

City of Asheville

Craven Street Improvement

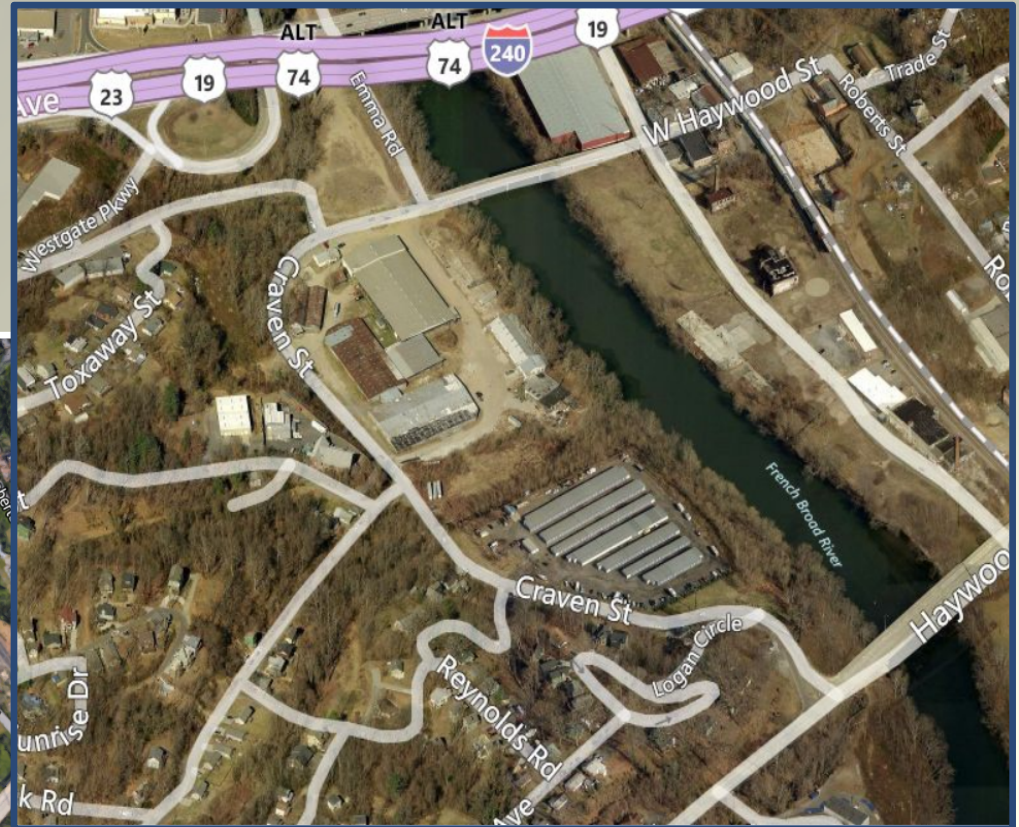
Brownfields to Green Infrastructure

McCray Coates, PE
Interim Streets Division Manager
February 22, 2017



Site

- 17.5 Acre existing site
- 100 Year Floodplain
- Brownfield



COA partnership



- Clean Water Management Trust Fund/RiverLink
 - Stormwater BMP's
- Economic Development Administration
 - Entire project
- GoldenLeaf Foundation
 - Roadway and Sidewalk
- Tourism Development Authority
 - Greenway and trail Head
- Buncombe County
 - Property
- NBB
 - Property



Complexities of the Process



- Stormwater Improvements broken into the following categories
 - Craven Street Improvements
 - Stream Restoration
 - NBB site construction
- Brownfield Site
 - Materials



Green Streets and Complete Streets CWMTF







Bio Retention Area and Level Spreader





Constructed Wetland





EQUINOX

Balance through proper planning

Phytoremediation Berm for Brownfield Spoil





Phytoremediation Berm for Brownfield Spoil

- **Phytoremediation** – Use of living green plants removal, degradation, or containment of contaminants
- Encourage healthy plant communities & pollutant uptake

