

# Introduction to Low Impact Development



Borrowed from Dwane Jones



# What is Low Impact Development (LID)?

- Plan, design, construct, & manage each development site to protect, or restore, the natural hydrology of the site so that the overall integrity of the watershed is protected.





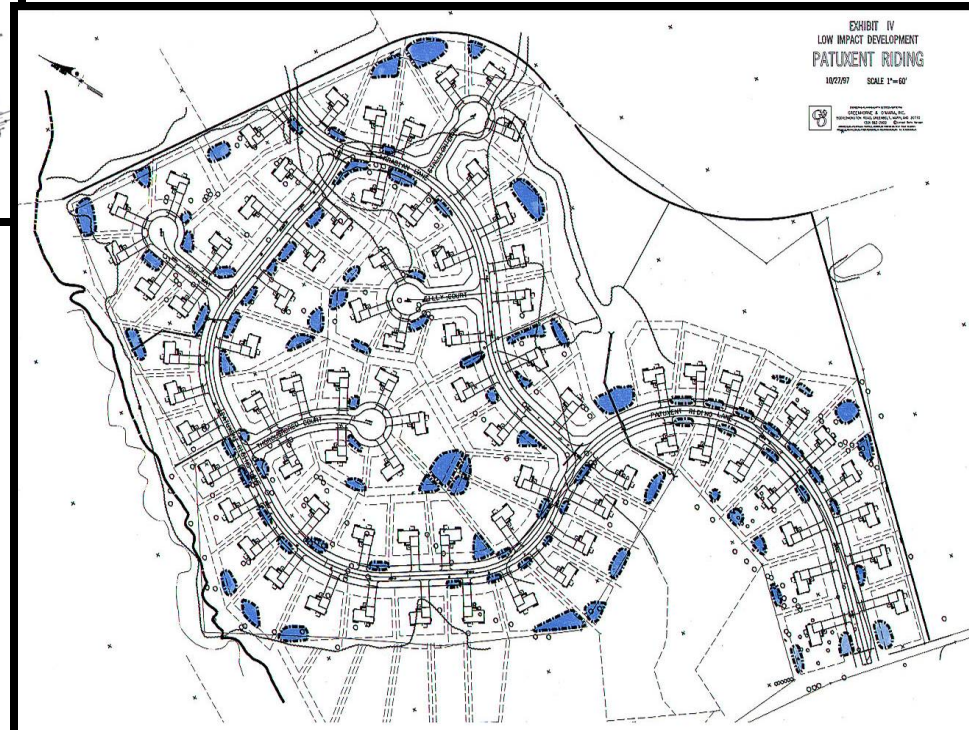
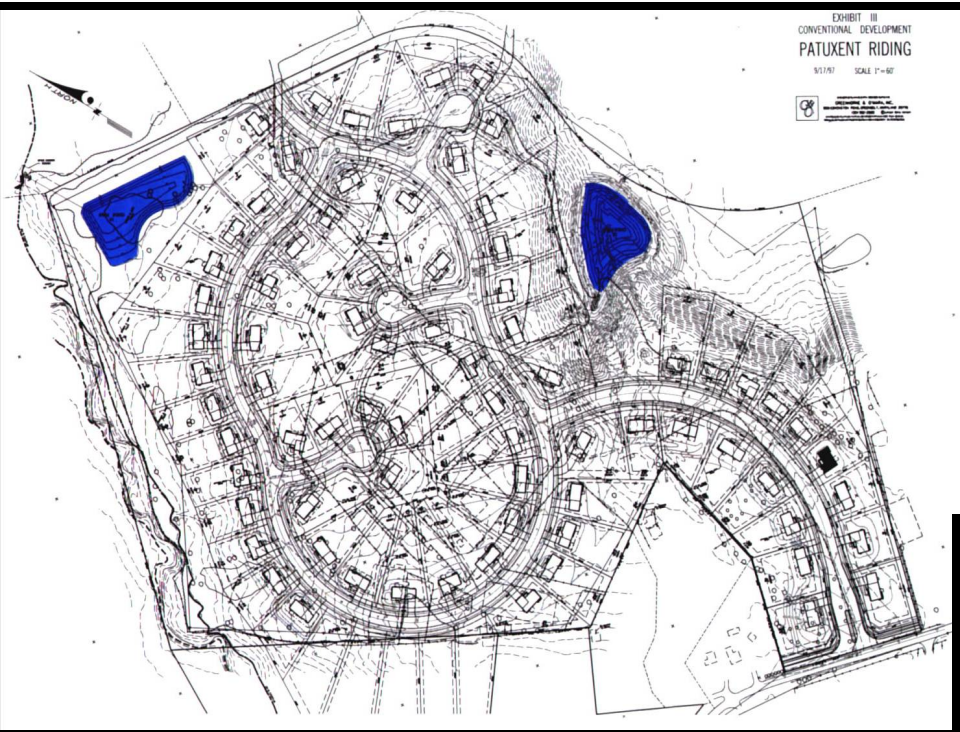
# What is Low Impact Development (LID)?

