
Division of Energy, Mineral and Land Resources
Stormwater News Flash
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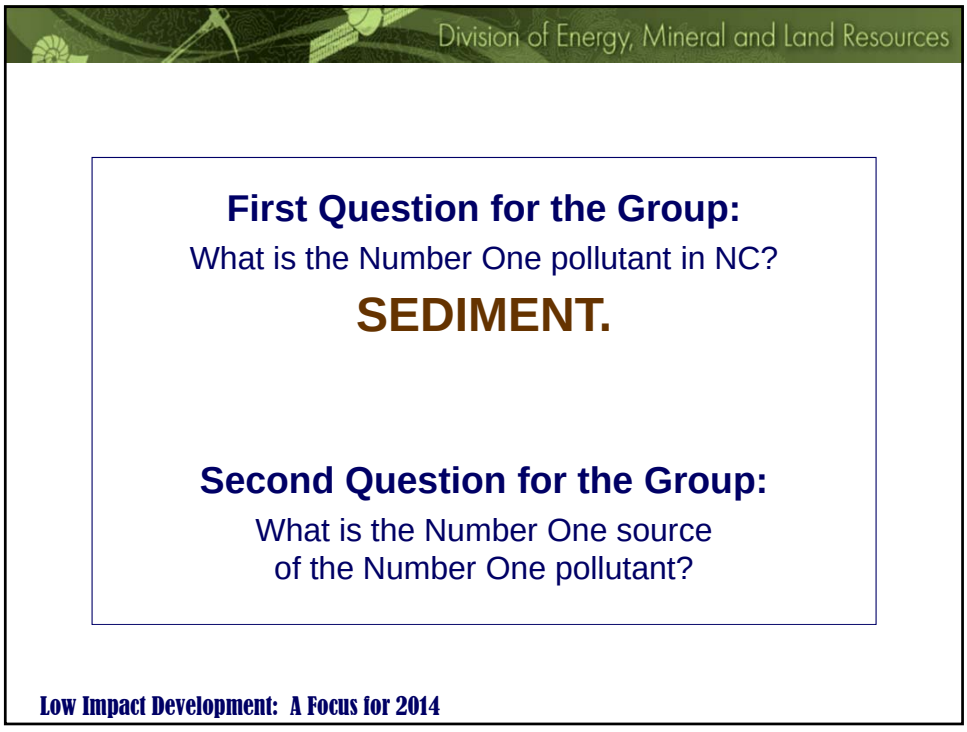
NC Division of Energy, Mineral and Land Resources
Stormwater Program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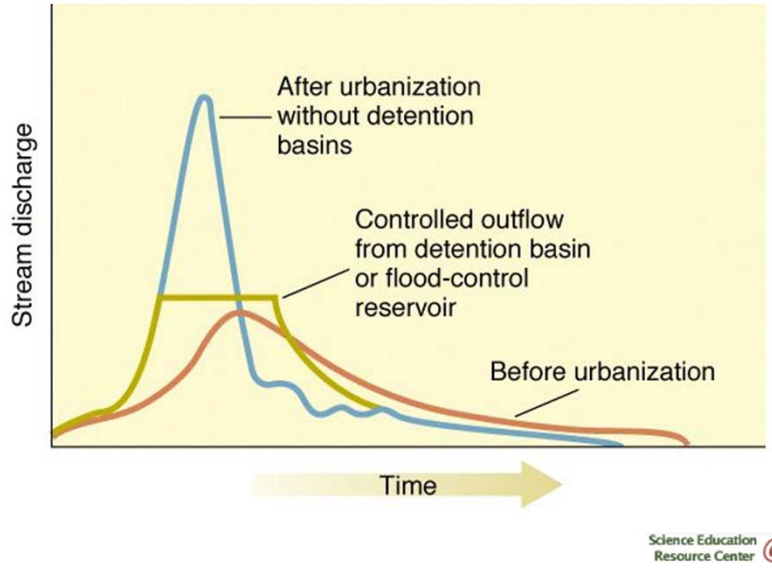
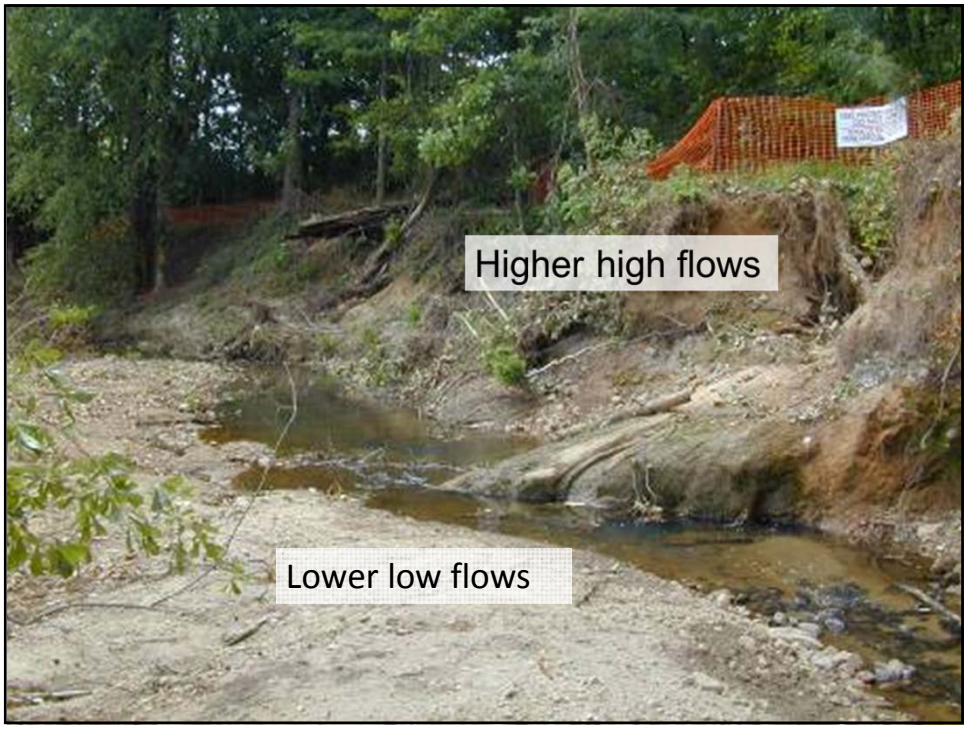
First Question for the Group:
What is the Number One pollutant in NC?
SEDIMENT.
Second Question for the Group:
What is the Number One source
of the Number One pollutant?
Low Impact Development: A Focus for 2014

