Nothing Compares
NORTH CAROLINA

WATER RESOURCES DEVELOPMENT GRANT

GREEN STORMWATER INFRASTRUCTURE PROJECTS

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December 2, 2019

PRESENTATION OUTLINE

- WRD Grant Overview
- What/Why of GSI
- WRD-Funded GSI Projects
- GSI at Other School Sites

WHO: ELIGIBLE APPLICANTS

- Units of Local Government
  - ✓County Agencies
  - ✓Municipal Agencies
  - ✓State Agencies
- Non-Governmental Entities
  - ❖Co-Applicant NRCS-EQIP Stream Restorations
- NGO's Can Serve As Project Administrator

WHAT: ELIGIBLE PROJECTS

Up To 50% Cost-Share Funding For:

- ❑Water Management
  - ✓Stormwater BMPs (SCMs), GSI
  - ✓Water Harvesting
  - ✓Drainage/Flood Control
- ❑Feasibility/Engineering Studies
  - ✓Implementation of Eligible Projects
  - ✓Small Watershed Assessments, Water Management Studies
- ❑Stream Restoration
- ❑Water-Based Recreation
- ❑Coastal Infrastructure: Navigation (Dredging)

WHEN: APPLICATION CYCLES

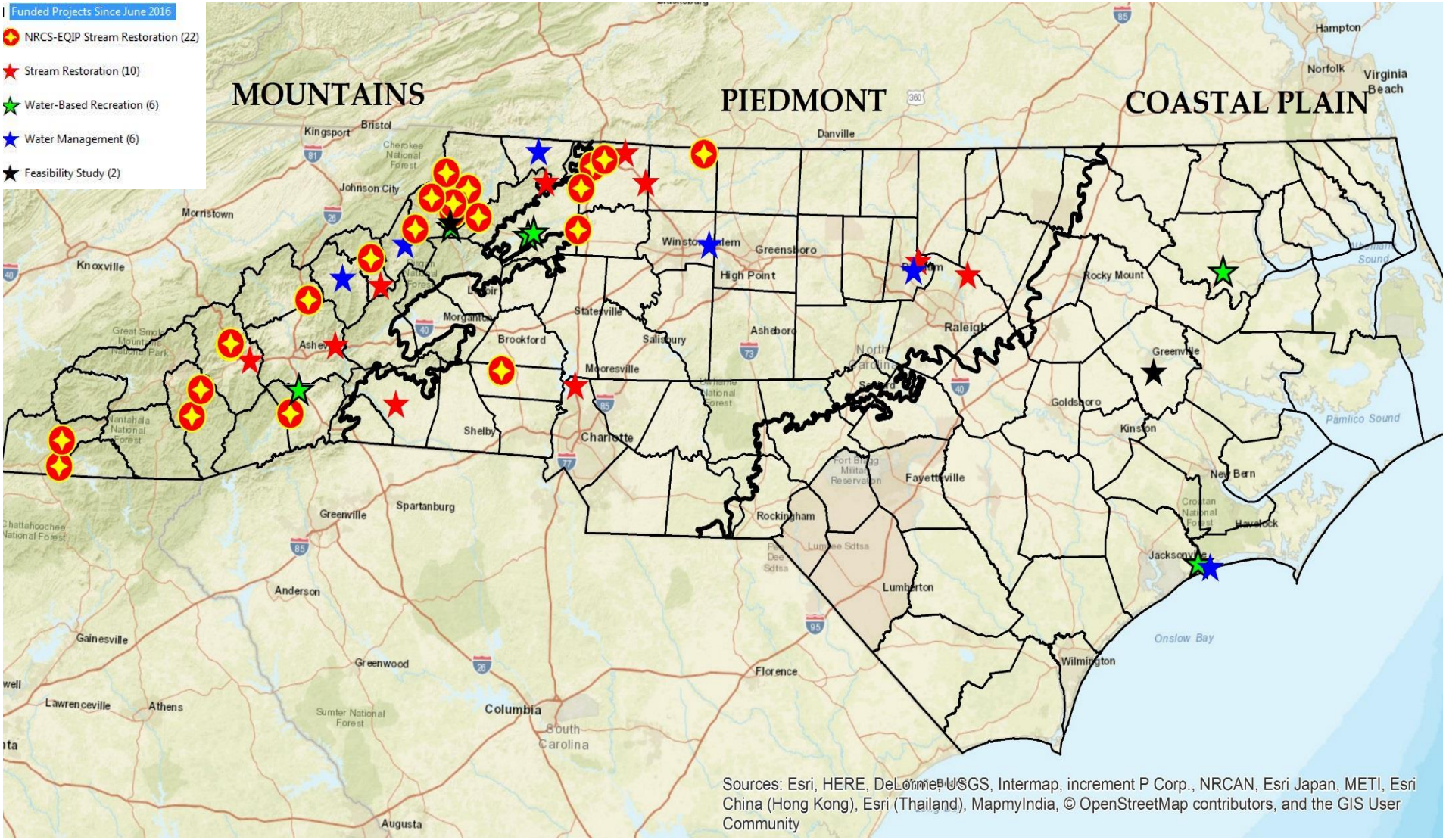
- Spring Application Cycle: Jan 1 – June 30

