

# WNC Stormwater Summit 2017



## New Belgium-East Coast Brewery : Brownfield to Green Infrastructure

Fred Grogan, Landscape Architect



*balance through proper planning*



# Context

- 17.5 acre site
- Previously Stockyard & Storage Units





# Strengths of the Process: Multi-Disciplinary Dialogue

- ‘Environmental Ethic’ was consistently reinforced by Clients and the Design Team (workshops, etc.)
- A Leadership in Energy & Environmental Design (LEED) certified project
- Importance of water quality was kept throughout process...
- Impervious was ultimately reduced, but placeholders kept stormwater treatment in the forefront









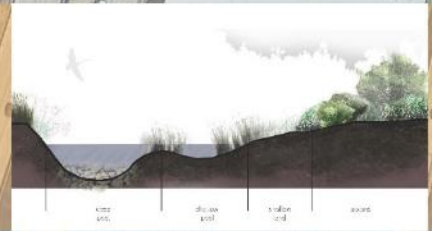
# New Belgium Brewing: East Coast



- Bio Swale
- Bioretention
- Porous Pavement
- Stream Restoration
- Constructed Wetland
- Green Streets/Complete Streets
- Phytoremediation



# Employee Parking Bioretention Area



**A** CONSTRUCTED WETLAND SECTION

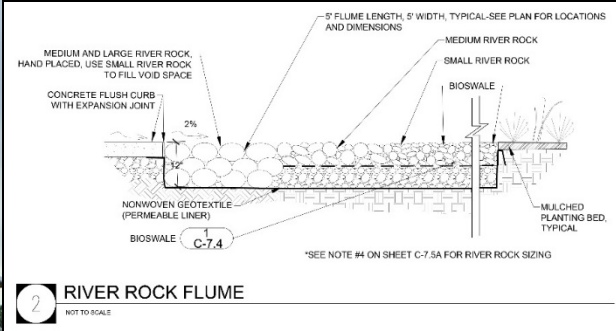
**B** LEVEL SPREADER SECTION

GREENWAY  
(view looking north)