Here's the Hydrograph!

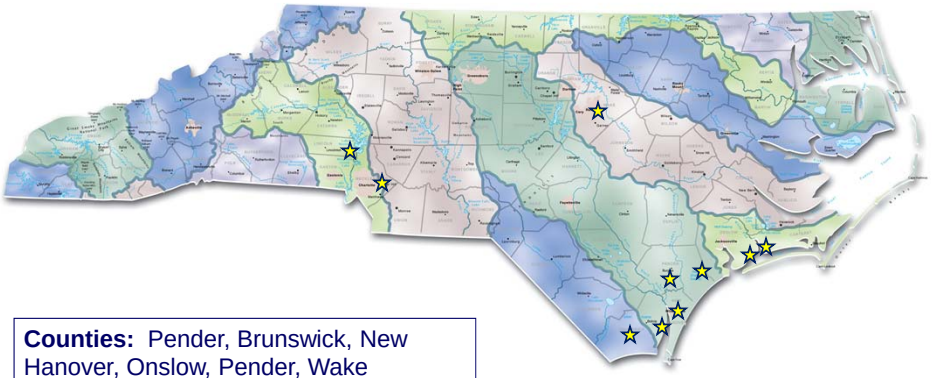


Science Education Resource Center @ Carleton College


Higher high flows
Lower low flows


Stormwater News Flash
November 6, 2013
Low Impact Development:
A Focus for 2014
New Options on the Horizon for
Stormwater Treatment
Stakeholder Committee to Revise
Minimum Design Criteria

Low Impact Development: A Big Focus for 2014



Counties: Pender, Brunswick, New Hanover, Onslow, Pender, Wake
Munis: Cape Carteret, Cedar Point, Huntersville, Midland, Wilmington *

Map: www.learnnc.org

* This is only a partial list.