  Review Decisions: ~ October

- Fall Application Cycle: July 1 – Dec 31

  Review Decisions: ~ April

WHERE: STATEWIDE



Map Last Updated 4/30/18

APPLICATION PROCESS

1) Review WRDG Website
   https://deq.nc.gov/about/divisions/water-resources/water-resources-grants/financial-assistance

2) Prepare A Conceptual Narrative & Map/Plan

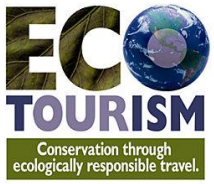
3) Call To Schedule A Pre-Application Site Visit
   a) Address Applicant's Questions
   b) Ask Applicant Questions
   c) Photo-Document Project Area

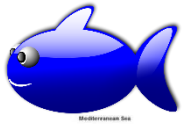
4) Submit Application

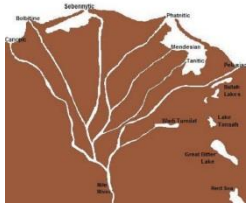
5) Await Award Decision: Range $10,000 ~ $200,000

BENEFITS & EVALUATION CRITERIA

- Economic Benefits
- **Environmental Benefits**
- **Environmental Impacts**
- Financial Resources
- Regional Benefits
- Social Benefits
- Benefits to State-Owned Properties







WHAT IS GREEN STORMWATER INFRASTRUCTURE?

- **Definition** (EPA): "Green infrastructure practices mimic natural habitats and absorb excess water; reduces and treats stormwater at its source while delivering environmental, social, and economic benefits."

- **Definition** (NCCN): "stormwater management that draws on or mimics natural processes to keep rainwater where it falls, soaking into the ground or evaporating back into the air rather than running into nearby streams"

- **Practices** (EPA): permeable pavements, rain gardens, bioretention cells (or bioswales), vegetative swales, infiltration trenches, green roofs, planter boxes, rainwater harvesting (rain barrels or cisterns), rooftop (downspout) disconnection, and urban tree canopies.

Design Goals

- B Hunt: Ecosystem Services> 1) Water Treatment; 2) Hydrologic Regulation
- NCCN: to ensure that, for at least 90% of storms, water runs off the developed landscape at no greater rate and volume than it ran off before development.

NCDEQ SCM Credit Document

A-3. Other SCM Benefits

Environmental Benefits

SCM Type	Protection of Streambanks	Protection of Stream Temp.	Removal of Bacteria	% TN Removal[1]	% TP Removal[1]
Bioretention	Excellent	Good	Excellent	35-65[2]	45-60[2]
Infiltration	Excellent	Excellent	Excellent	84	84
Permeable Pavement (infiltration)	Excellent	Excellent	Excellent	84	84
Permeable Pavement (detention)	Fair	Good	Good	30	30
Wet Pond	Fair	Poor	Fair	30	30
Stormwater Wetland	Good	Fair	Good	44	40
Sand Filter	Poor	Fair	Good	35	45
Rainwater Harvesting	Excellent	Excellent	Good	Variable[3]	Variable[3]
Green Roof	Good	Good	Good	30	30
DIS	Good	Good	Good	30	35
LS-FS	Poor	Poor	Poor	30	35