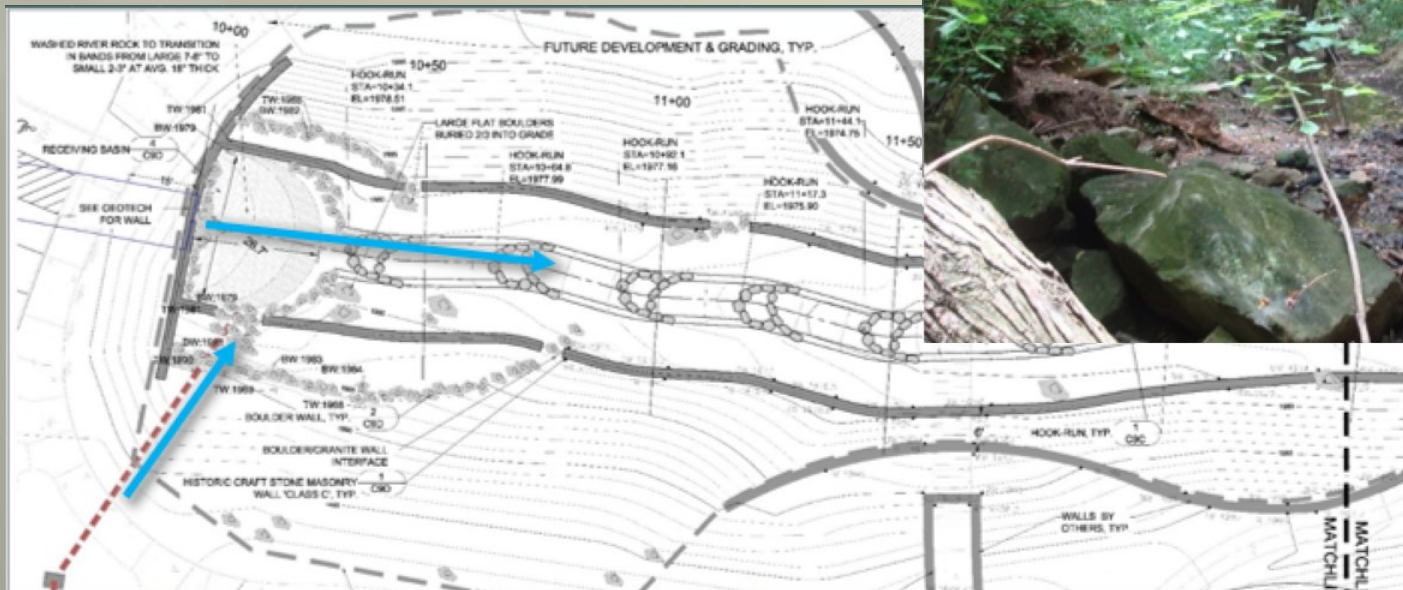


Stream Restoration



Stream Restoration

- Easement donated by NBB
- Splits NBB site
- Extensive coordination





EQUINOX

balance through proper planning



EQUINOX

balance through proper planning



Greenway and Trail Head



- French Broad Greenway West
 - Second section in planning
- Place Maker for the Area



QUESTIONS?

Phase II Stormwater Permit Assistance And Stormwater Control & Treatment Measures



Eric Romaniszyn
Executive Director

828-476-4667

info@haywoodwaterways.org

www.haywoodwaterways.org

NPDES Phase II Stormwater Permits

6 Minimum Measures

Public Education and Outreach

Public Involvement and Participation

Illicit Discharge Detection and Elimination

Construction Site Stormwater Runoff Controls

Post-Construction Stormwater Management

Pollution Prevention and Good Housekeeping

Towns of Clyde (9 Years)

Town of Waynesville (10 Years)

- Earned Income for Haywood Waterways
 - IRS limit, under 50%
 - 20% is common
 - Meets our mission
- Fiscal Year contract basis (July 1 – June 30)
- “Not to Exceed”
 - Quotes range from \$9,000 to \$12,000, actual \$6,400 average
 - Hours, mileage, supplies, advertisements, printing
 - Town sharing
 - Over and above other funding sources
- Quarterly Reports and Invoices

Topics Covered:

Bacteria	Pesticides
Car washing	Pet waste
Drain dumping	Rain barrels
Drainage	Recycling
Dumpsters	Riparian buffers
Fertilizers	Stream clean-ups
Hazardous Waste	Wash runoff
	Yard waste

Minimum Measure #1

Public Education and Outreach

- Press releases
 - Newspapers, social media, newsletters, website, email distribution lists
- Presentations
 - Public officials
 - Community organizations
 - Summer camps
 - Schools
 - Chamber of Commerce/Businesses
 - Erosion & Sediment Control trainings



Kids in the Creek



Leaders in the Creek



Mountain H2OPro



Create and Distribute Educational Materials

A Report to the Citizens of the Pigeon River Watershed, Haywood Co., North Carolina, Issue 3, November 2016

State of the Watershed

The State of the Watershed is an annual report created by the Haywood Waterways Association for the citizens of Haywood County. It provides an update on the quality of our streams, good and bad, and some of the changes taking place in the landscape.