- Creating a “hydrologically” functional landscape
- Disconnecting impervious surfaces





# Which illustration accurately depicts LID?



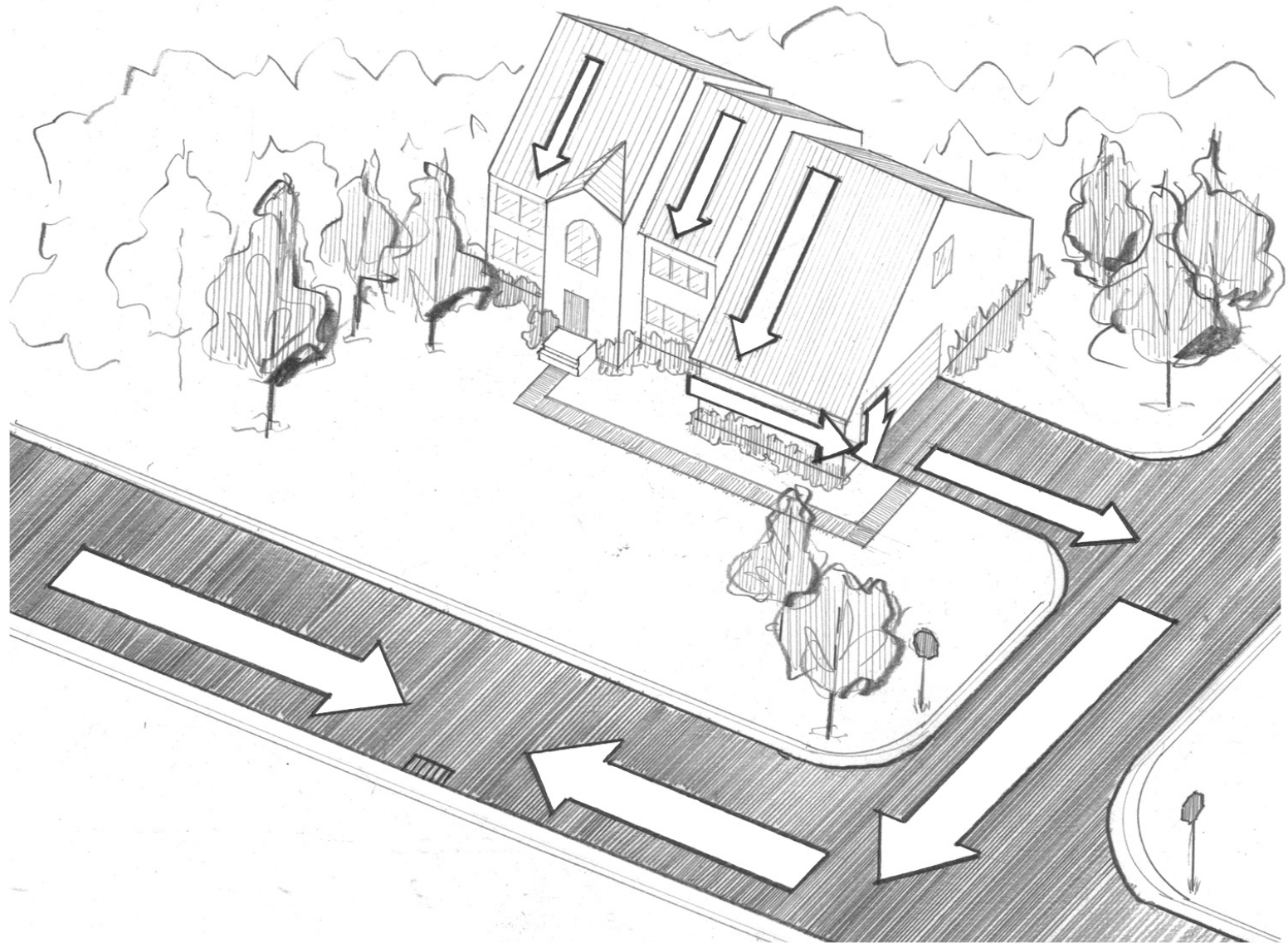


# Conventional Development



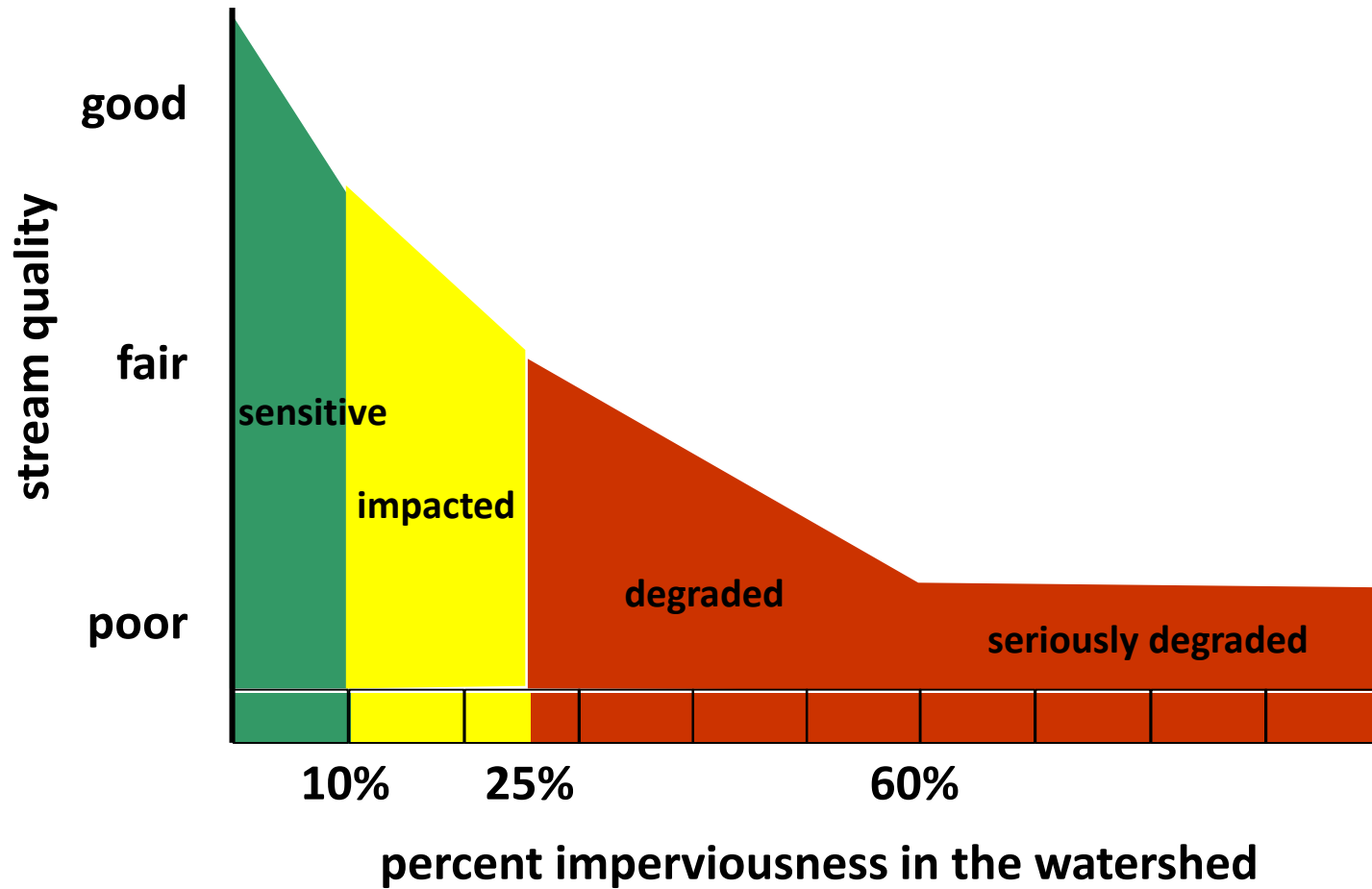


# The Stormwater “Super-Highway”





# Imperviousness effects stream quality





# Conventional Development

- Removal of all vegetation

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- Compacting the soil



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- Removal of all vegetation
- Compacting the soil
- Putting in large areas of hard (impervious) surfaces
- Reduced infiltration
- Increased in surface runoff
- **Stormwater runoff overwhelms streams:**
  - Causing flooding
  - Damaging public and private property
  - Polluting waterbodies and wildlife habitat