Source: https://files.nc.gov/ncdeq/Energy%20Mineral%20and%20Land%20Resources/Stormwater/BMP%20Manual/SCM-Credit-Doc-2018-11-7.pdf

NCDEQ Stormwater Design Manual

Economic, Social Benefits

Table 4: Cost, Community & Environmental Issues for SCMs

SCM	Construction Cost	Maintenance Level	Safety Concerns	Community Acceptance	Wildlife Habitat
Bioretention	Med-High	Med-High	N	High	High
Stormwater Wetland	Med	Med	Y	Med	High
Wet Pond	Med	Med	Y	Med	Med
Sand Filter	High	High	N	Med	Low
Permeable Pavement	Med-High	High	N	High	N/A
Infiltration Device	Med	Med	N	Med-High	Low
Filter Strip	Low	Low	N	High	Med
Treatment Swale	Low	Low	N	High	Low
Dry Pond	Med	Med	Y	Low	Low
Rooftop Runoff System	Med-High	High	N	High	Med

Source: https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permit-guidance/stormwater-bmp-manual

Pervious & Impervious Surfaces

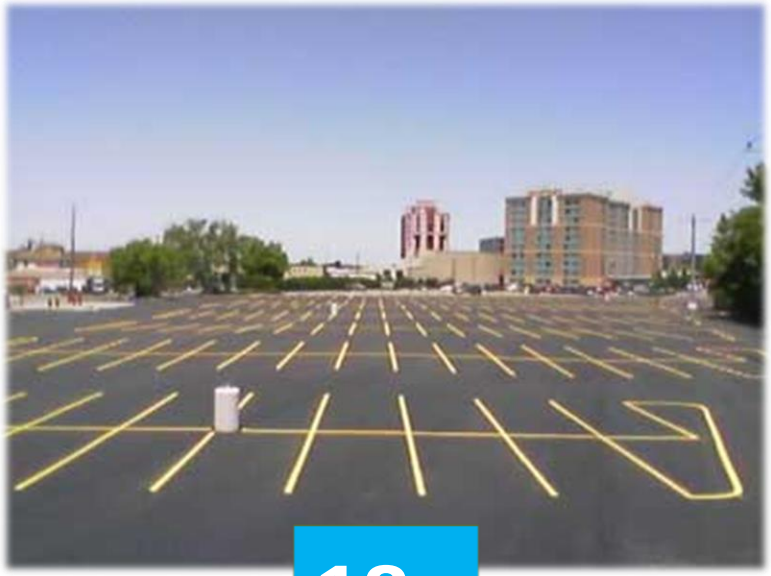
Impervious 'hard' surfaces (roofs, roads, large areas of pavement, and asphalt parking lots) increase the volume and speed of stormwater runoff. This swift surge of water erodes streambeds, reduces groundwater infiltration, and delivers many pollutants and sediment to downstream waters.

Pervious 'soft' surfaces (green roofs, rain gardens, grass paver parking lots, and infiltration trenches) decrease volume and speed of stormwater runoff. The slowed water seeps into the ground, recharges the water table, and filters out many pollutants and sediment before they arrive in downstream waters.

Conceptual diagram illustrating impervious and pervious surfaces. Impervious surfaces are hard and increase stormwater runoff, causing pollutant and sediment delivery in downstream waters. Pervious surfaces are soft and decrease stormwater runoff, which filters out pollutants and sediments before they arrive in downstream waters.
Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science. Source: Chesapeake and Atlantic Coastal Bays Trust Fund. 2013. Stormwater Management: Reducing Water Quantity and Improving Water Quality. IAN press. newsletter publication.

