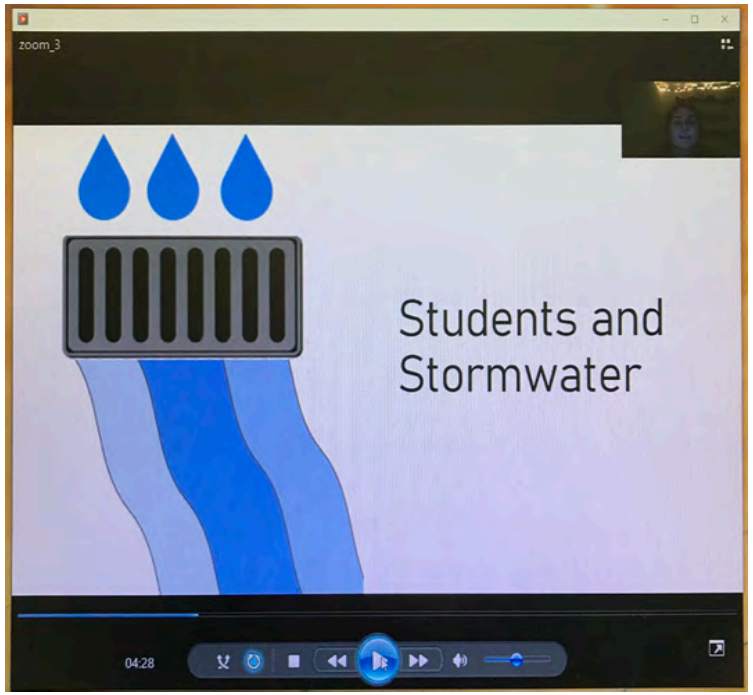
APPLES Service-Learning Initiative, UNC-CH
Volunteer Stream Cleanup, August 2018

North Carolina Hillel, UNC Chapel Hill Chapter
Volunteer Stream Cleanup, October 2019

Public Involvement & Participation

Six Minimum Measures

Interns & student workers



Stormwater awareness training presentation by Kayla Fiser

Orange County Creek Week educational flyer by Logan Timm

Art display with campus cigarette butt litter by Peyton Hillman

Public Involvement & Participation

Six Minimum Measures

Encourage staff volunteer activities

UNC Campus Stream Cleanup
2022 Orange County Creek Week

UNC staff planting stormwater wetland at Outdoor Education Center, 2020

Campus stream cleanup with UNC staff, 2018

Public Involvement & Participation

Six Minimum Measures

Class tours and projects

Educating students on stormwater control measures, Battle Grove regenerative stormwater conveyance

Public Involvement & Participation

Six Minimum Measures

Storm drain inlet labels

- Some materials last longer than others
- Students will creatively remove markers
- Need to re-inventory, especially around sports arenas
- Available in your school colors

Illicit Discharge Detection & Elimination (IDDE)

The joys!

- UNC owns the buildings
- Familiar maintenance staff
- People call the hotline
- Great GIS mapping
- UNC Emergency response team
- Internal repair process

The pitfalls

- Policy, not ordinance
- Equipment in mechanical rooms
- Unique student activities

IDDE

Six Minimum Measures

IDDE Policy

- Definitions
- Allowed discharges
- Best management practices
- Enforcement and penalties
- Outfall inspection and sampling
- IDDE training
- Contact information

IDDE

Six Minimum Measures

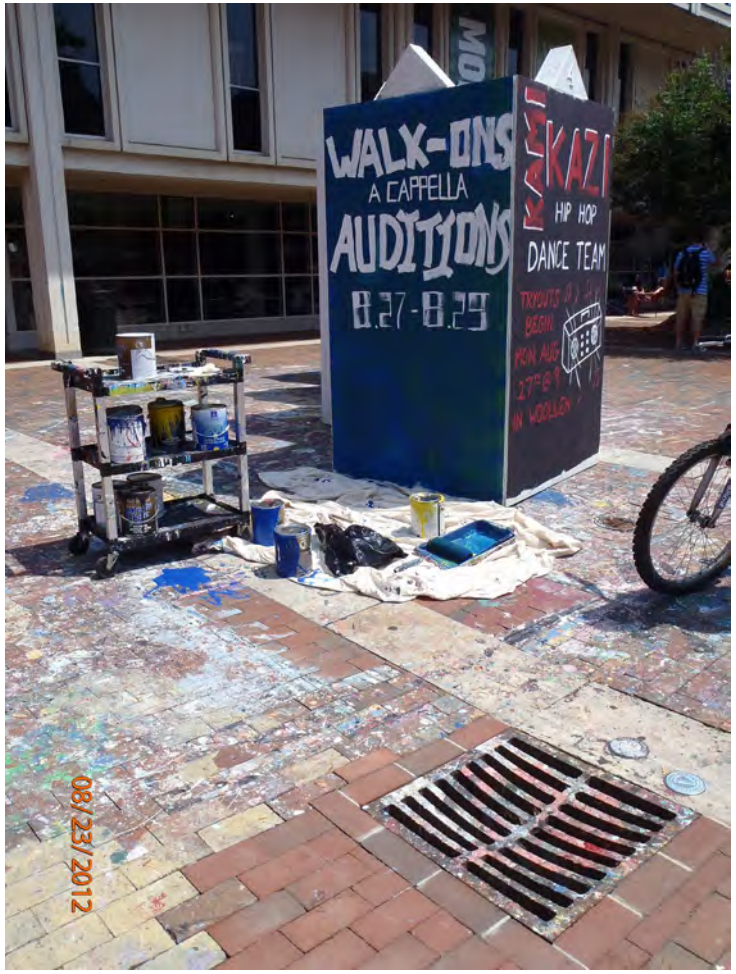
Educational information

- Students have creative ways of generating illicit discharges
- Form contacts with Student Union, Art Department, Facilities permitting office, student organizations
- Watch social media and news publications for upcoming events