Successful LID Projects

Tonbo Meadows, Wilmington
Meadow & woods preserved
Minimized grading
Rain gardens

Images: NC LID Guidebook

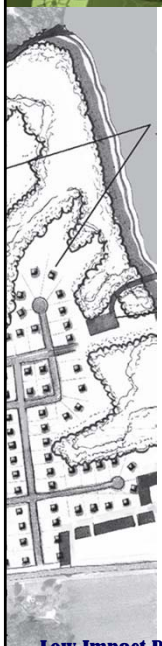
Whole Foods, North Raleigh
Discharges LESS after development than before.

Photos: www.sandec.com

Wilkes Co. Rest Area

All stormwater from the site is captured and reused or sent to a bioretention cell.

Photos: www.ncdot.gov



Status Report:
How far is LID from the mainstream?

My stormwater reviews for the past 7 years:

>1,000 projects

5 were LID (< 0.5%)

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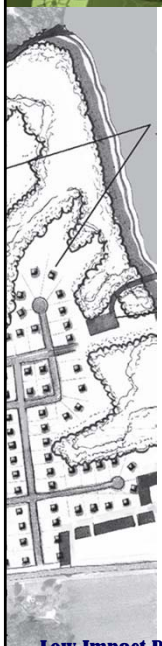

Goal: Get LID to the Mainstream

Scenarios:

1,000 projects

LID considered as an option on EVERY project.*

* NOTE: LID will ***not*** be required.

Low Impact Development: A Focus for 2014

LID considered on every project… HOW?

NEW RESOURCES:

LID definition

Storm-EZ tool

LID Education

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NC LID Guidebook definition:

LID creates a landscape that mimics the natural hydrologic functions of infiltration, runoff, and evapotranspiration.

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A development is LID when:

1. Pre- & post- development rainfall fates are a close match for the 90th percentile storm event.

2. The integrity of surface waters is maintained (hydrology, flows and structure).

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What are "RAINFALL FATES?"

Before development, there are **two** rainfall fates:

1. Runoff
2. LI fates: Infiltration, ET, Evaporation
   Post-filtration discharge (bioretention)
   Re-use from a cistern

After development, we add a **third** fate:

3. Treated runoff (wet pond/wetland)

Photo: www.nowiknow.com

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The "Conventional" Approach:
All SW directed via pipes to a wet pond

Before:

Runoff
+
Infiltration, ET,
Evaporation

After:

Treated Runoff
+
Infiltration, ET, Evaporation

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One way to be LID

Before:

Runoff
+
Infiltration, ET,
Evaporation

After:

Runoff
+
Infiltration,
ET, Evaporation

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Another way to be LID

Before:

Runoff
+
Infiltration, ET,
Evaporation

After:

Runoff
+
Infiltration

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Another way to be LID

Before:

Runoff
+
Infiltration, ET,
Evaporation

After:

Runoff
+
Infiltration, Post-Filtration Discharge, ET, Evaporation

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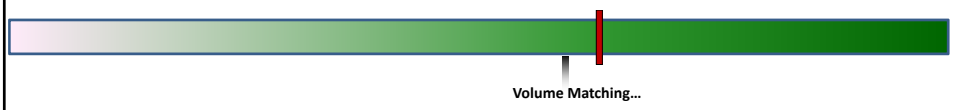
COMPLIANCE SCALE

VOLUME MATCHING SCALE



Low Impact Development: A Focus for 2014

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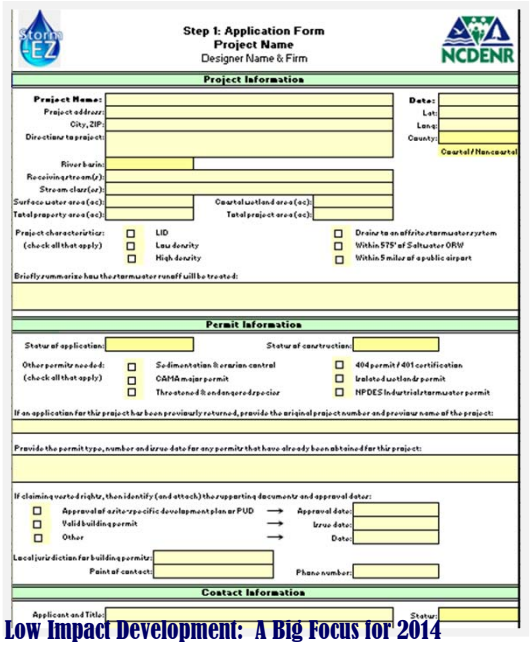