Haywood County is a headwater community. Because the county line follows the mountain ridges, all the water in the county originates from springs or as rainfall. No rivers or streams flow into the county, which puts us, as its citizens, in a unique situation - we have a lot of control over how clean we want our streams.

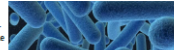


Pigeon River Watershed Summary

- Allens Creek, upper Jonathan's Creek, upper Richland Creek, and upper Pigeon River have water quality ranked among the best in western NC.
- 14 of the 24 monitored streams have water quality grades below the average for western NC.
- Haywood County has six stream sections and one reservoir (Lake Junaluska) on the NC 303(d) list of impaired waterways.
- Sedimentation remains the #1 water quality problem in our streams and lakes.
- In 2015 the estimated population of Haywood County was 61,079 and remains a popular tourist and retirement community.

Fecal Coliform Pollution: Sources and Impacts

Fecal coliform is one water quality parameter that is monitored to determine the health of a stream. Fecal coliform is a term used to describe the bacteria complex found in human and animal feces. These bacteria are necessary for the digestion process and while inside the intestine fecal coliform is not harmful. However, if released to the environment it can become unsafe for humans. Every year swimming areas across the US are shut down due to high fecal coliform levels. The safe levels for fecal coliform, set by the Environmental Protection Administration (EPA), is 400 colonies/100 ml. When fecal coliform levels exceed the



bec
spor
fort
de ti
se ti
roes
hep
ues
into
mon
mp
gnc
e fe
rof
A

Getting Ready for Growth in Haywood County



Haywood Waterways Association

PO Box 389
Waynesville, NC 28786

Phone: 828-452-9077
info@haywoodwaterways.org
www.haywoodwaterways.org

Recicle los Peligros del Hogar

Consejos de Reciclaje para Ayudarle a ser el Mejor Reciclador!

El Aceite usado del motor, liquido de transmisión y anticongelante
Aceptado en los 10 Centros de Servicio en el Condado de Haywood.



Pintura

Solamente Pintura Secal Para secar la pintura, hay que mezclarla con arena de gatos en la lata. Después, puede tirarlo en el compactador de basura.



Reciclar—Sí!!!

Pilas de uso del Hogar

Para evitar fuegos, separe las pilas alcalinas de las pilas recargables de litio. Luego, ponga las pilas que separe en una bolsa de cremallera superior. Entregue la bolsa de pilas a la operadora.



INNOVATIVE STORMWATER CONTROLS

CASE STUDY: BETHEL ELEMENTARY SCHOOL

HAYWOOD COUNTY, NORTH CAROLINA

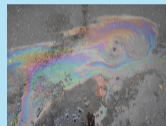


¡POR FAVOR NO BOTE!!

Recuerde drenajes de tormenta botan las aguas no tratadas en los cursos de agua más cercanos.



Basura



Aceite en un parqueo

Recortes de Césped



It's Not Just Dirt

A Guide for Preventing Erosion and Keeping Our Water Clean

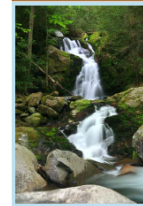


Photo: Bryan Hickox

Haywood County has some of the purest, most scenic waterways found anywhere.

Haywood County is a special place to live.

Our Watershed

Because of its mountains, Haywood County is a unique watershed. All water flowing through Haywood County, and all our drinking water originate here. We are entirely responsible for the quality of our water and the way we send downstream to our neighbors.

It's Not Just Dirt

- Suspended dirt particles block light and prevent the growth of aquatic plants, which also prevent oxygen production.
- Sediment can devastate fish, aquatic insects, and other wildlife.
- Sediment on the stream bottom smothers insect larvae, mussels and fish eggs, and destroys the spawning areas of fish and shellfish. In severe cases, it can even kill fish.
- Sediment fills lakes and ponds, including your favorite swimming

Stewardship Begins In Our Backyards

A Landowner's Guide To Protecting Our Land and Streams

Streams of western North Carolina are one of our most beautiful assets.



What Regulations Affect Land Disturbing, Land Clearing, Development, and Construction Projects?