IDDE

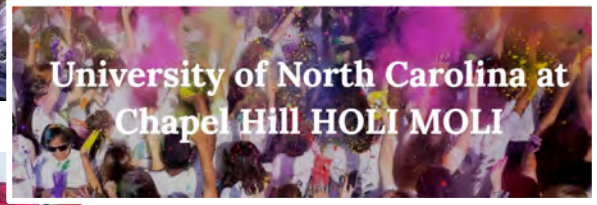
Six Minimum Measures

Cube painting at Student Union and Campus Y



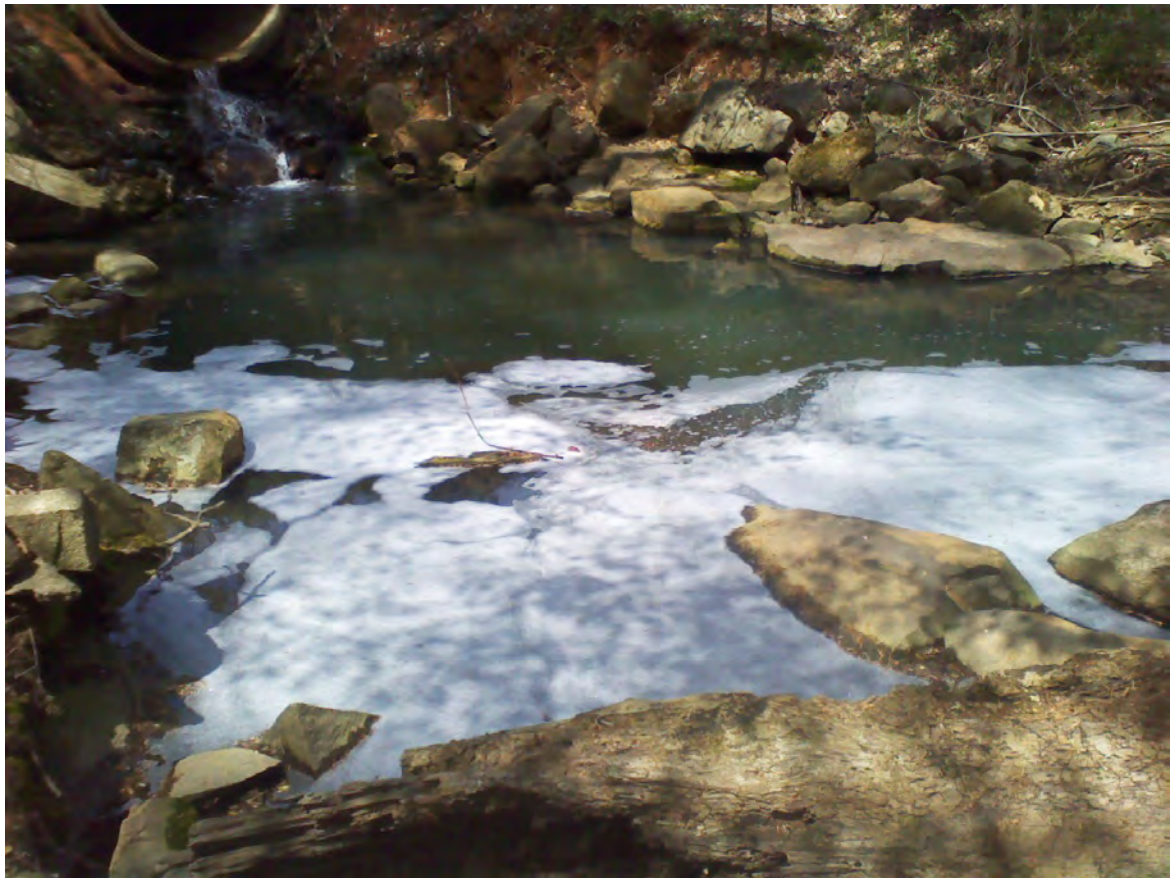
IDDE

Six Minimum Measures



IDDE

Six Minimum Measures



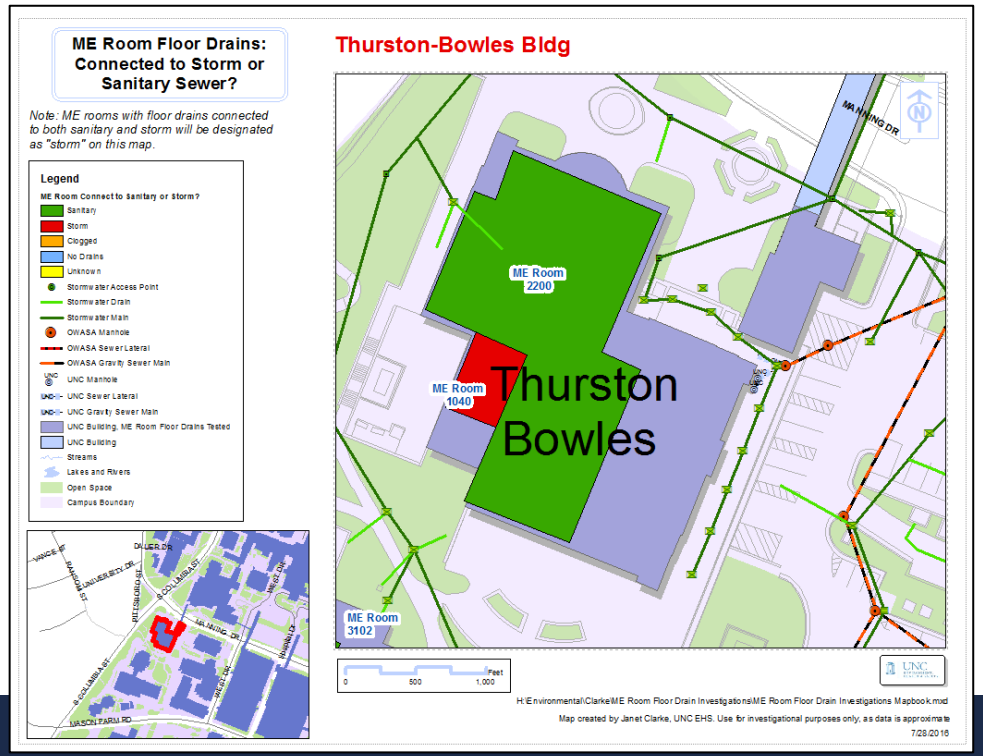
What is this soapy substance at the outfall?