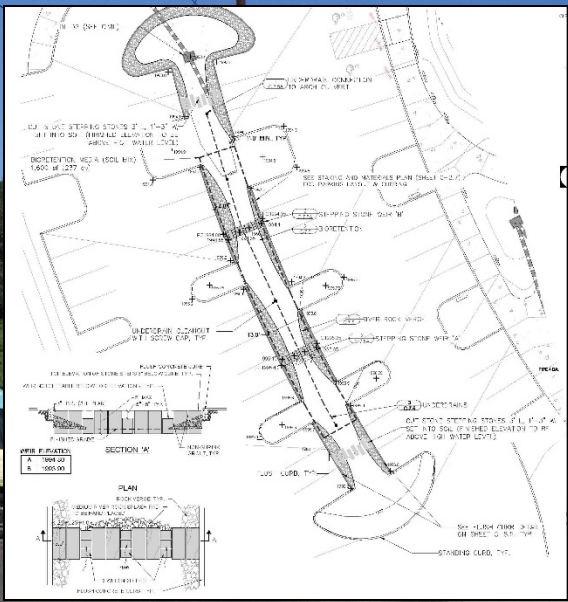
BIOSWALE

STORMWATER BUMP-OUT GREEN STREETS







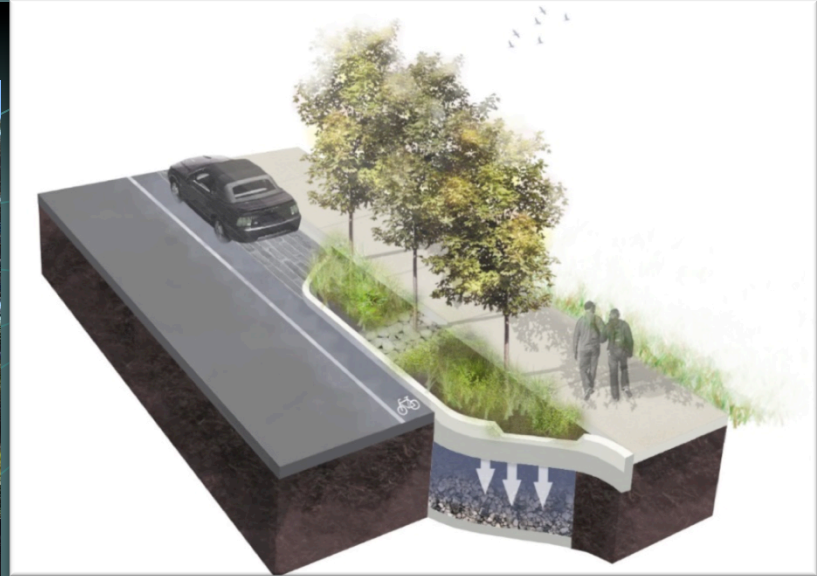




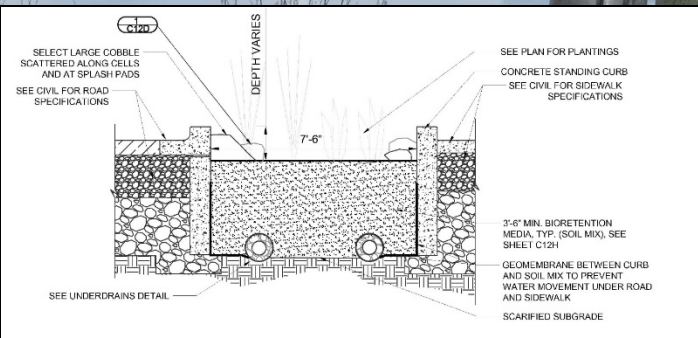
# Green Streets & Complete Streets



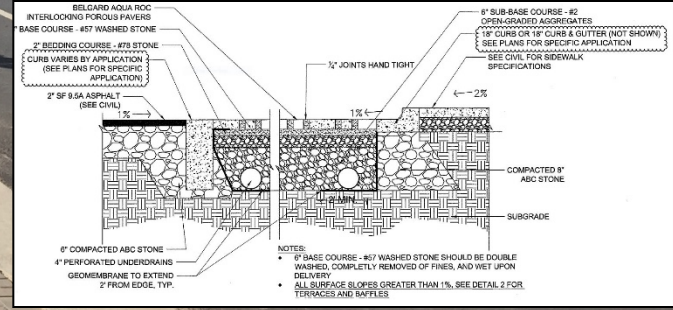










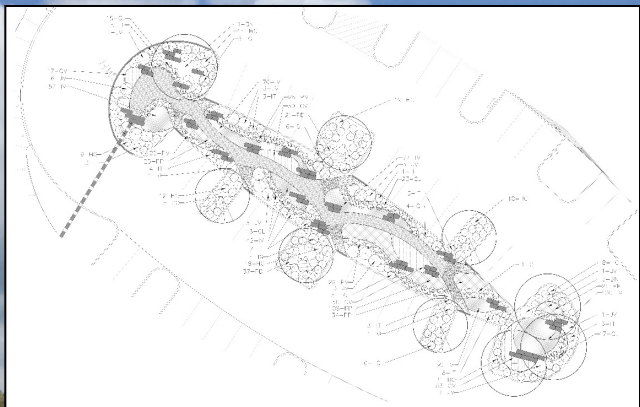




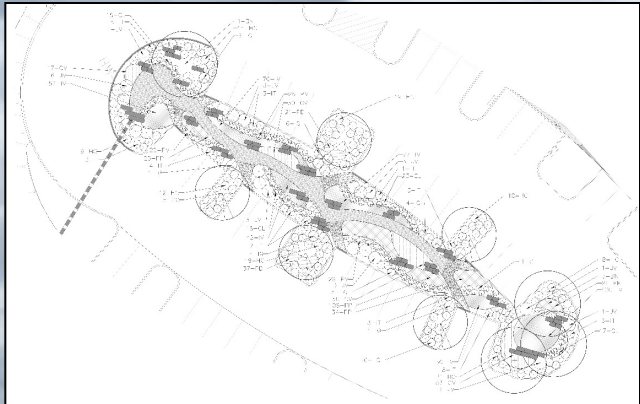
# Visitor Parking Lot- Bio Swale



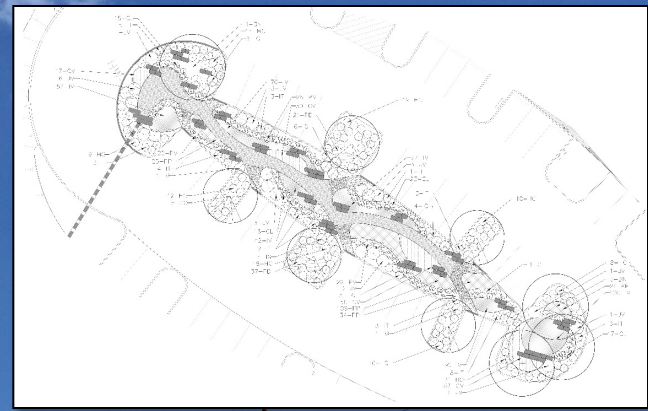


