# Conventional Development

Collect and convey stormwater runoff through storm drains and pipes



# Conventional Development

This typically requires extensive use of pipes and sometimes large, costly, stormwater best management practices.





# Low Impact Development



# The LID “Toolbox”

## Why a toolbox?

- There are many practices that make up LID
- LID is not a one-size-fits-all approach
- Local conditions matter
  - High water table?
  - Clay soils?





**Limit site disturbance, clearing, and grading. Work with natural features.**





**Minimize Lot Clearing &  
Promote Tree Conservation**



# Bioretention

- Many applications, including
  - Parking lot islands
  - Median strips
  - Residential lots (e.g. rain gardens)
  - Office parks
- Landscape amenities, not just plumbing



**Bioretention**



# Bioretention



Source: Chatham County Cooperative Extension - NC State University





# Bioretention



# Bioretention





# Shared Driveway



# House Setbacks



- Relax side yard setbacks and allow narrow frontages to reduce total road length
- Relax front setback requirements to minimize driveway lengths





# House Setbacks: Shorter Driveways





# House Setbacks: Room for Open Space





# Permeable Paving

- Parking stalls
- Overflow parking
- Driveways
- Walkways and plazas





# Pervious Concrete Parking Lot

**Storm Water Soaks Through Concrete  
Less Runoff - Cleaner Water**



**NC STATE UNIVERSITY**



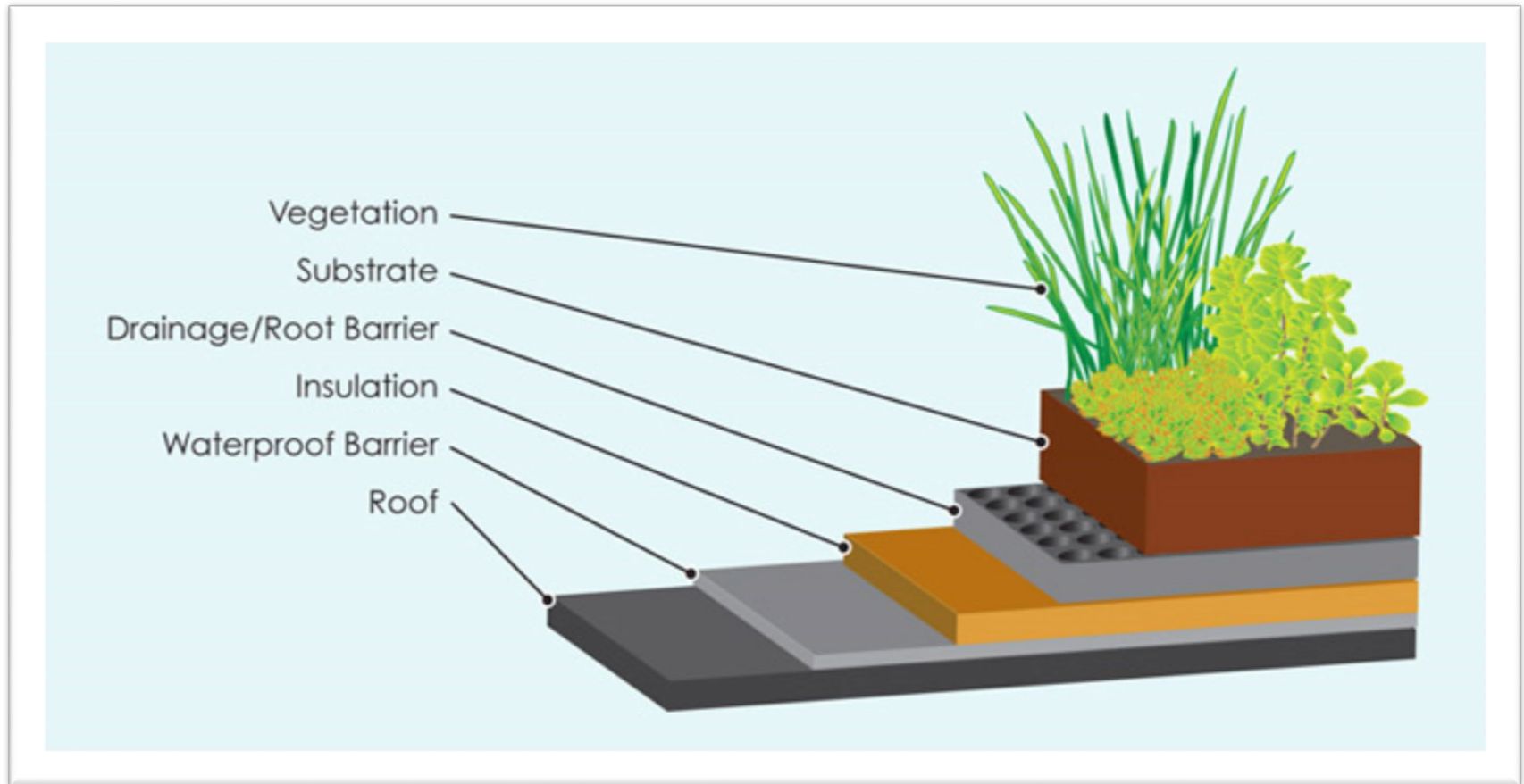
Partners: City of Wilmington Storm Water Services and Parks & Landscape  
Department, NC State University Cooperative Extension Service