Developing in the western North Carolina mountains can be difficult because of steep slopes, soils, geology, changing weather conditions, access issues, and water. This publication will help you identify what regulations may affect your project and what permits and plans you may need.



Waterways Association, Inc. with financial support from the EPA 319 Fund, general Trust Fund and the Pigeon River Fund.

Signs



FLOODPLAINS & FLOODWAYS

WHAT IS A FLOODPLAIN?
 Floodplains are land adjoining rivers and streams that periodically overflow their banks. The natural floodplain is an important part of our water system that slows water after flooding events. Forested and vegetated floodplains protect water quality, provide an important wildlife and riparian habitat, and serve as a water filter.

Did You Know?
FLOODPLAINS SUPPORT HEALTHY ECOSYSTEMS

- Provide wildlife habitat
- Slow floodwaters and reduce flood impacts
- Clean rainwater before it flows back into the river
- Cool the climate during summer

"100-year floodplain"
 Floods once every 100 years (25 cubic feet per second)

"500-year floodplain"
 Floods once every 500 years (250 cubic feet per second)

FLOODWAY
 The floodway is the land immediately adjoining the river channel that is the natural path for flood waters. The channel must remain clear of buildings, structures and debris for flood waters to pass.

FLOODPLAIN
 The areas upland of the floodway are called the 100-year and 500-year flood zones. These areas are covered by floodwaters only during longer storm events.

Floodway
 This is the area, which is the floodway of the Haywood Waterways Association of Haywood North Carolina, Haywood Waterways Association, Asheville NC (Haywood, Chairwoman of Haywood Waterways Association, Haywood 216 West 2nd Street, Haywood, NC 28745)

Mailing Inserts and Postcards

Don't Dump Oil or Paint Into Stormdrains!!!



All stormdrains in Waynesville transport untreated stormwater to the Pigeon River by way of Richland Creek. The trash and chemicals that enter the streams can harm wildlife.

For proper disposal take used oil to any convenience center. Take used paint that has been dried or mixed with kitty litter to Jones Cove materials recovery facility. Questions? Call 627-8042



A message from the Town of Waynesville and Haywood Waterways ASSN



Please Don't Dump Yard Waste Into Stormdrains, Ditches or Waterways



Fall leaf pickup for Waynesville town residents is from mid October to mid January. During this time the Town of Waynesville will automatically pickup your loose leaves curbside. Other times of the year regular scheduled pickups will be implemented. For questions you can contact the Waynesville Public Services office at 828-456-3706.



Don't dump yard waste in stormdrains, ditches, or waterways. Debris can clog stormdrains and ditches causing street and residential flooding. Also, all our stormdrains drain to Richland Creek; decomposing yard waste in a waterway removes oxygen and can cause fish kills.

A message from the Town of Waynesville and Haywood Waterways Association.



Help Keep Trash out of the Pigeon River

All storm drains in Clyde transport untreated stormwater to the Pigeon River. This means trash that enters the storm drain system will end up in the river.

Facts:

- ◆ 75% of trash on land ends up in a waterway
- ◆ Each day a person drives or walks by 12,000 pieces of trash
- ◆ 80% of ocean trash came from land sources
- ◆ Trash harms wildlife, interferes with recreation, and reduces land value



Solutions:

- ◆ Place trash in a trash receptacle that has a secure lid
- ◆ When hauling trash make sure it's secure and use a tarp to prevent it from blowing out
- ◆ Don't allow trash cans to overflow
- ◆ Join a local stream cleanup
- ◆ Reduce, reuse, recycle

A message from the Town of Clyde and Haywood Waterways (www.haywoodwaterways.org)



Displays



Minimum Measure #2
Public Involvement and Participation

Stream clean-ups/Adopt A Stream/Big Sweep

- 16 Participating Groups
- 1,170 Volunteers
- 40,370 lbs Trash



Storm Drain Stenciling



Riparian Buffers

- Streamside plantings
- Invasive species removal



Recycling and waste collection

- Recycle and be a Winner!!!