# Bioretention Cell and Level Spreader

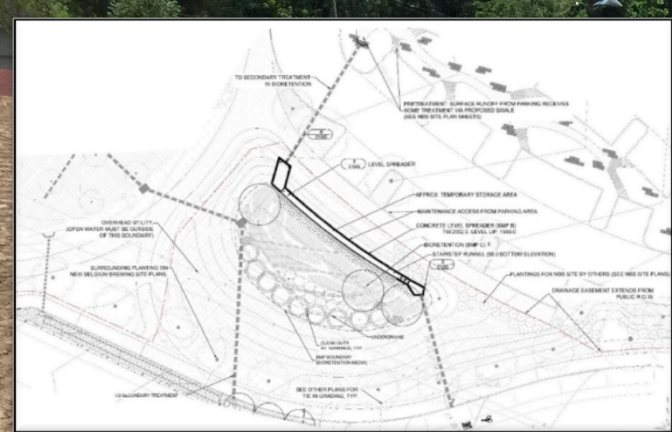


DOWNTOWN ASHEVILLE







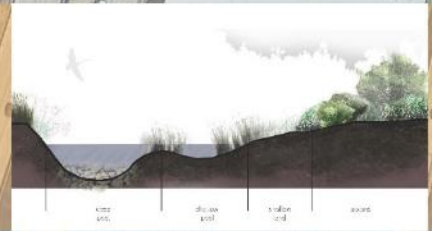








# Constructed Wetland



**A** CONSTRUCTED WETLAND SECTION

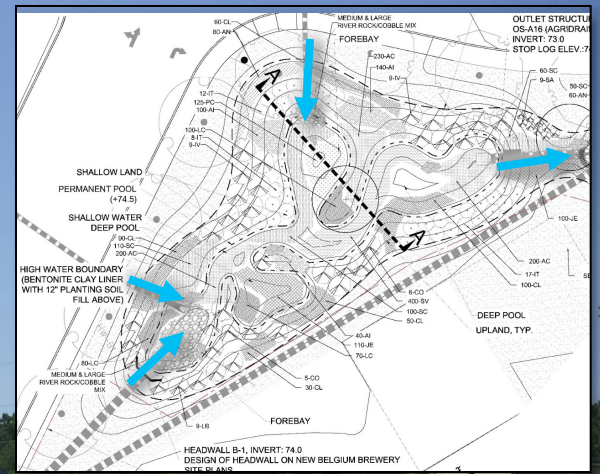
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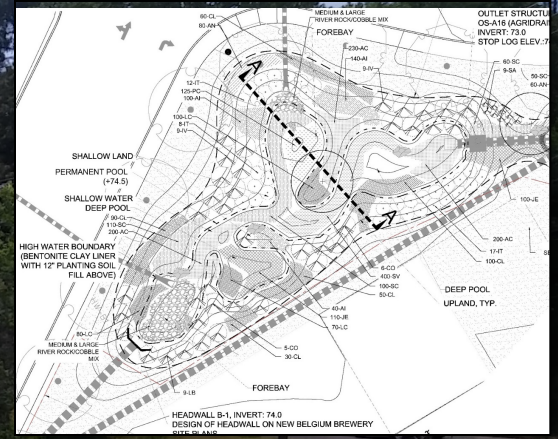
BIOSWALE

