DEVELOPING A STORMWATER MANAGEMENT PLAN FOR COASTAL CAROLINA UNIVERSITY

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Abstract

The increase of impervious surfaces due to the continuous development of Coastal Carolina University's campus has the potential to turn CCU into a significant contributor of non-point source pollution. The Better Site Design resolution, signed last year by the CCU Senate, SGA, and administration agreed to develop a stormwater management plan for the campus. This plan has been drafted as an undergraduate research project, where potential problem areas on campus were assessed with a goal to lessen the impacts of stormwater runoff from Coastal. The plan includes measures to educate administration and staff, implement best management practices, and continue the monitoring of stormwater on campus. Field surveys of hot spot sites, pervious areas streets and storm drains, and stream reaches were conducted using evaluation sheets from the USRM-11 and USRM-10 manuals. These surveys were used to evaluate the campus with respect to stormwater and determine what potential retrofits and restorations would be the most beneficial and cost effective. Interviews were conducted with certain individuals on campus who are involved in activities that may impact the effectiveness of CCU's stormwater management. Expert opinions were obtained to determine the current status of impacted wetlands on campus and to help in developing restoration projects for these areas. The presentation will include details of the data collection and field survey process and photographs of the investigated sites, as well as descriptions of the proposed improvements for stormwater management at Coastal Carolina University.

Introduction

- Stormwater management plans are used to improve water quality.
- This plan was designed to reduce Coastal Carolina University's stormwater impact on the Waccamaw River. Its purpose is also to make CCU accountable for its stormwater management responsibilities. CCU will be the first university in S.C. to develop and implement a stormwater management plan, establishing its leadership in the academic community in this field.
- Clean Water Act's National Pollutant Discharge Elimination System (NPDES) Phase II Stormwater Program began in 2003
- Requires large universities to have stormwater management plans and programs
- Program goals
  - Reduce the discharge of pollutants to the "maximum extent practicable"
  - Protect water quality
  - Satisfy Clean Water Act requirements

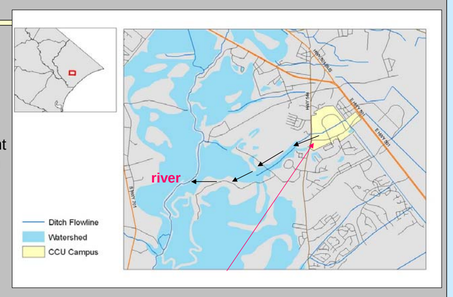


Figure 1. CCU's hydrological connection to the Waccamaw River

Why does CCU need a Stormwater Management Plan?
- It is hydrologically connected to the Waccamaw River.
- Polluted runoff from campus flows through wetlands into the floodplain and main stem of the river.

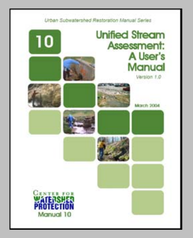
Plan Development Process

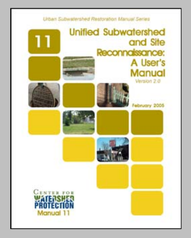
- Scoping
- Assessment and Surveys
- Interviews with Stakeholders
- Generated draft report with recommended goals and activities
- Draft report feedback from Stakeholders
- Create final report
- Implement Plan
- Assessing plan implementation
- Review and revise plan

} 5-year cycle

Survey & Assessment Methods

- USRM-10 and USRM-11 Manuals from the Center for Watershed Protection
- Survey and Assessment Areas
  - Streets and Storm Drains
    - Street conditions
    - Municipal pollutant reduction strategies
  - Pervious Area Assessment
    - Parcel description
    - Current vegetative cover
    - Forest impacts
    - Wetland impacts
    - Reforestation constraints
  - Hot Spot Site Investigation
    - Vehicle operations
    - Outdoor Materials
    - Waste Management
    - Turf/Landscaping areas
    - Stormwater infrastructure
    - Follow-up action
  - Stream Reach Assessment
- GIS Mapping
- Photographs
- Expert Opinions and Interviews





Potential Non-Point Contaminant Sources

Figure 2. Secondary Containment

Figure 3. Overflowing Dumpster

- Campus investigations conducted from September through November 2006 identified best management practices (BMPs) already in use (figure 2) and areas needing implementation of BMPs (figure 3). Uncontained trash can cause a problem by blocking waterways and lowering water quality.