IDDE

Six Minimum Measures

Special Projects: Detection and Elimination

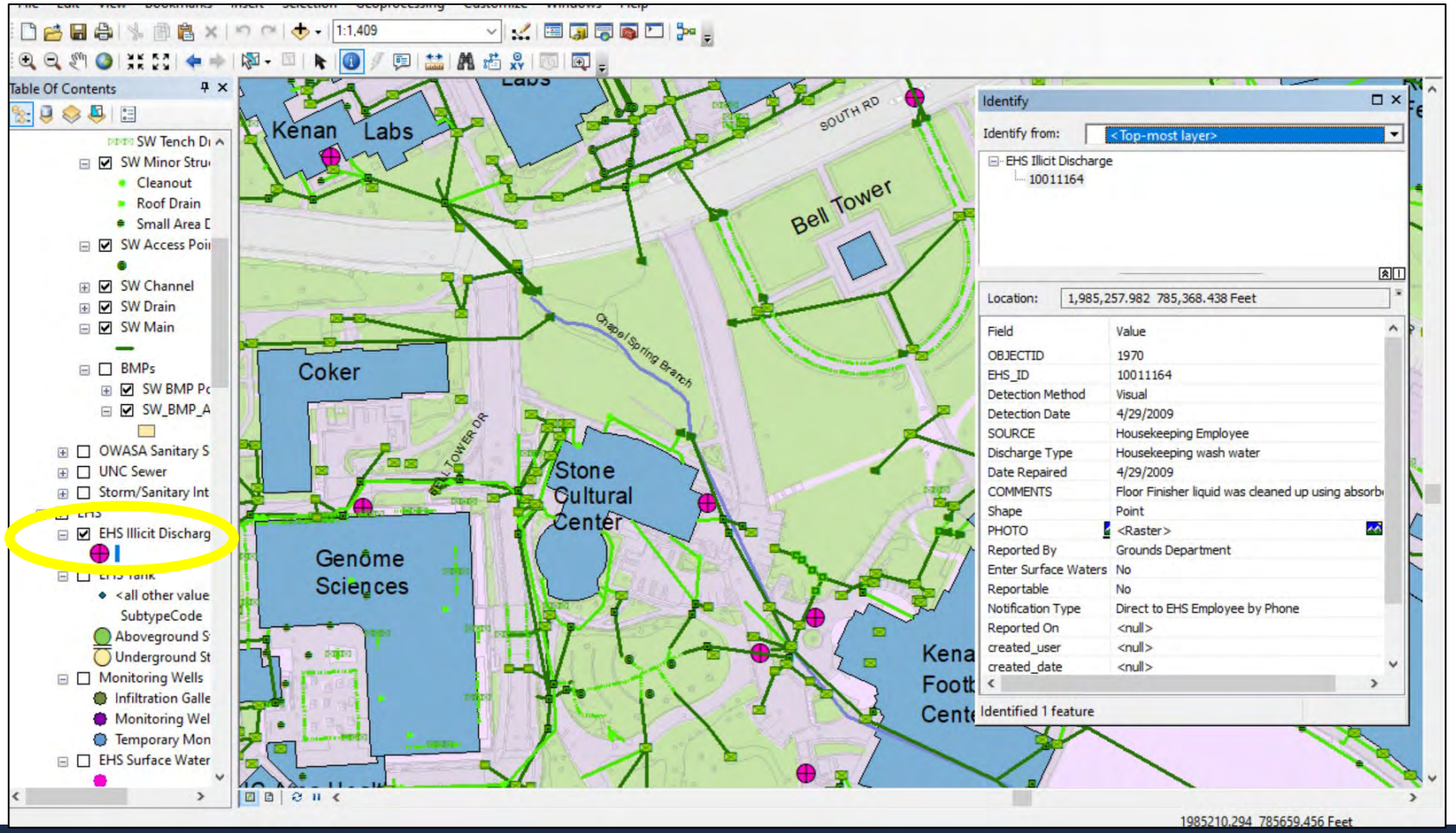
- Old mechanical room floor drains, some connect to storm drain system
- Use GIS to collect and share data



IDDE

Using GIS to document illicit discharges

Six Minimum Measures



IDDE

Spill response procedure

Six Minimum Measures

IDDE

Standard Operating Procedure (SOP)

Six Minimum Measures

UNC | INSTITUTIONAL INTEGRITY AND RISK MANAGEMENT
Environment, Health and Safety

Illicit Discharge Detection and Elimination (IDDE) Standard Operating Procedure (SOP)