STORMWATER BUMP-OUT  
GREEN STREETS

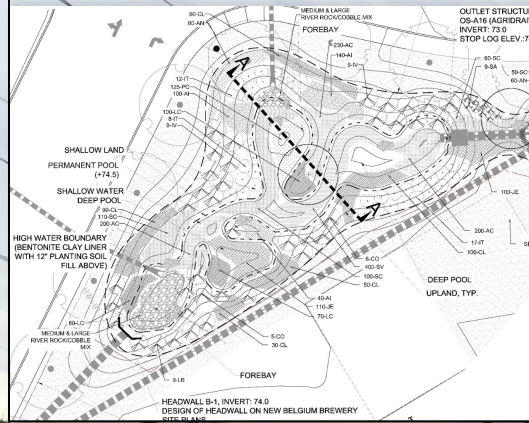








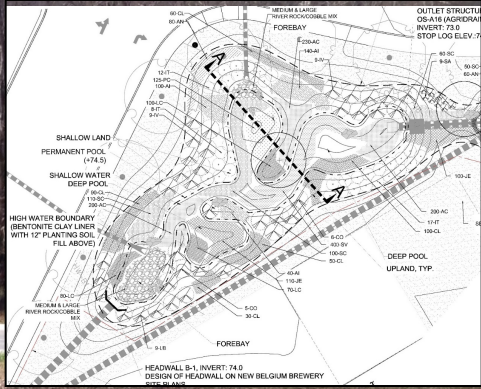






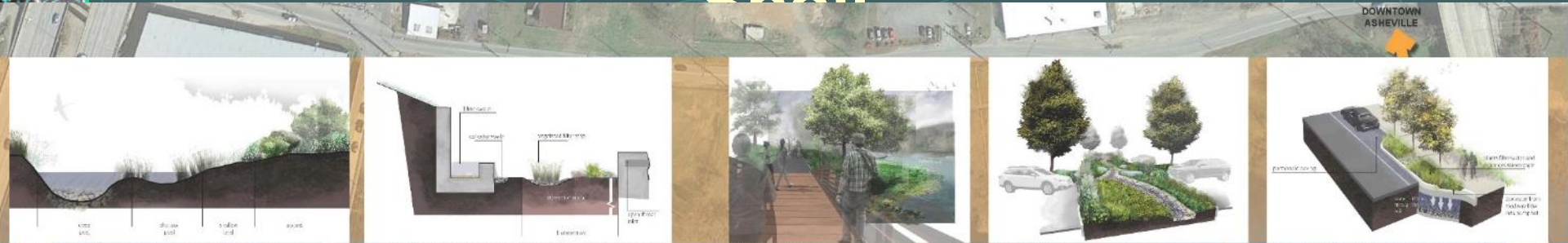








# Phytoremediation Berm for Brownfield Soil





# Phytoremediation Berm for Brownfield Spoil

- **Phytoremediation** - Use of living green plants removal, degradation, or containment of contaminants
- Encourage healthy plant communities & pollutant uptake
- Example Plants - *Andropogon*, *Liatris*, *Panicum*, *Yellowwood*, *Honeylocust*, *Redbud*



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balance through proper planning