Step 1: Application Form
Project Name
Designer Name & Firm

NCDENR

Project Information

Project Name:
Project address:
City, ZIP:
Directions to project:
River basin:
Receiving stream(s):
Stream class(es):
Surface water area (ac):
Total property area (ac):
Coastal wetland area (ac):
Total project area (ac):
Date:
Lat:
Long:
County:
Coastal / Non-coastal

Project characteristics: (check all that apply)
- LID
- Low density
- High density
- Drains to an offsite stormwater system
- Within 575' of Salt water ORW
- Within 5 miles of a public airport

Briefly summarize how the stormwater runoff will be treated:

Permit Information

Status of application:
Status of construction:

Other permits needed: (check all that apply)
- Sedimentation & erosion control
- CAMA major permit
- Threatened & endangered species
- 404 permit / 401 certification
- Isolated wetland permit
- NPDES Industrial stormwater permit

If an application for this project has been previously returned, provide the original project number and previous name of the project:

Provide the permit type, number and issue date for any permits that have already been obtained for this project:

If claiming vested rights, then identify (and attach) the supporting documents and approval dates:
- Approval of a site-specific development plan or PUD → Approval date:
- Valid building permit → Issue date:
- Other → Date:

Local jurisdiction for building permits:
Point of contact:
Phone number:

Contact Information

Applicant and Title:
Status:

Low Impact Development: A Big Focus for 2014

Storm -EZ

- **Excel**
- **Permitting tool**
- **Hunter Freeman, PE, Withers and Ravenel**

Storm -EZ

- User inputs data about pre- and post-dev land uses and SW practices.
- Uses SCS Method to pre- and post-development rainfall fates.
- Works for both the conventional "treated runoff" approach and LID.

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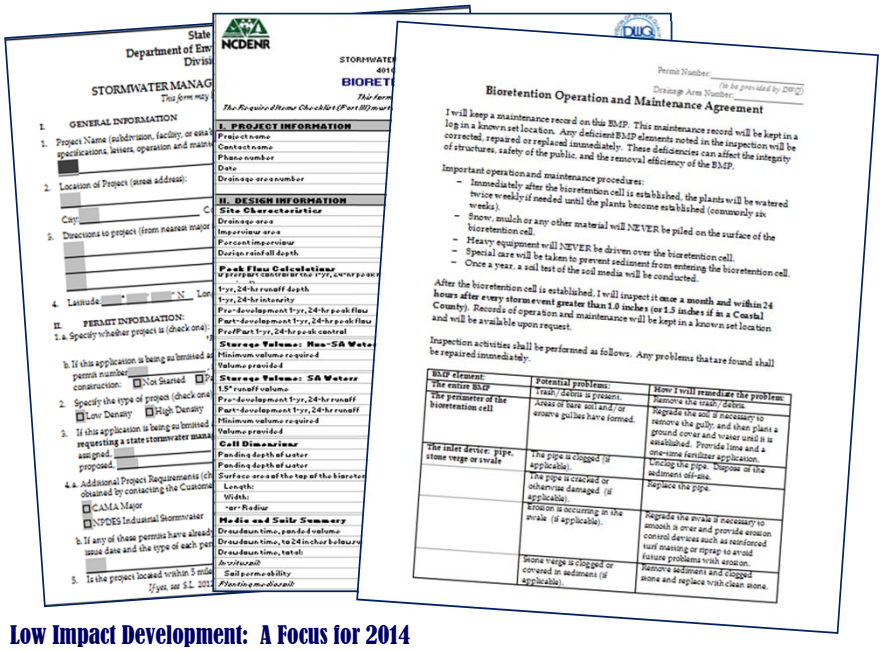


Bioretention Operation and Maintenance Agreement

I will keep a maintenance record on this BMP. This maintenance record will be kept in a log in a known set location. Any deficient BMP elements noted in the inspection will be corrected, repaired or replaced immediately. These deficiencies can affect the integrity of structures, safety of the public, and the removal efficiency of the BMP.

Important operation and maintenance procedures:

- Immediately after the bioretention cell is established, the plants will be watered twice weekly if needed until the plants become established (commonly six weeks).
- Snow, mulch or any other material will NEVER be piled on the surface of the bioretention cell.
- Heavy equipment will NEVER be driven over the bioretention cell.
- Special care will be taken to prevent sediment from entering the bioretention cell.
- Once a year, a soil test of the soil media will be conducted.