Used oil, batteries

Prizes: \$10 gift cards to Autobell



Rain barrels

- Water Conservation
- Build Your Own workshop



Measuring Effectiveness

- Results:
 - #drains stenciled,
 - #volunteers engaged,
 - # press releases, presentations, etc.
 - Pounds trash removed
- Rain barrels models
 - Save 650 gallons/yr
 - Remove 1.3 pounds N
- Public survey –
 - Example: Kids in the Creek
 - 90% said it helped them better understand what they learned in class; 83% said it changed their mind about taking care of our natural resources; 80% said they are more likely to take action

Part II: Stormwater Control & Treatment Measures

Partners

- Haywood County
- Haywood County Schools
- Haywood Soil & Water Conservation District
- Haywood Waterways Association
- Municipalities
- NC Clean Water Management Trust Fund
- Southwestern NC RC & D Council



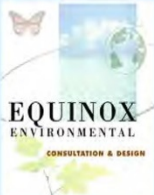
BETHEL
ELEMENTARY SCHOOL

"Caring Promotes Student Success"

The Bethel Elementary School Innovative Stormwater Controls Project

Total cost of school = \$17.5 million

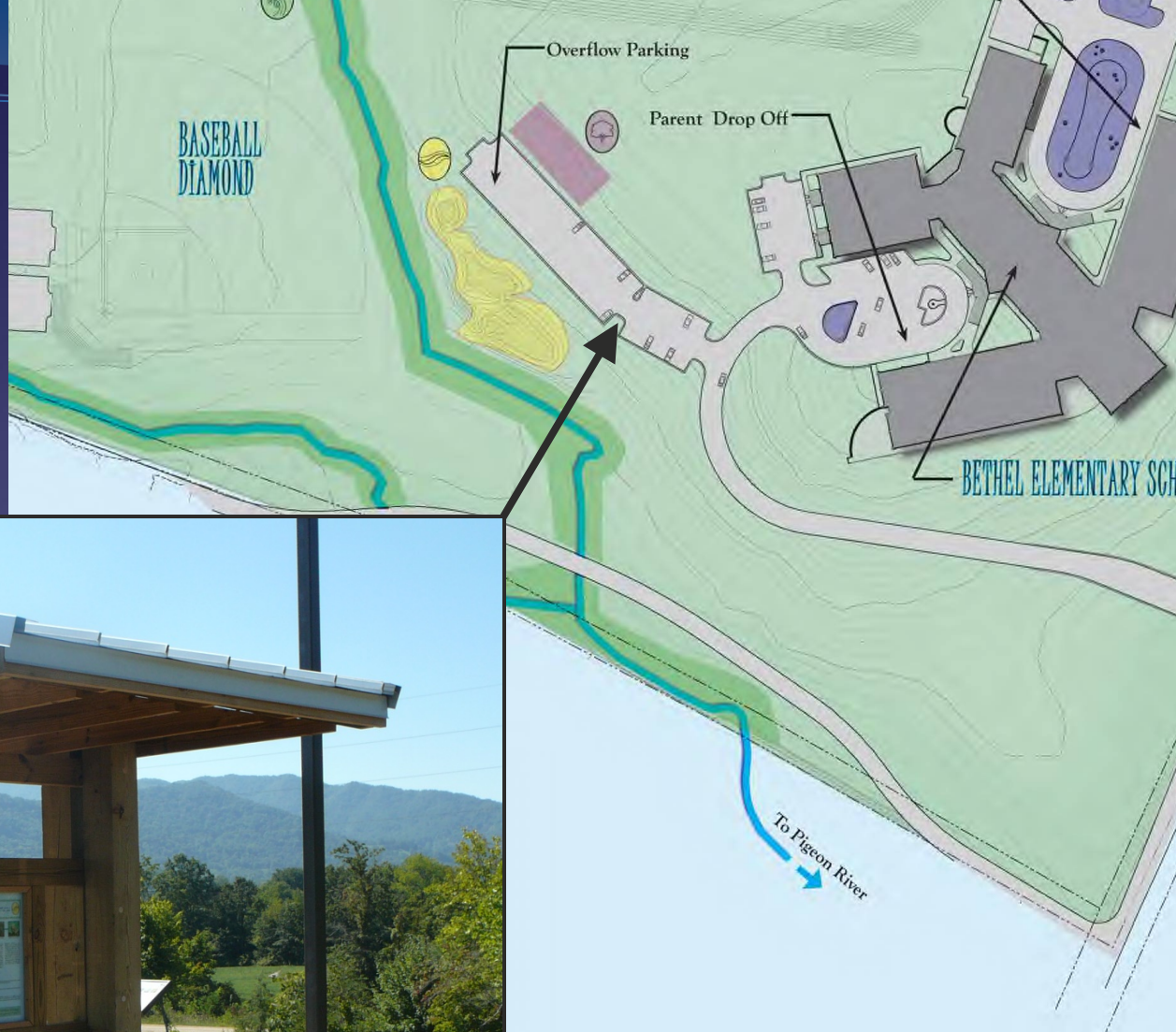
- Conventional (curb and gutter) = \$336,000
- Additional cost for treatment system = \$115,000 (25%)
- Of total school budget, cost 0.6% more for treatment