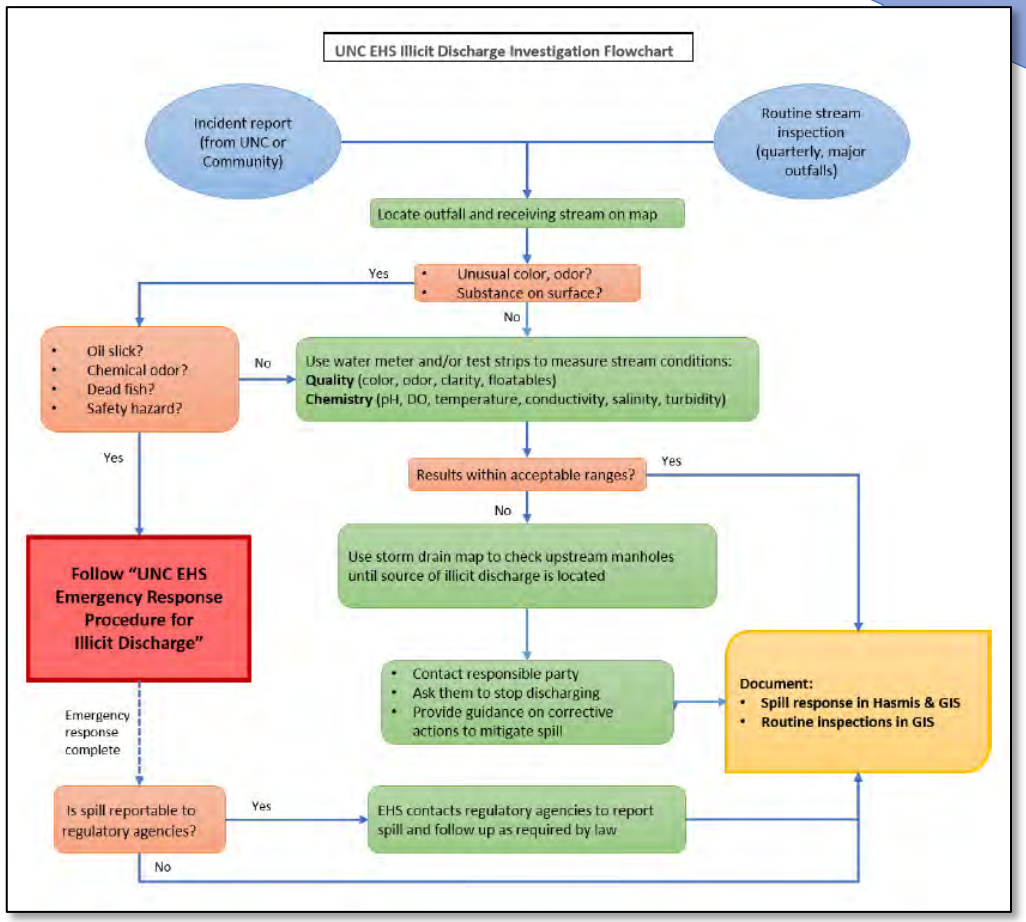
An Illicit Discharge is the release of pollutants to UNC's storm drainage system via overland flow or by direct dumping of materials into a catch basin, curb gutter, or grated inlet (e.g., storm drains).

Common methods of discovering an illicit discharge:

1. Routine stream monitoring: EHS routinely conducts dry-weather monitoring of surface water. This ensures that stream flow is minimized, and any illicit discharge pollution will be more highly concentrated and easier to detect.
2. Calls to EHS hotline: Members of the community call EHS to report concerns about surface water or to report evidence of chemical spills or releases on campus.
3. Calls to 911 (Campus Police): Members of the community call Campus Police to report concerns about surface water or to report evidence of chemical spills or releases on campus. Campus Police will notify EHS 24/7 with any calls regarding chemical releases.
4. Notification directly to EHS Environmental Affairs: UNC employees often contact EHS directly to report spills, releases, or environmental concerns.
5. Routine inspections of construction sites, chemical storage areas, and operational activities: EHS and other UNC employees may observe potential illicit discharges during routine inspections on campus.

Investigating a potential illicit discharge:

The "UNC Illicit Discharge Investigation Flowchart" shows the general process of determining the cause of an illicit discharge, as well as spill response and follow-up if the illicit discharge requires a larger response. If the



Sediment and Erosion Control Program

The joys!

- DEQ DEMLR responsible
- UNC leadership support
- EHS plan review
- UNC-specific requirements
- Inspect our own sites
- Communication with project team
- Campus community keeps an eye on projects

The pitfalls

- DEQ DEMLR is not enough
- Construction sites are highly visible

Sediment and Erosion Control Program

Regulatory requirements

- Projects of all sizes are subject to erosion control & stormwater requirements
  - ✓ Sedimentation Pollution Control Act (SPCA) of 1973
- DEQ approval for sites > 1 acre
  - ✓ ESC Plan approval, DEQ DEMLR Land Quality Section
  - ✓ NPDES NCGO1, DEQ DEMLR Sediment Program, Environmental Management Commission

UNC requirements

- Projects > 0.8 acre must get DEQ Permit
  - ✓ EHS review and approval
  - ✓ Vice Chancellor is Financially Responsible Person