Development ➡ Increased Stormwater

- Impervious Surfaces: (Buildings, Pavement, Roads) > Less Stormwater Seeps Into Ground
- Stormwater: Volume Increased 18x By Impervious Surfaces



18x

Image Source: NC DEQ, DEMLR

No Stormwater Management

No Stormwater Management

No Stormwater Management

GSI Solution – Grass!

GSI Community Benefits

Source: NPRA 2017. A Resource Guide for Planning, Designing and Implementing Green Infrastructure in Parks.

GSI Community Benefits

Green Infrastructure Benefits and Practices

This section, while not providing a comprehensive list of green infrastructure practices, describes the five GI practices that are the focus of this guide and examines the breadth of benefits this type of infrastructure can offer. The following matrix is an illustrative summary of how these practices can produce different combinations of benefits. Please note that these benefits accrue at varying scales according to local factors such as climate and population.

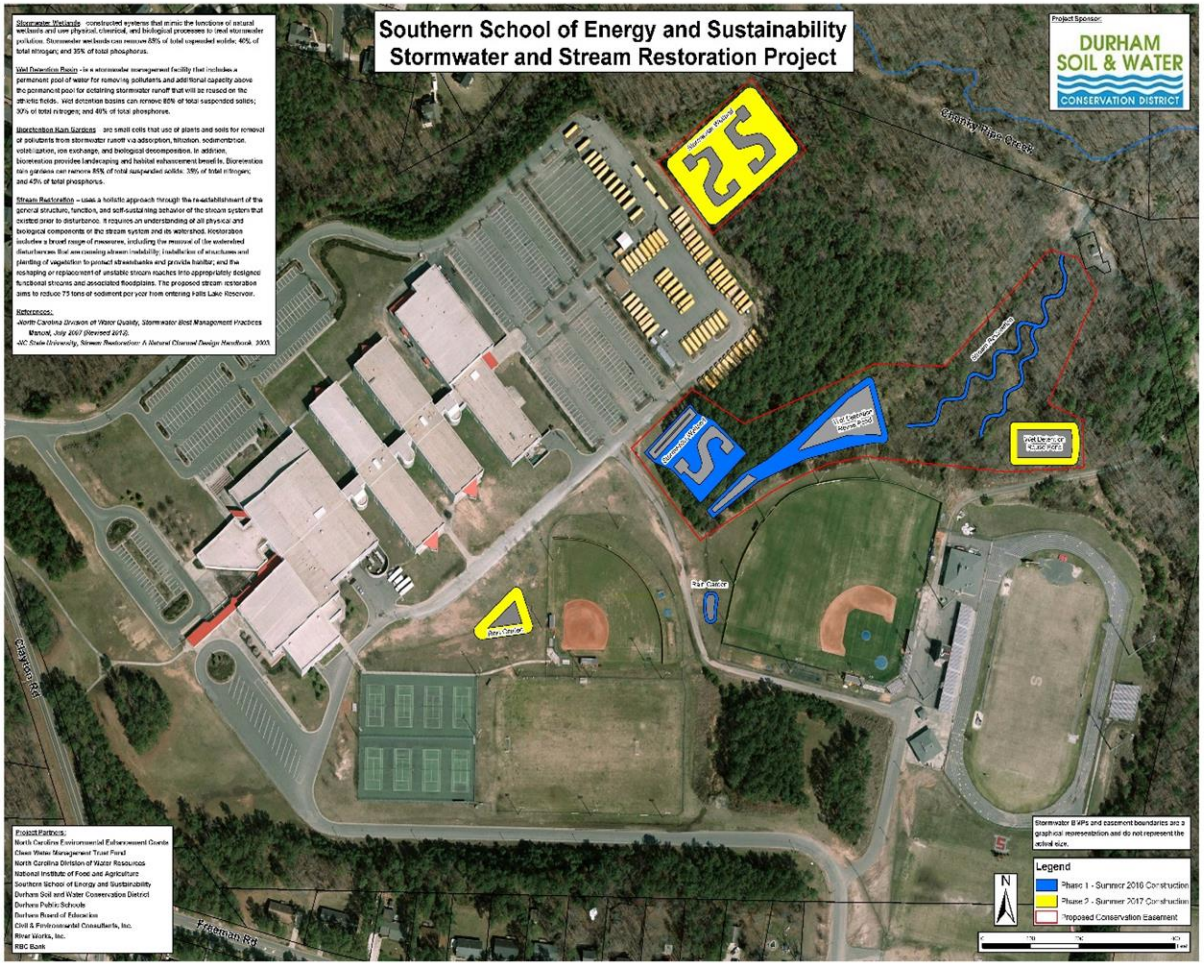
Benefit	Reduces Stormwater Runoff											Improves Community Livability						
	Reduces Water Treatment Needs	Improves Water Quality	Reduces Grey Infrastructure Needs	Reduces Flooding	Increases Available Water Supply	Increases Groundwater Recharge	Reduces Salt Use	Reduces Energy Use	Improves Air Quality	Reduces Atmospheric CO_2	Reduces Urban Heat Island	Improves Aesthetics	Increases Recreational Opportunity	Reduces Noise Pollution	Improves Community Cohesion	Urban Agriculture	Improves Habitat	Cultivates Public Education Opportunities
Practice										CO_2								
Green Roofs	●	●	●	●	○	○	○	●	●	●	●	●	◒	●	◒	◒	●	●
Tree Planting	●	●	●	●	○	◒	○	●	●	●	●	●	●	●	●	◒	●	●
Bioretention & Infiltration	●	●	●	●	◒	◒	○	○	●	●	●	●	●	◒	◒	○	●	●
Permeable Pavement	●	●	●	●	○	◒	●	◒	●	●	●	○	○	●	○	○	○	●
Water Harvesting	●	●	●	●	●	◒	○	◒	◒	◒	○	○	○	○	○	○	○	●