10 Stormwater treatment controls

- LEGEND**
- Bio-Retention
 - Constructed Wetlands
 - Streamside Vegetation
 - Filter Strip
 - Rain Tanks

Kiosk



Interpretive Signs



BIO-SWALE

At Bethel Elementary School, river rocks and plants slow the movement of water allowing for filtering of pollutants such as sediments and nutrients. The Bethel School bio-swale is used to collect stormwater from parking lots before runoff enters the stream system.



Liatris spicata - Blazing Star



Clethra alnifolia - Clethra



River Rock



Hydrangea quercifolia - Oakleaf Hydrangea



Jute Mesh



Echinacea purpurea - Purple Coneflower



Nyssa sylvatica - Black Gum

A bioswale is a gently sloping channel, or swale, planted with native vegetation. Similar to other stormwater best management practices, such as bio-retention systems, bioswales treat and filter stormwater runoff. Unlike bio-retention systems that allow captured surface water to pond and infiltrate through a soil mix into underdrains, bioswales allow for some infiltration by slowing velocity, but often direct water towards a destination. Controlled transportation of water is particularly important in managing concentrated flows during severe storm events.

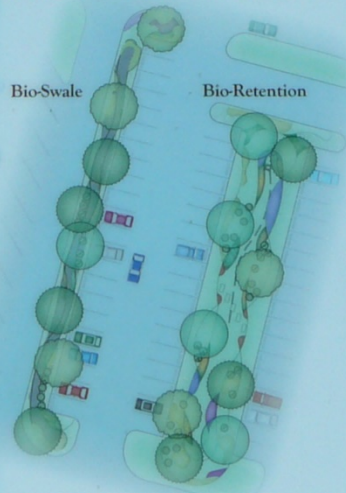
SPOTLIGHT SPECIES: PURPLE CONEFLOWER

Purple Coneflower (*Echinacea purpurea*) was the only native prairie plant popularly used as a medicine by folk practitioners and doctors. Early settlers used echinacea root for almost every kind of sickness including colds, sore-throats, toothaches, and snake bites. In addition to its use as a herbal remedy, Purple Coneflower is also grown for its ornamental value. It blooms throughout the summer and can survive in both wet and dry conditions, which makes it a perfect species for a bioswale.

EQUINOX

Bio-Swale

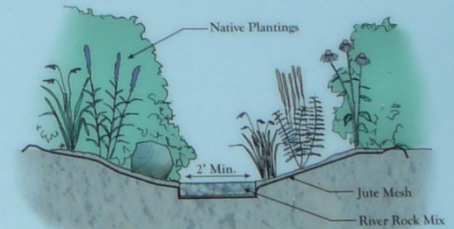
Bio-Retention



SCARY FACT



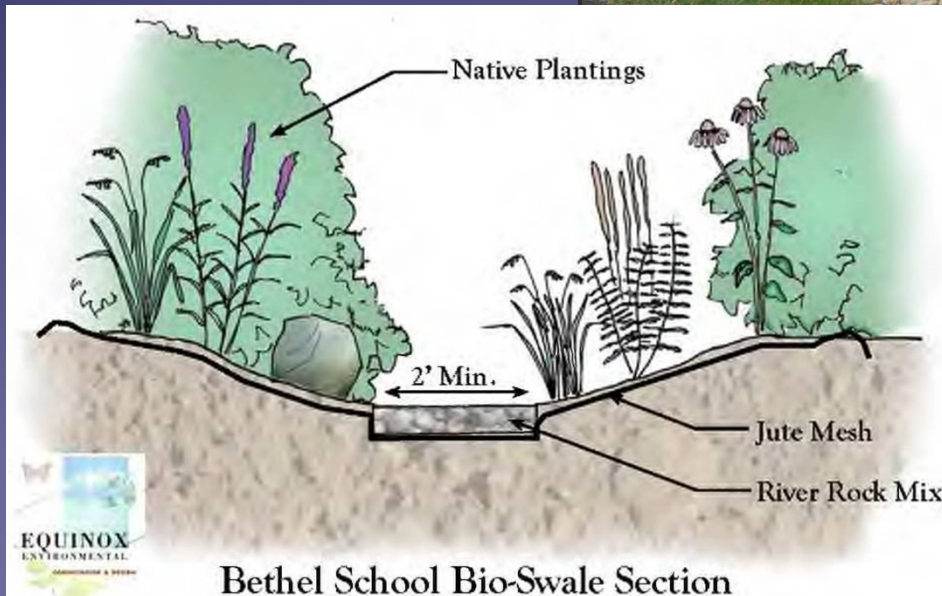
Multiflora Rose (*Rosa multiflora*) is an invasive species that threatens native plant populations and natural ecosystems in the Southeast. An average plant produces an estimated one million seeds per year, which remain viable in the soil for up to twenty years.