Figure 4. Good Buffer

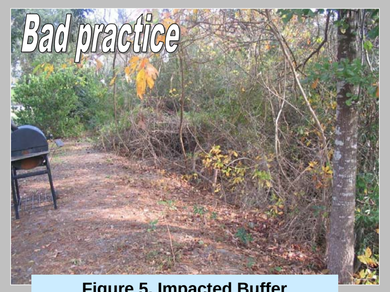


Figure 5. Impacted Buffer

- Buffers around bodies of water and drainage ditches are an important BMP for stormwater management. A good buffer (figure 4) will be allowed to grow and will have natural vegetation to protect the bank. An impacted buffer (figure 5) may have a lack of vegetation, leading to bank erosion. Problems found during the stream reach assessment included severe bank erosion, algal cover in ponds, trash and debris in and around streams and impacted buffers.

- As the percentage of watershed imperviousness increases, water quality is degraded (figure 6). CCU's impervious coverage of 27% puts it in the category of "degraded" water quality. Implementing this stormwater management plan can help maintain higher water quality as campus runoff makes its way to the Waccamaw River.

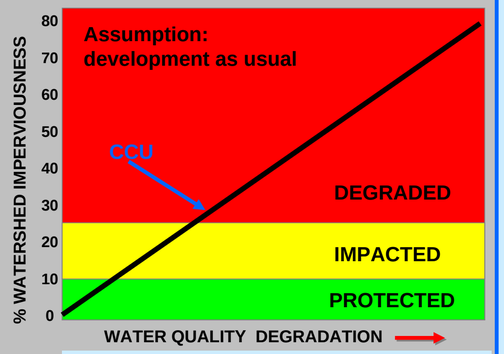


Figure 6. Relationship Between Impervious Cover and Water Quality. From Schueler et al. (1992)

Site Investigation Results

Pervious Area Assessment

Site	Natural Area	Open Area	Comments
Prince Lawn	Poor Candidate for Restoration/Conservation	Poor Candidate for reforestation or regeneration	High traffic area, Runoff collects in forested area
Dorms Area	Potential Restoration Candidate	May be reforested with extensive site preparation	Standing water
Wall Building	Potential Restoration Candidate	Poor Candidate for reforestation or regeneration	High traffic area
Library & Student Center	Potential Restoration Candidate	Poor Candidate for reforestation or regeneration	High traffic area
Singleton Loop	Good candidate for conservation or protection	May be reforested with minimal site preparation	NA
Athletic Fields	Potential Restoration or Conservation Candidate	Poor Candidate for reforestation or regeneration	Pocket Wetlands

Hot Spot Assessment

- **Severe**
  - Maintenance Garages
- **Confirmed**
  - Commons Dining Hall
  - Cino Grille/Student Center
- **Potential**
  - Greenhouse
  - Campus Recreation Center
- **Not a Hot Spot**
  - Print shop

Minimum Control Measures

The U.S. EPA NPDES Phase II Stormwater Program requires that six minimum control measures be implemented. These measures are:

NPDES Phase II Stormwater Program: Six Minimum Measures

1. Public *education* and outreach on stormwater impacts
2. Public *involvement*/participation
3. *Illicit discharge* detection and elimination
4. *Construction* site stormwater runoff control
5. *Post-construction* stormwater management in new development and redevelopment
6. Pollution *prevention/good housekeeping* for municipal operations (*we are the role model*)

Stormwater Plan

After conducting surveys and interviewing stakeholders, the following action plans were developed to meet the six minimum measures and thereby improve stormwater management at Coastal Carolina University.

- Minimum Measure 1
  - Public Education including brochures & displays at campus events
- Minimum Measure 2
  - Create a clear Chain of Command for stormwater management
  - Create a Stormwater Advisory Board
- Minimum Measure 3
  - Measure water quality in campus ponds, streams & ditches
- Minimum Measure 4
  - Ensure that soil erosion BMPs are used during construction
- Minimum Measure 5
  - Implement post-construction BMPs
    - Pervious concrete sidewalks
    - Longleaf pine restoration in front of old dorms
    - Establish constructed wetland around Founders Drive pond
    - Install bioretention cells in parking lots
- Minimum Measure 6
  - Training of staff, especially Facilities Management and Dining Hall
  - Improve dumpster management
  - Improve paint disposal management
  - Improve oil disposal at dining hall
  - Improve fertilizer, pesticide and herbicide application and management

Stakeholder Feedback

- Public review of draft plan
- Solicit feedback
  - Do you agree with our recommendations?
  - What priority would you put on the recommendations?
  - Where should the money to implement the plan come from?
  - Any other thoughts?

Plan Implementation

- Incorporate feedback to generate final stormwater management plan
- Formation of Stormwater Advisory Board
- Funding Options

Acknowledgements

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