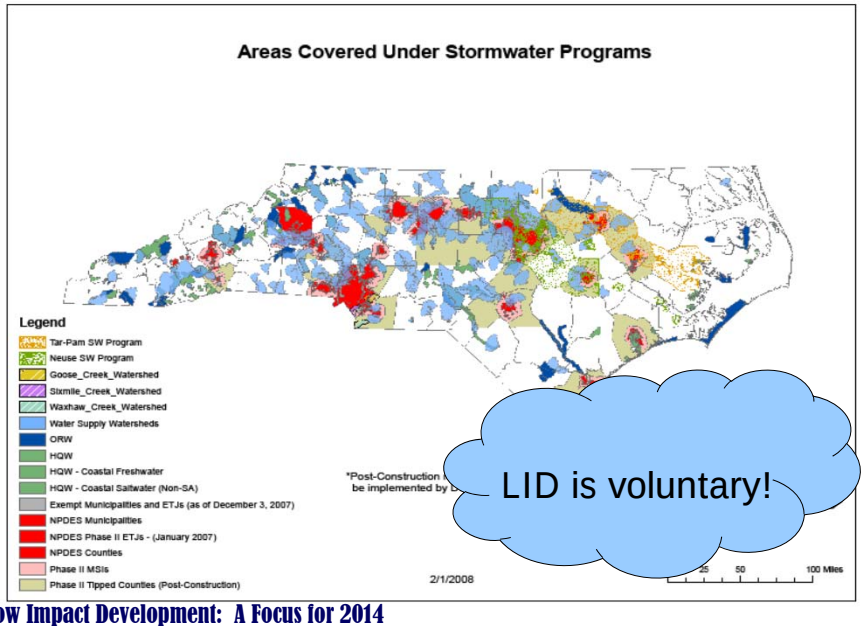
After the bioretention cell is established, I will inspect it **once a month and within 24 hours after every storm event greater than 1.0 inches (or 1.5 inches if in a Coastal** County). Records of operation and maintenance will be kept in a known set location and will be available upon request.

Inspection activities shall be performed as follows. Any problems that are found shall be repaired immediately.

BMP element:	Potential problems:	How I will remediate the problem:
The entire BMP	Trash/debris is present.	Remove the trash/debris.
The perimeter of the bioretention cell	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then plants a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
The inlet device: pipe, stone verge or swale	The pipe is clogged (if applicable).	Unclog the pipe. Dispose of the sediment off-site.
	The pipe is cracked or otherwise damaged (if applicable).	Replace the pipe.
	Erosion is occurring in the swale (if applicable).	Regrade the swale if necessary to smooth it over and provide erosion control devices such as reinforced turf matting or riprap to avoid future problems with erosion.
	Stone verge is clogged or covered in sediments (if applicable).	Remove sediment and clogged stone and replace with clean stone.

Low Impact Development: A Focus for 2014

LID will meet all of these programs!



LID is voluntary!

Low Impact Development: A Focus for 2014

2014 NC LID SUMMIT

North Carolina Low Impact Development Summit

March 26-27, 2014
Raleigh Convention Center
$100 for 2 days (11 pdhs)

NC STATE UNIVERSITY
College of Agriculture and Life Sciences | College of Engineering

Biological & Agricultural Engineering

Stormwater Engineering Group

NC STATE UNIVERSITY A&T STATE UNIVERSITY COOPERATIVE EXTENSION
Helping People Put Knowledge to Work

May 7-8, 2014 – Boone, NC

May 14-15, 2014 - Raleigh, NC

May 21-22, 2014 - Wilmington, NC

More on the horizon!