# Rooftop Runoff: Green Roofs



# Green Roof Cross-Section





# Rainwater Harvesting

- Irrigation
- Vehicle washing (firetrucks)
- Street sweepers
- Toilet flushing





# Rainwater Harvesting

**3,000 Gallon Cistern**

**Pump Station**





# Retrofit Opportunities





# Retrofit: Bioretention







**Retrofit: Curb Cuts**



# Retrofit: Stormwater Wetland





# Retrofit: Stormwater Wetland





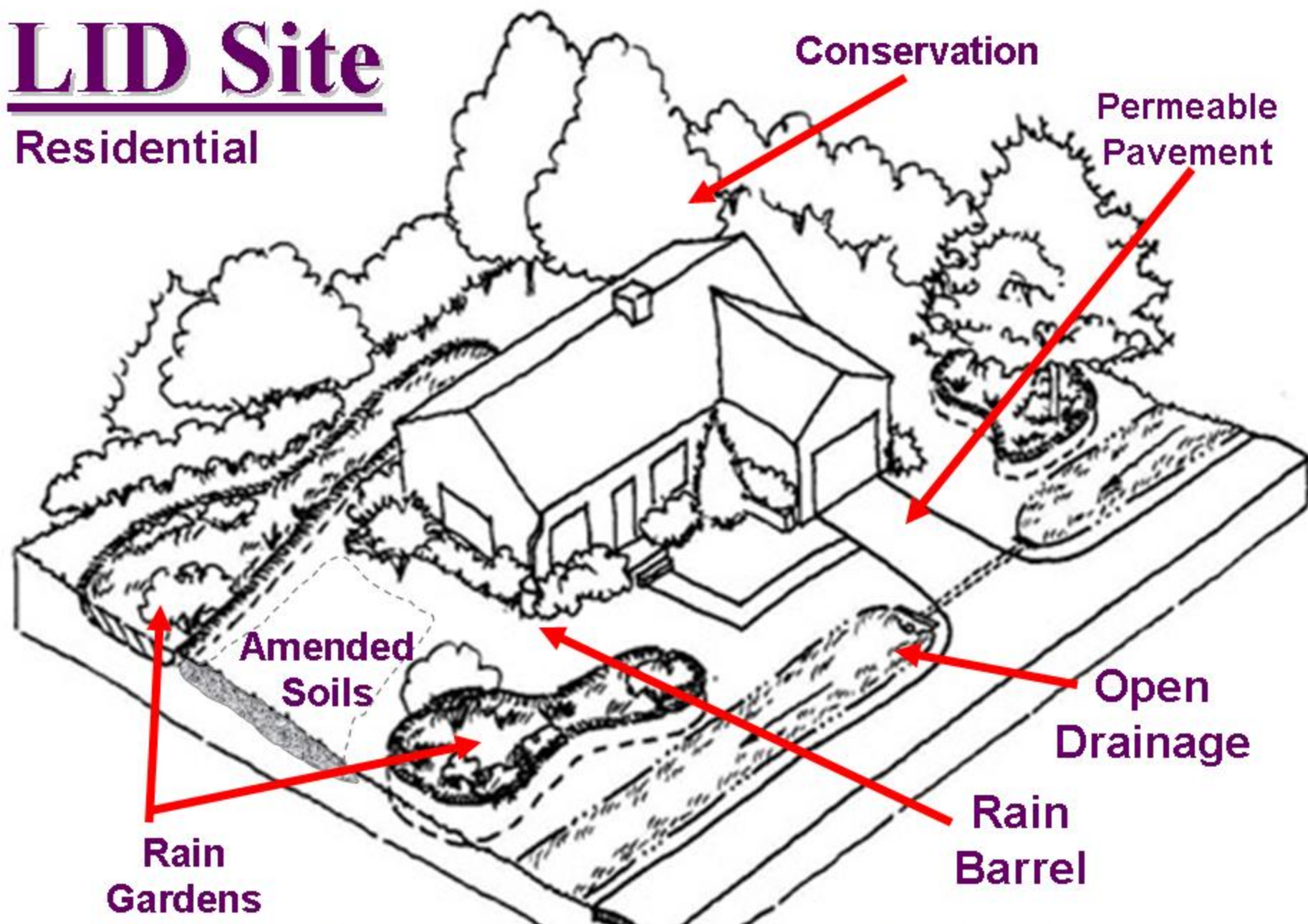
# Retrofit: Stormwater Wetland





# LID Site

## Residential



Create a Hydrologically Functional Lot

# Let's Compare...

LID	Conventional Development
Minimize land clearing	Removal of most or all native vegetation
Amended soils	Compacted soils
Minimize use of impervious surfaces	Excessive use of impervious surfaces
Infiltration	Costly Infiltration
Natural hydrology	Severely altered hydrology



# Why LID?

- Reduced capital costs
- Reduced operating costs
- Marketing benefits
- Increased value
- Health & productivity gains
- Water quality benefits over conventional development
- Personal satisfaction through stewardship



# Why Not LID?

- Outdated development codes
- Developers often not interested in “experimentation”
- Lawsuits? Lawsuits are often based on a deviation from standard practice
- Developers build what is selling; consumers buy what is on the market
- Some benefits not easily quantified or measured



**Where can I get more information?**





# LOW IMPACT DEVELOPMENT A GUIDEBOOK FOR NORTH CAROLINA

North Carolina State University • June 2009 • Published by North Carolina Cooperative Extension



# **Low Impact Development A Guidebook for North Carolina**

[www.onsiteconsortium.org/npsdeal/  
NC\\_LID\\_Guidebook.pdf](http://www.onsiteconsortium.org/npsdeal/NC_LID_Guidebook.pdf)



# North Inlet-Winyah Bay

## National Estuarine Research Reserve

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## Low Impact Development in Coastal South Carolina