Sediment and Erosion Control Program

Six Minimum Measures

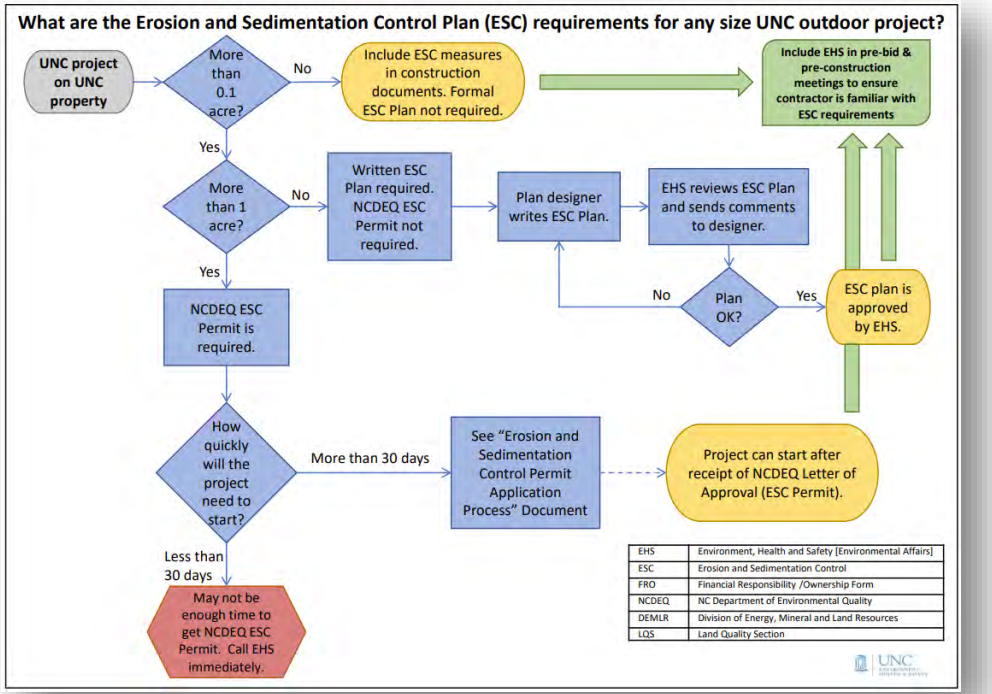
Sediment and erosion control guidelines

Erosion and Sedimentation Control | SCMs and Drainage | Stream Buffers and Wetlands

All projects on campus that remove ground cover and expose soil must follow erosion and sedimentation control (ESC) best management practices as required by the North Carolina Sedimentation Control Act of 1973 and the US Clean Water Act.

Guidance Documents

- Requirements Flowchart
- Permit Application Process, UNC Project on UNC Property
- Permit Application Process, Non-UNC Project on UNC Property
- Guidelines for Construction Projects
- Stormwater Requirements for Small Construction Projects
- Spill Prevention Control and Countermeasure (SPCC) Plan Construction Site Guidelines
- Chapel Hill/Carrboro Soil Stabilization Mix
- NC Department of Environmental Quality: NPDES Stormwater Permit for Construction Activities (NCG01)



Sediment and Erosion Control Program

Compliance inspections

	Contractor	EHS	NCDEQ
Required?	Required by NCDEQ ESC Permit	Required by UNC's NPDES Permit	Jurisdictional authority
When?	Weekly and after 1 inch rainfall	Planned, random or triggered by complaint	Planned, random or triggered by complaint
Who?	Site superintendent or designated crew member	Includes Contractor site superintendent (when available) and UNC Construction Manager (if preferred)	May or may not notify or include UNC or Contractor
Documents?	Use required inspection checklist	Paperwork review: inspection checklist, ESC Permit, ESC Plan	Paperwork review: inspection checklist, ESC Permit, ESC Plan
How?	Site walk-through	Site walk-through	Site walk-through
Repairs?	Fix problems ASAP, no later than 24 hours or prior to next storm event	Contractor has option to fix problems "on the spot"	May or may not allow "on the spot" repairs
Notifications?	No requirement to notify EHS but recommended to contact EHS with questions	E-mails reports and/or photos to UNC Construction Manager and/or Contractor	Sends letter to UNC Legal within 30 days of the inspection
Results?	Follow ESC Plan and prevent off-site sedimentation	Helps reduce/avoid potential for fines, IF corrective action taken by Contractor	Can issue fines and/or Notice of Violation

Sediment and Erosion Control Program

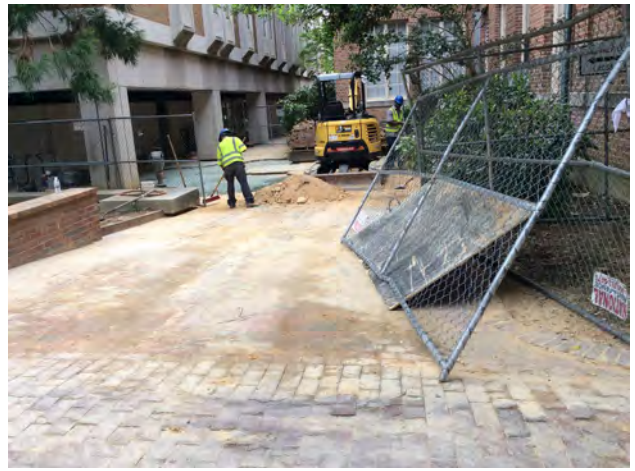
Six Minimum Measures

Unique challenges on college campus

- Which projects are applicable?
  - ✓ Typical construction projects
  - ✓ … also turf replacement, utility work, roadwork, building demolition, staging areas
- Limited workspace
- Paved or bricked surfaces

Hooker Fields turf replacement, 2016

Pavement resurfacing on campus-owned road



Sediment control on brick walkways

Sediment and Erosion Control Program

Six Minimum Measures

Public involvement

Notifying the Campus Community

When the green water from dye testing ends up in a campus creek, EHS sends out a campus-wide e-mail alert. For example:

Attention: _____ Creek on UNC's campus may have a green tint today due to testing storm drain pipes. The dye used in storm drain testing is nontoxic and will break down within a few days. Today's dye testing of the floor drains in the _____ Building caused green dye to discharge into the storm drain system, and into _____ Creek. For more information, please contact UNC Environment, Health and Safety at 919-962-5507 or stormwater@ehs.unc.edu.