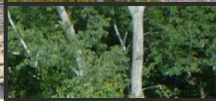
Bethel School Bio-Swale Section

Bethel Elementary School
Stormwater Management Project

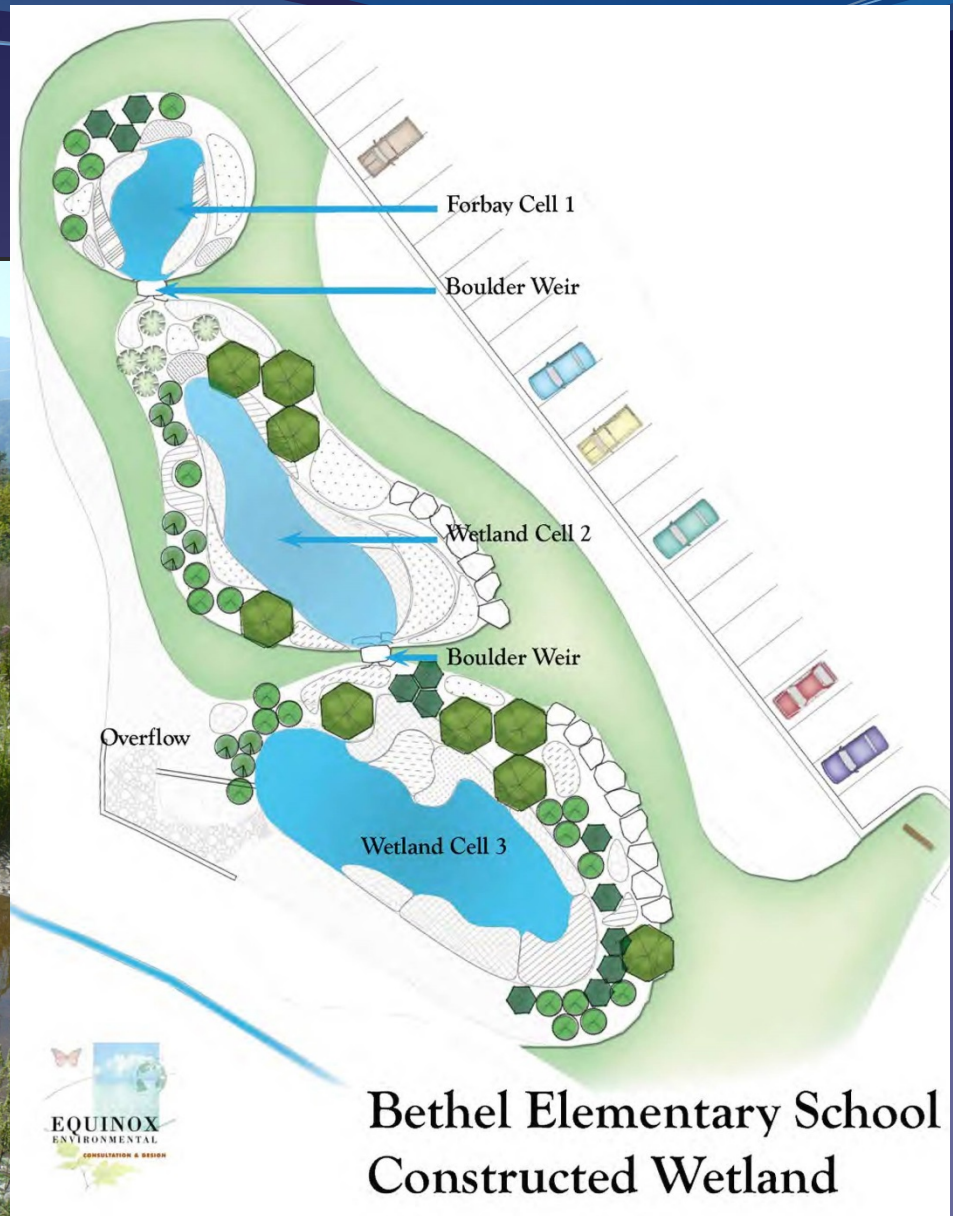
Bio-Swale

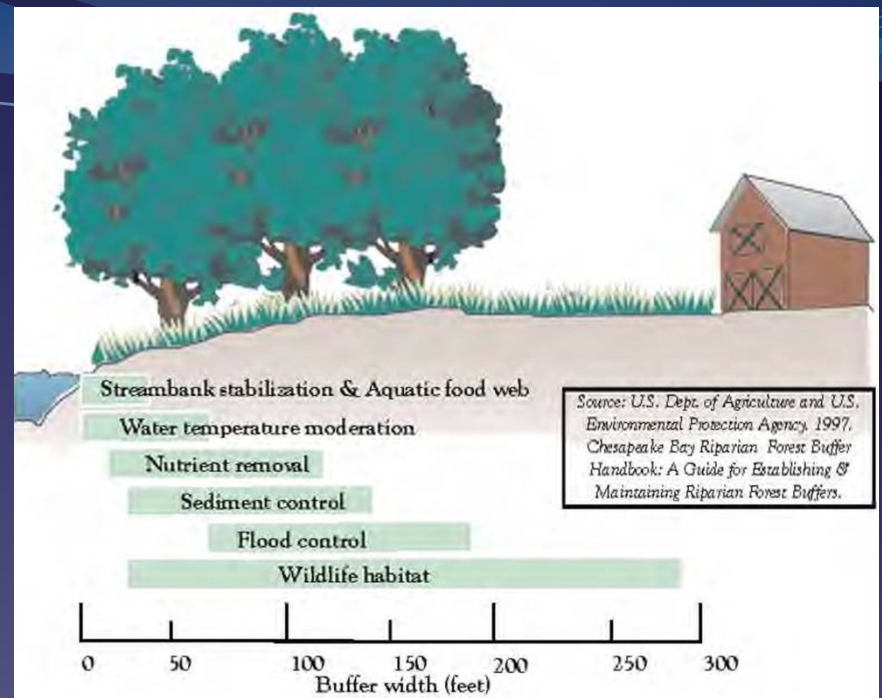


Bio-Retention



Constructed Wetland





Streamside Vegetation (6,420 linear feet)

- Permanent easement
- Maintain riparian buffer

Filter Strips



Rain Storage Tanks

- Storage
- Infiltration
- Microbial treatment



Maggie Valley

Stormwater Mitigation Project

- Assess stormwater conditions
- Complete Stormwater Management Plan
- Helpful guide for new development and retrofitting existing facilities; aid for pursuing grant opportunities
- Integrate stormwater management into standard way of doing business; not looking for new ordinances
- Recruit property owners for Site Conservation Plans