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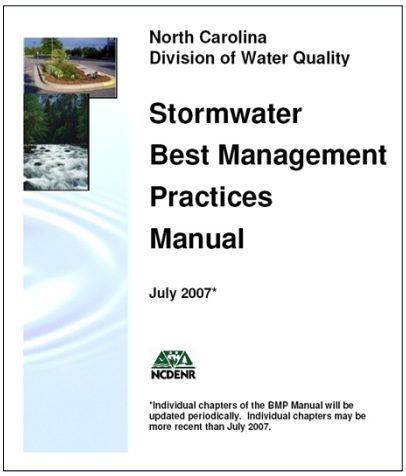
Why ***treat*** the runoff when you can ***eliminate*** the runoff?
-Boyd DeVane

BMP Manual Updates:

Permeable Pavement
Disconnected Impervious Surface (DIS)
Rainwater Harvesting
Green Roof
Bioretention
Infiltration
Swales

BMP Manual Updates will provide:

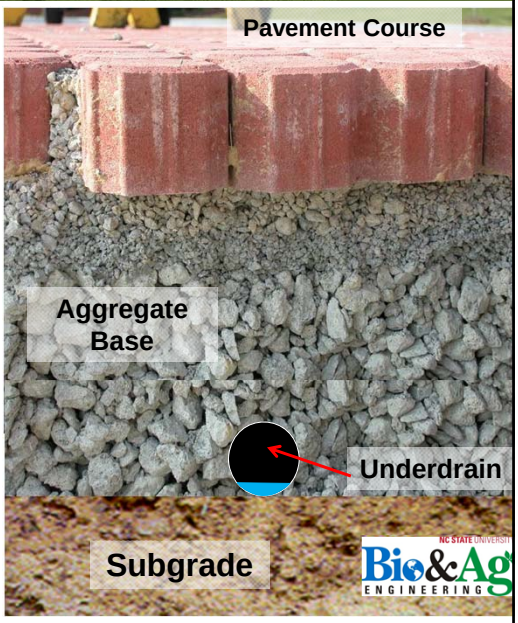


- More options
- More credit
- More infiltration designs

These apply to ***both*** LID & conventional development.

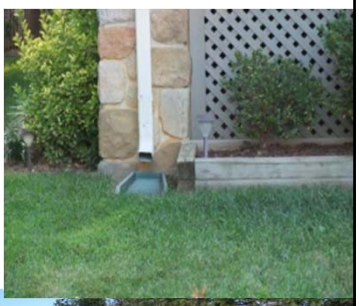
Permeable Pavement:
(new chapter – Oct. 2012)

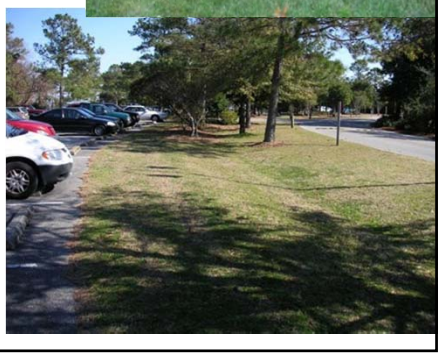
- Statewide use & credit
- Can treat other areas
- Soil testing
- Higher bar – construction & maintenance

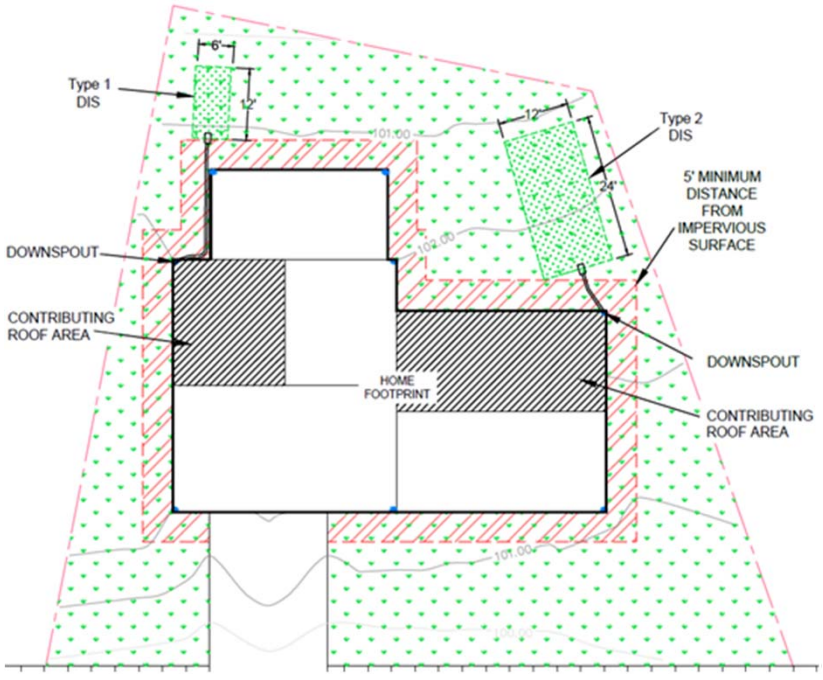


Disconnected Impervious Surface (DIS): (new chapter)