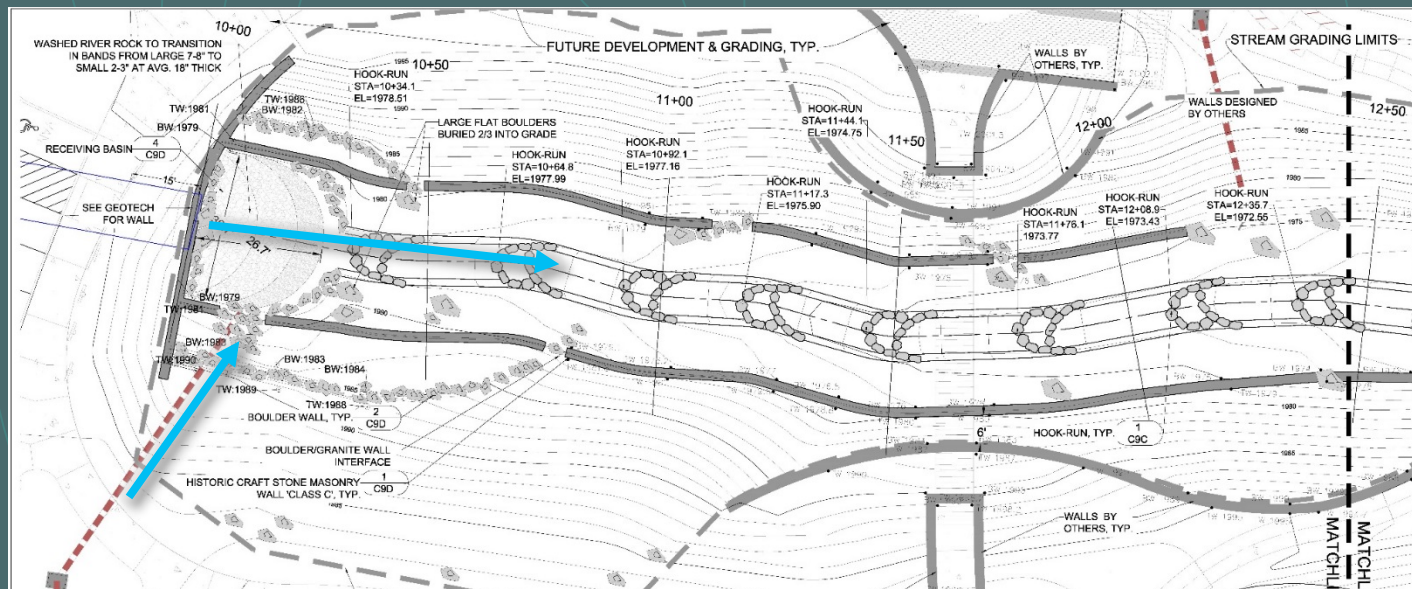
# Stream Restoration





# Stream Restoration

- Arch culvert to span stream
- Stream morphology
  - Floodplain bench
  - Drop pools
- Extensive planting