Pollution Prevention and Good Housekeeping

The joys!

- UNC has industrial stormwater permits
- Covered in stormwater awareness training
- Staff trained in integrated pest management
- UNC service station car wash
- In-house HazMat spill response

The pitfalls

- Many people to train
- Lots of catch basins, inlets, etc. (~4,800)

Pollution Prevention and Good Housekeeping

Six Minimum Measures

Spill prevention and response

- Trained EHS spill response team
- Someone always on call

Pollution Prevention and Good Housekeeping

Six Minimum Measures

Inspections

- System inspections (EHS & Grounds)
  - structures and outfalls
  - Industrial sw permit
- Inspections of “industrial” facilities
  - Vehicle maintenance areas
  - Hazardous waste facility

Pollution Prevention and Good Housekeeping

Six Minimum Measures

Industrial NPDES facilities

- Co-Generation facility
- Hazardous waste management facility
- Both facilities have training, inspection, and sampling requirements (SWPPP)

Pollution Prevention and Good Housekeeping

Six Minimum Measures

Vehicle and equipment cleaning

- UNC service station has covered car wash with oil/water separator, water recycling and sanitary sewer connection
- Equipment cleaning covered in Stormwater Awareness Training

Pollution Prevention and Good Housekeeping

Six Minimum Measures

- Storm drain maintenance – Preventive Maintenance (PM) Work Orders
- Existing work management system (AIM)
- Annual for each structure

- Equipment:
  - Vac Trailer
  - Jetter
  - Pole Camera
  - Push Camera
  - iPads

Pollution Prevention and Good Housekeeping

Six Minimum Measures

- Street sweeping for parking lots, roads, permeable pavement

- Equipment:
  - Regenerative Air Street Sweeper

Post-Construction Stormwater Management for New Development & Redevelopment

The joys!

- All the SCMs are ours
- Incorporate w/University Design Guidelines
- Existing Grounds Department
- Well-trained inspection and maintenance staff
- Existing work management database
- Great GIS mapping

The pitfalls

- Many SCMs to inspect and maintain (~280)
- Guidelines, not ordinance
- Must comply with Jordan Nutrient Management Rules

Post-Construction Stormwater Management for New Development & Redevelopment

Standards and policies on SCMs for post construction controls

- Part of University Design Guidelines: *Stormwater Performance Criteria, Design Standards, and Procedures*, June 1, 2010, version

- Reference NCDEQ SCM manual, NCDOT and Town of Chapel Hill standards where applicable
- No minimum threshold for project size

Post-Construction Stormwater Management for New Development & Redevelopment

Plan reviews

- All plans reviewed by UNC-CH Energy Services engineer(s)
- Plan review managed thru Dr. Checks (Projnet.org) – existing plan review software
- Coordination with Town of Chapel Hill plan reviewers

Post-Construction Stormwater Management for New Development & Redevelopment

Six Minimum Measures

Field inspections

- Responsibility of design engineer
- If staff time allows, UNC staff accompany design engineer and file photos

Post-Construction Stormwater Management for New Development & Redevelopment

Six Minimum Measures

Maintenance and inspection program for SCMs

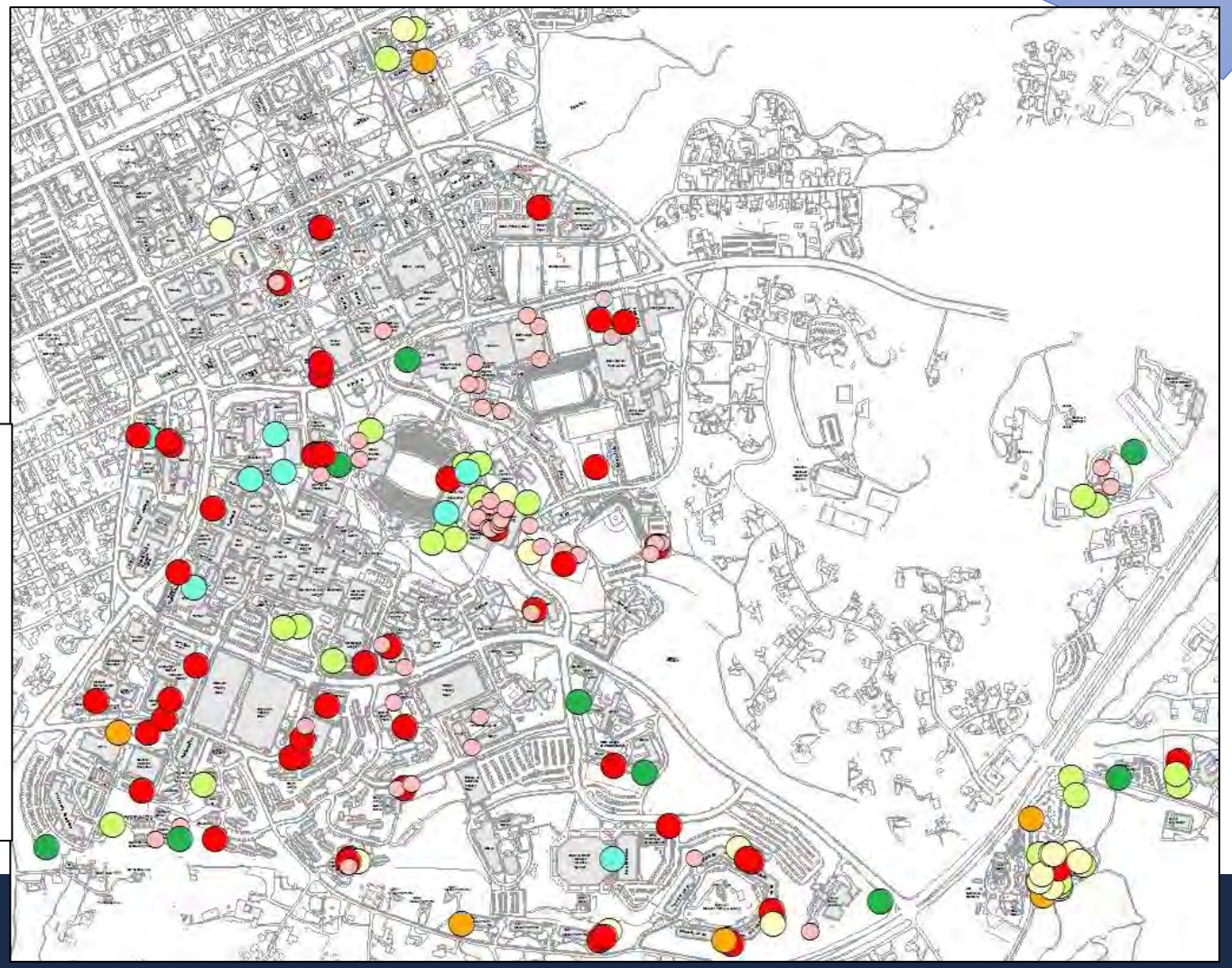
- 50 plus employees certified in SCM inspection and maintenance
- Work management system
- Grounds Dept. crew
- UNC has a Stormwater Infrastructure Inspection and Maintenance Manual
- Keep records of Preventative Maintenance (PM) inspections (hard copies and scanned)
- Digital “SCM Map Book”