● Yes ◒ Maybe ○ No

Source: CNT 2010. Value of GI: Guide To Recognizing Economic Env & Social Benefits

Southern High School Stormwater Durham County

- Public School of Energy & Sustainability
- **Awarded $90,000** towards $555,461 project (2015)
- Constructed:
  1) Stormwater Wetland
  2) Wet Detention Pond
  3) Stream Restoration
- Overall Goal: Completely capture, treat, &/or reuse 1" stormwater runoff within campus.



Southern High School Stormwater
Durham County

Stormwater Wetland – April 2017

Southern High School Stormwater
Durham County

Stormwater Wetland – June 2018

Southern High School Stormwater
Durham County

Wet Detention Pond

Southern High School Stormwater
Durham County

Stream Restoration

Avery County Aquatic Center LID Newland (Avery County)

- New County Aquatics Facility
- **Awarded $187,000** towards $394,000 project (2017)
- Constructed four bioretention areas and a bioswale to provide treatment to over 100 acres.

Avery County Aquatic Center LID
Newland (Avery County)

Cub Creek Park Bioretention Wilkesboro (Wilkes County)

Cub Creek Park Bioretention– Wilkesboro (Wilkes Co)

- Popular Town Park
- **Awarded $58,250** towards $118,000 project (2012)
- Constructed 0.5 ac bioretention cell to treat 22 acres

Cub Creek Park Stream Restoration
Wilkesboro (Wilkes County)

Stream Restoration

Bob Martin Agricultural Complex
Williamston (Martin Co)

- NCDA&CS Facility
- **Awarded $75,000** towards $183,900 project (2013)
- Installed four 10,000 gallon connected cisterns

Bob Martin Ag Complex – Williamston (Martin Co)

- Reuse water in coliseum for equestrian, motorcross & other events
- 1,000 gallon tank can be filled in 8 minutes
- Project paid for itself in 3 years per savings on facility water bill.