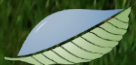


















# Questions

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# WNC Stormwater Summit

February 22, 2017



The City of  
*Brevard*  
North Carolina



# Brevard

Brevard City Limits / ETJ

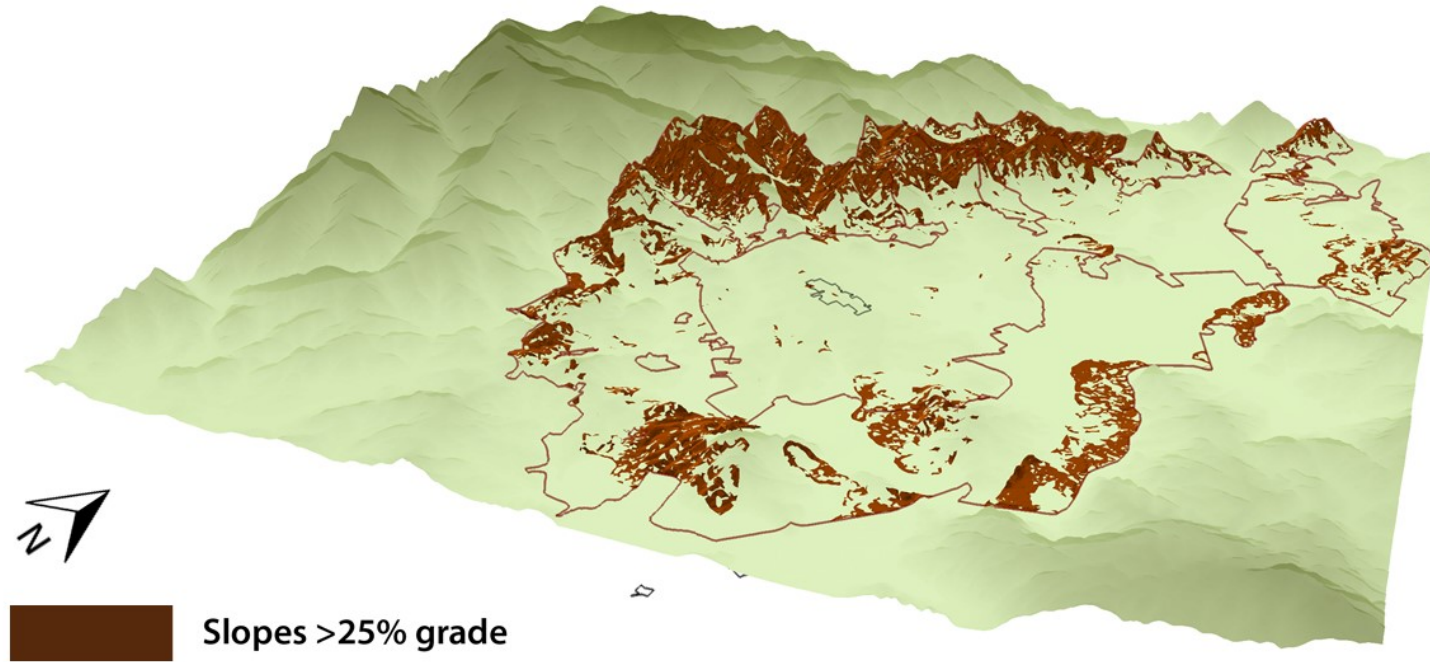
Heart of Brevard





# Restricted Area – Steep Slopes

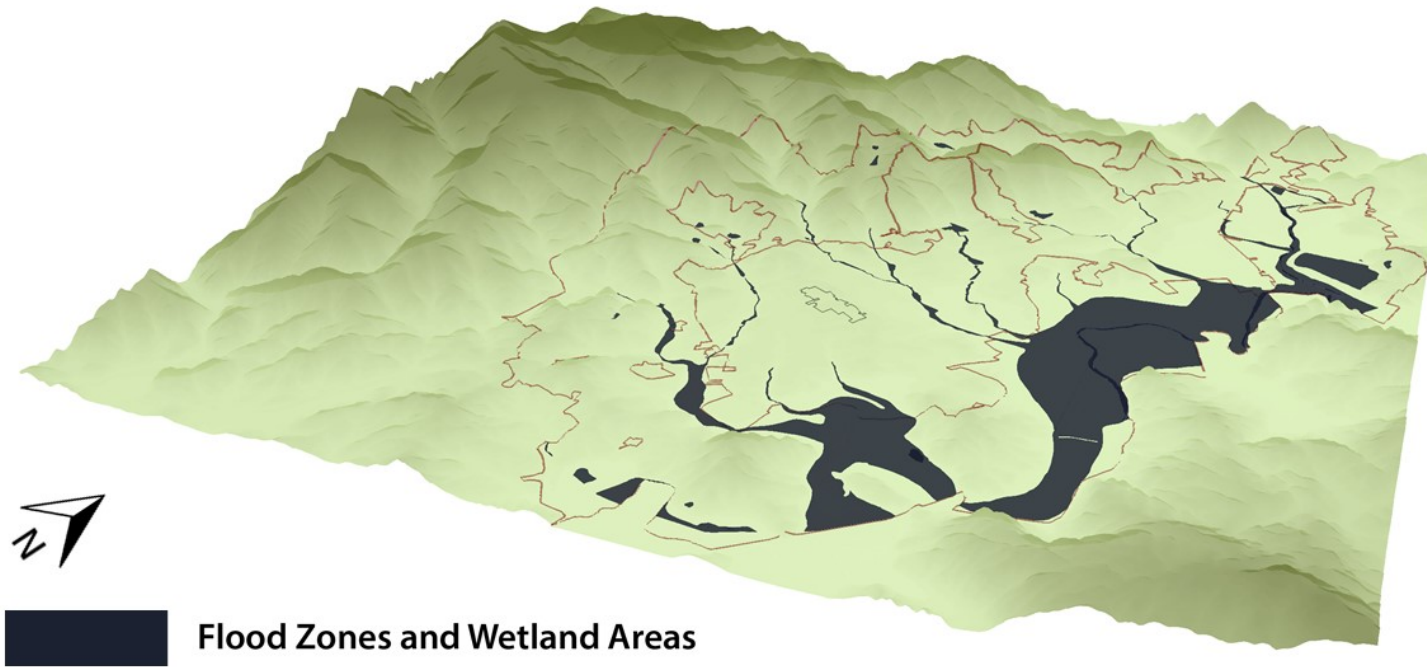
Steep Slopes



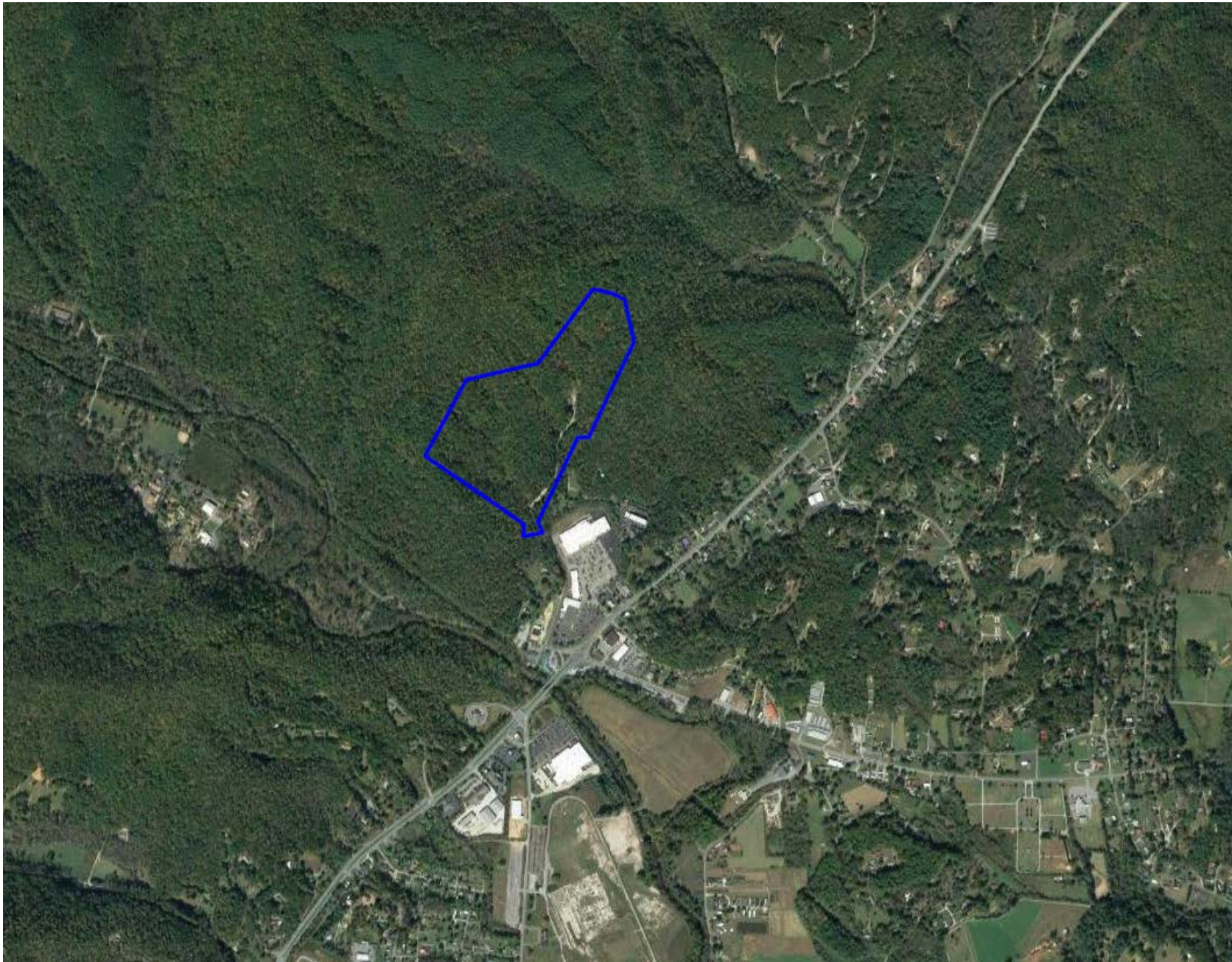


# Restricted Area – Floodplains

Flood Zones and Wetlands















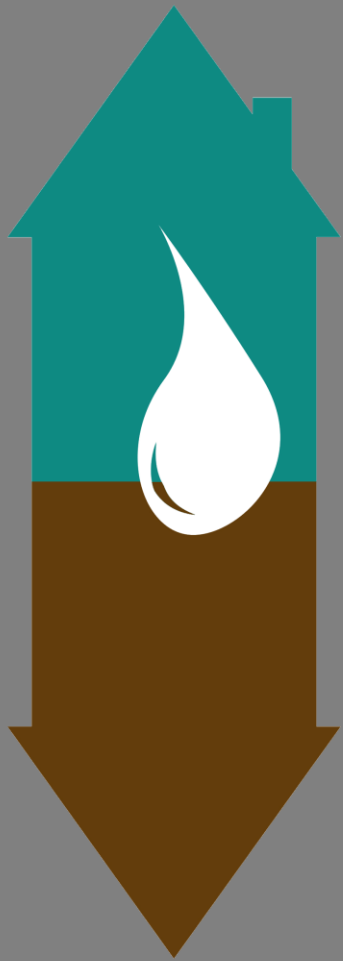












**WATER  
RICH**  
A RiverLink Initiative



# Water Reuse, Infiltration, and Conservation for the Home

RiverLink's

Residential Stormwater Management Program



## Water Reuse, Infiltration, and Conservation for the Home

### Homeowner Benefits

- ❑ **Reduce potable water use**