Post-Construction Stormwater Management for New Development & Redevelopment

Six Minimum Measures

Inventory - 283 SCMs

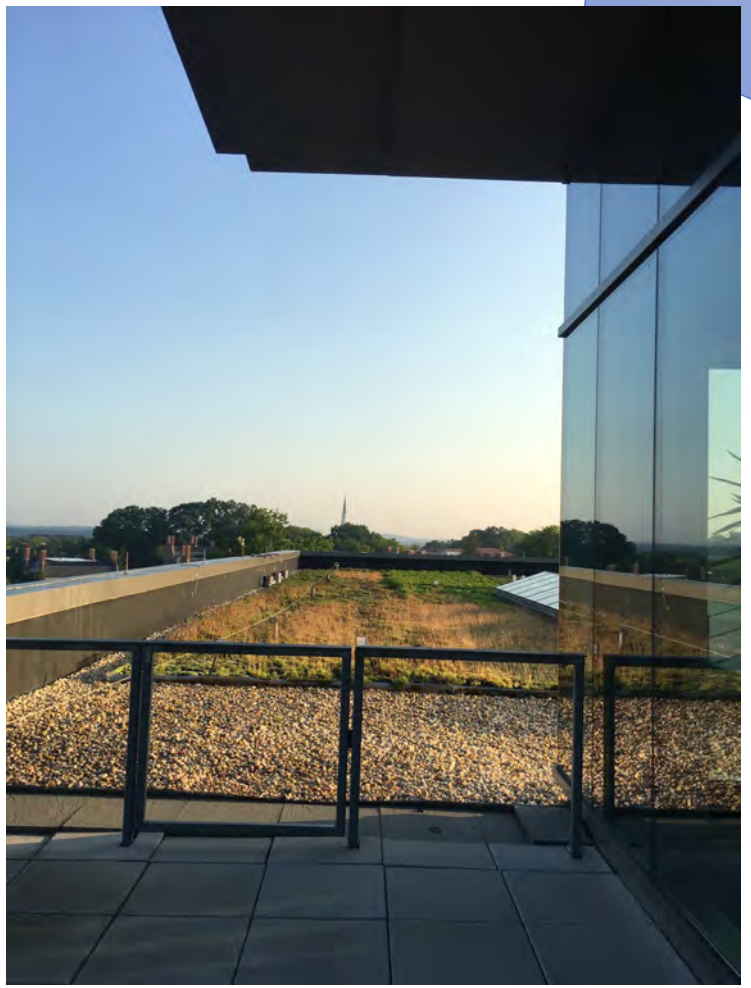
- Add to GIS database during project closeout



Post-Construction Stormwater Management for New Development & Redevelopment

Six Minimum Measures

Provide input to DEQ Manual



Planning for Jordan Lake Rules Existing Development Requirement

Battle Grove RSC

OEC Stormwater Wetland

Current UNC SW Program Funding

UNC-CH's stormwater program is funded by four different funding sources

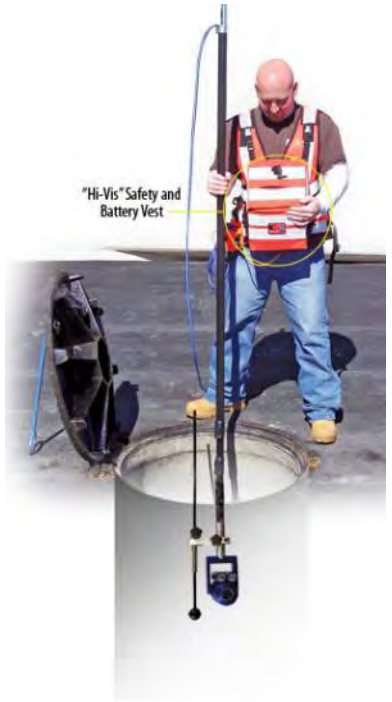
- Stormwater Utility Fees based on impervious areas of UNC-CH property
- Water/Sewer Mark-Up on water, irrigation and sewer bills
- Grant Overhead (EHS Dept.)
- Occasional One -Time Project Funding (e.g. grants, other UNC-CH funding sources)