UNC Wilmington Center for Marine Science

Bioretention

Raingarden

Wetland Boardwalk

Constructed Wetland

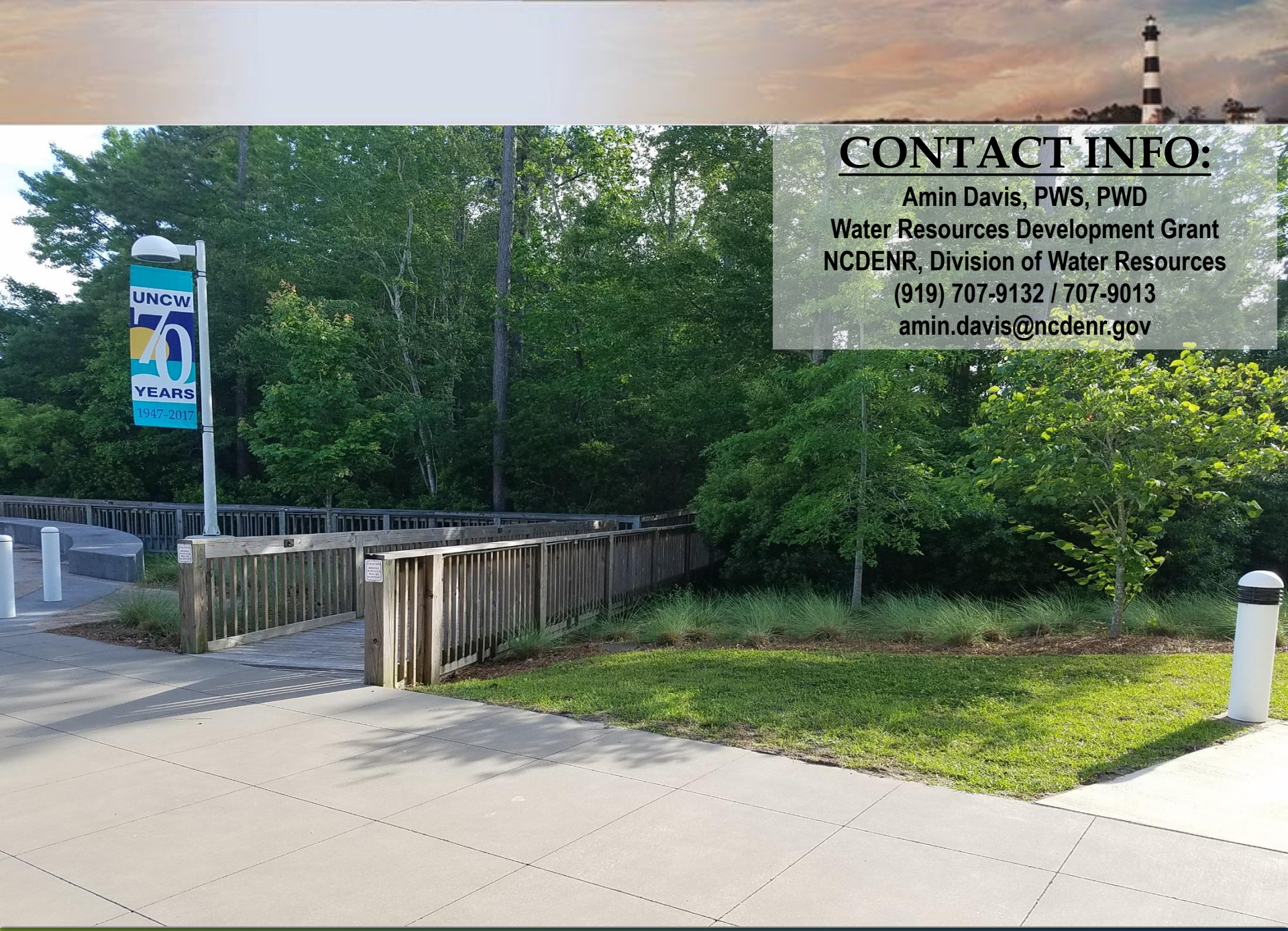
Bioretention – Kingswood Elementary School Cary (Wake Co)

Bioretention – West Cary Middle School (8/10) Cary (Wake Co)

Bioretention, Permeable Pavement, Trees
Edison High School, Minneapolis, MN (7/18)

Linear Bioretention – NC State University Raleigh (Wake Co)

Constructed Wetland – NC State University Raleigh (Wake Co)



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