- ❑ **Improve drainage onsite**
- ❑ **Increase aesthetics and property value**
- ❑ **Create a productive landscape (edible, pollinator, wildlife)**





## Water Reuse, Infiltration, and Conservation for the Home

### Watershed Benefits

- ❑ Reduce storm water flows
- ❑ Decrease soil erosion
- ❑ Filter and reduce pollutants
- ❑ Recharge groundwater
- ❑ Support base flows in streams
- ❑ Improve receiving waters





## Resources

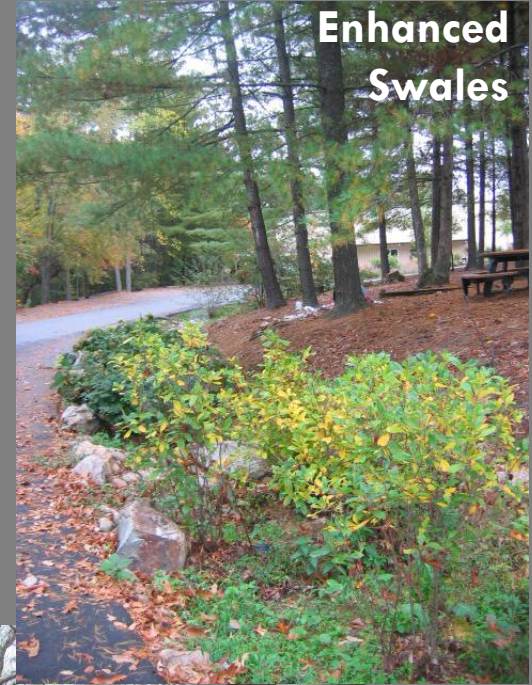
- ❑ **Online Handbook**
  - ❑ Hydrologic Principles
  - ❑ Site Inventory
  - ❑ Site Analysis
  - ❑ Stormwater runoff calculation
  - ❑ Stormwater BMP selection
  - ❑ BMP Construction information
  - ❑ Plant Lists
- ❑ **Workshops**
- ❑ **Demonstrations**

Ideal for:

- ✓ Urban Areas
- ✓ Residential
- ✓ Small Lots ( $\leq 1$  acre)









# WaterRICH Goals



- ❑ Improve water quality in the French Broad River Watershed
- ❑ Provide user friendly resources about stormwater management specific to WNC
- ❑ Empower the homeowner to create more sustainable landscape
- ❑ Provide Hands-on and in-class workshops
- ❑ Enroll 75 Pilot homes
- ❑ Build Incentive based Certification Program





# WaterRICH – Grow!



- Expand into watershed
  - ▣ Beyond Buncombe County
- Build partnerships
  - ▣ Municipalities
  - ▣ Non-profits
  - ▣ Sponsorships
- Create financial incentives
  - ▣ Reduction in stormwater fees
- Identify new funding opportunities
  - ▣ Collaborative grant applications
- Grow beyond residential
  - ▣ Small commercial sites, public schools, institutions







Thank You



Amy Annino,  
Watershed Resources Manager