Grant overhead (est ~2002)

- Positions:
- Major Equipment: Vacuum Trailer, Camel Jet, Water Quality Testing
- Projects/Other: Ed & Outreach Materials

Water and Sewer Mark-up (est. ~2005)

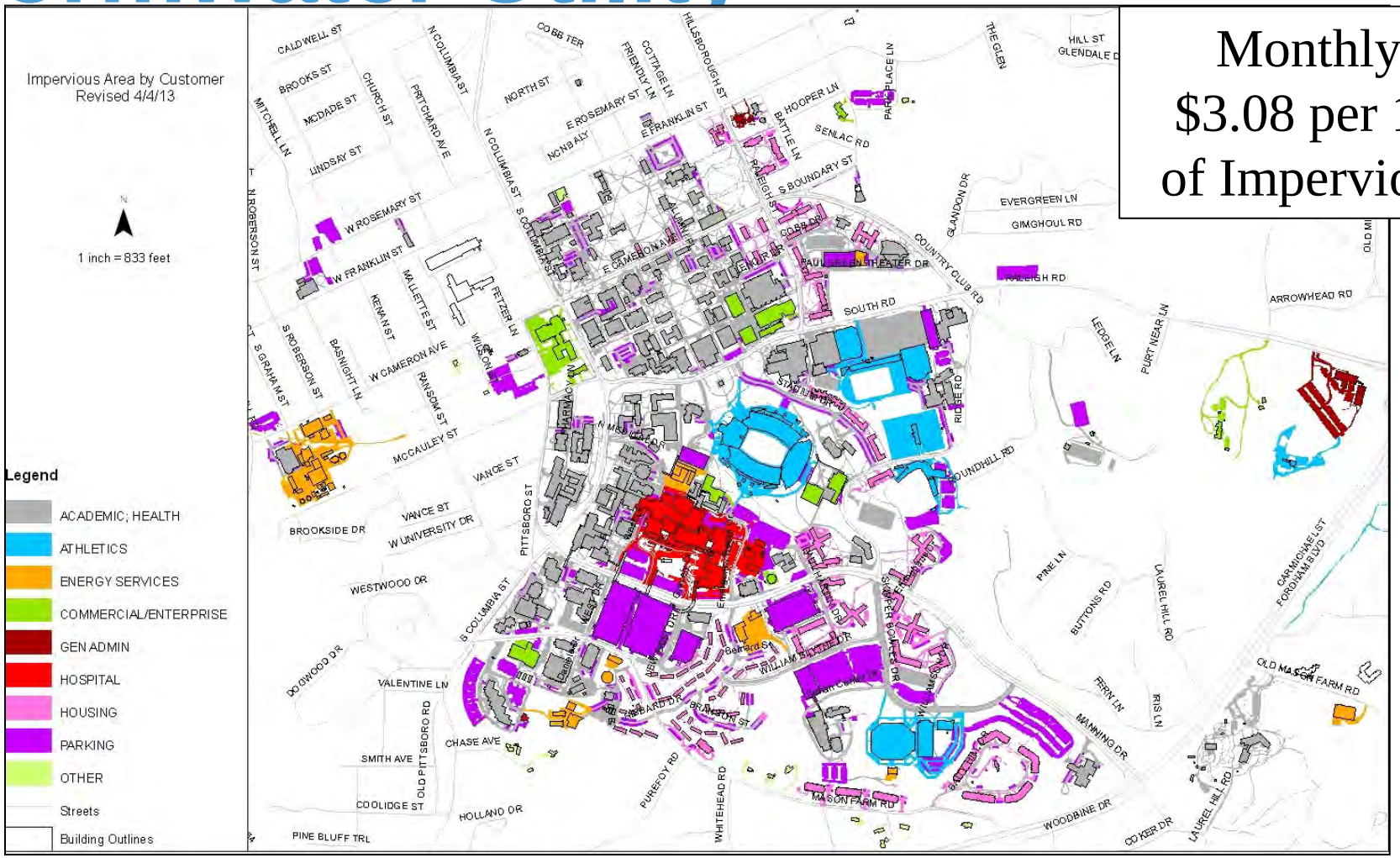
- 5% mark-up on Water and Sewer
- Positions: ★ ★ ★ ⯪
- Major Equipment
  - Pole Camera



Stormwater Utility (est. FY 2014)

- Positions: ★ ★ ★ ★ ★
- Major Equipment:
  - Street sweeper
  - Pick-up trucks
  - Kubota
  - Push camera
  - Confined space entry gear
- Projects/Other:
  - Repairs to stormwater infrastructure
  - Deferred maintenance Projects (<$200,000)
  - Water quality improvements

Stormwater Utility



Monthly Bill:
$3.08 per 1000 sf
of Impervious Area

Key Takeaways

- Public universities and colleges: **Subject to regulation**
- Decide how you'll work with local municipality (co-permittee or individual)
- If co-permit, what are you getting for your money? (written agreement)
- Build on existing campus programs
- Meet requirements but start with what you can do

- Ask questions!
  - We are happy to help (EHS website, permit questions, ok to plagiarize)

Questions?

- Janet Clarke, jlclarke@ehs.unc.edu, 919-843-0475
- Sharon Myers, samyers@ehs.unc.edu, 919-962-9752
- Jamie Smedsmo, jamie.smedsmo@energy.unc.edu, 919-259-4411
- Sally Hoyt, sally.hoyt@raleighnc.gov, 919-996-4388