### Project Description

The ACE Basin and North Inlet-Winyah Bay National Estuarine Research Reserves, the Center for Watershed Protection, and South Carolina Sea Grant Consortium were funded through a NERRS Science Collaborative grant to create a Low Impact Development Guide for Coastal South Carolina. This two-year project has provided local decision-makers with stormwater engineering specifications, land use planning resources, and site design practices that are tailored to the conditions of the South Carolina coast. Continue to check back to this page for more information as the project progresses.

- [Project Description](#)

### Low Impact Development in Coastal South Carolina: A Planning and Design Guide

Below are PDF files of the final document completed in September 2014. Chapter 4 is included as the full chapter, and separate PDFs for each specification.

**Low Resolution Version**  
(good for viewing online)

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#### Individual Chapters

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[Chapter 4 \(full\)](#)

[4.1 Introduction](#)

[4.2 Bioretention](#)

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# **Low Impact Development in Coastal South Carolina**

[www.northinlet.sc.edu/lid/](http://www.northinlet.sc.edu/lid/)



# Summary

As our state continues to develop, the need for effective stormwater management will also grow.

# Summary

Water quality regulations are often reactive measures to degraded environmental conditions. As responsible citizens, we should focus on preventative actions to safeguard our natural resources.



# Summary

In the long run, doing what is good for the environment is good for the economy. Clean water and healthy habitats makes coastal real estate more desirable.