- Two types: Downspout disconnection & paved areas
- LIF credit via infiltration







Bioretention:

- Promote infiltration via soil prep and underdrains
- LIF credit based on ET and infiltration

Photos: NCSU-BAE

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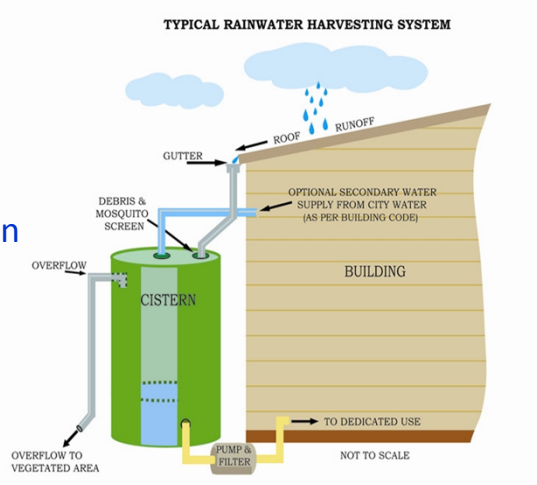
Rainwater Harvesting:

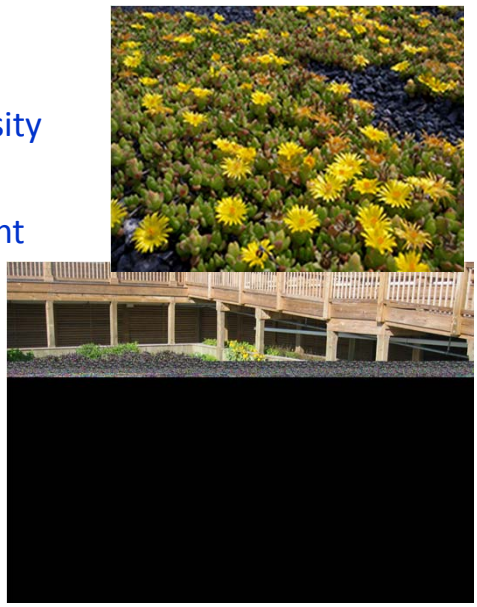
- Drafted by NCSU.
- RWH model estimates performance.
- New passive drawdown design→small infiltration or bioretention
- LIF credit via ET or dedicated use



New Options on the Horizon for Stormwater Treatment

Green Roof:

- Drafted by NCSU & University of Auckland, NZ
- LIF credit based on the plant available water in growing medium (ET)



Photos: NCSU-BAE

Infiltration:

- Need to get started
- Test soil infiltration rates
- Soil prep to improve infiltration
- LIF credit based on infiltration capacity

Photo: NCSU-BAE

Photo: Tyner, U of Tennessee

Swales:

- Not just for conveyance anymore
- Design as infiltration, wetland or bioretention
- LIF credit based on design

Landscaped swales help slow stormwater run-off.
Photo by W.F. Hunt

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LID – State Technical Review Team:

Withers & Ravenel
Red Line Engineering
Estes Design Group
Morrisville, Raleigh, Greensboro, Charlotte
NCSU Stormwater Group
UNC-Chapel Hill
Coastal Federation
American Rivers
Division of Water Resources
DEMLR

House Bill 480, entitled:

An act to provide regulatory certainty for NC by requiring the development of **minimum design criteria** for stormwater permits to guide DENR in permit issuance and to reform the permitting process to allow **a fast-track permitting process for applications certified by a qualified professional to be in compliance with the minimum design criteria**.

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Minimum Design Criteria Stakeholder Group

Members selected by Rep. Millis, PENC and DENR.

Will be a broad cross-section, including:

- DEMLR, DWR, DCR, NCDOT
- Academia
- Engineers
- Local Governments
- NC Home Builders
- Assoc General Contractors
- Environmental Interests

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Minimum Design Criteria Stakeholder Group

Starts next month!

Wet ponds

Infiltration system

Swales

It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change.
- *Charles Darwin*

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