Lake Junaluska Shoreline

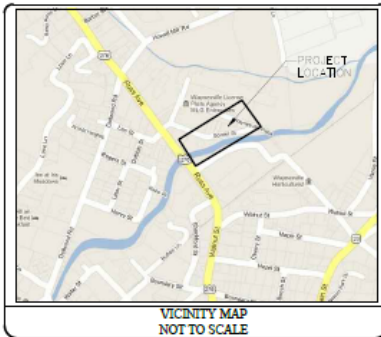


Waynesville and Mountain Creek Plazas

Southwestern N.C. Resource Conservation and Development Council Inc.

Waynesville Stormwater Retrofits Project

Haywood County, North Carolina



INDEX OF SHEETS

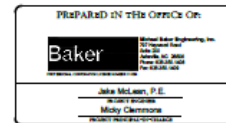
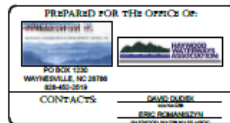
1	Title
2	Legend
3-4	Plan
5	Typicals and Details
6	Erosion and Sediment
7-8	Control and Traffic Control
9	Planting Plans
	Quantities

Datum Description:
Horizontal Datum is based on NCGS NAD 83.
Vertical Datum is based on NCGS NAVD83. Data in areas of proposed work is based on NCRMP LIDAR.
20-foot grid elevation data.
Temporary control points are present on site and shall be used for required survey data to be provided to engineer.

CONTROL POINTS

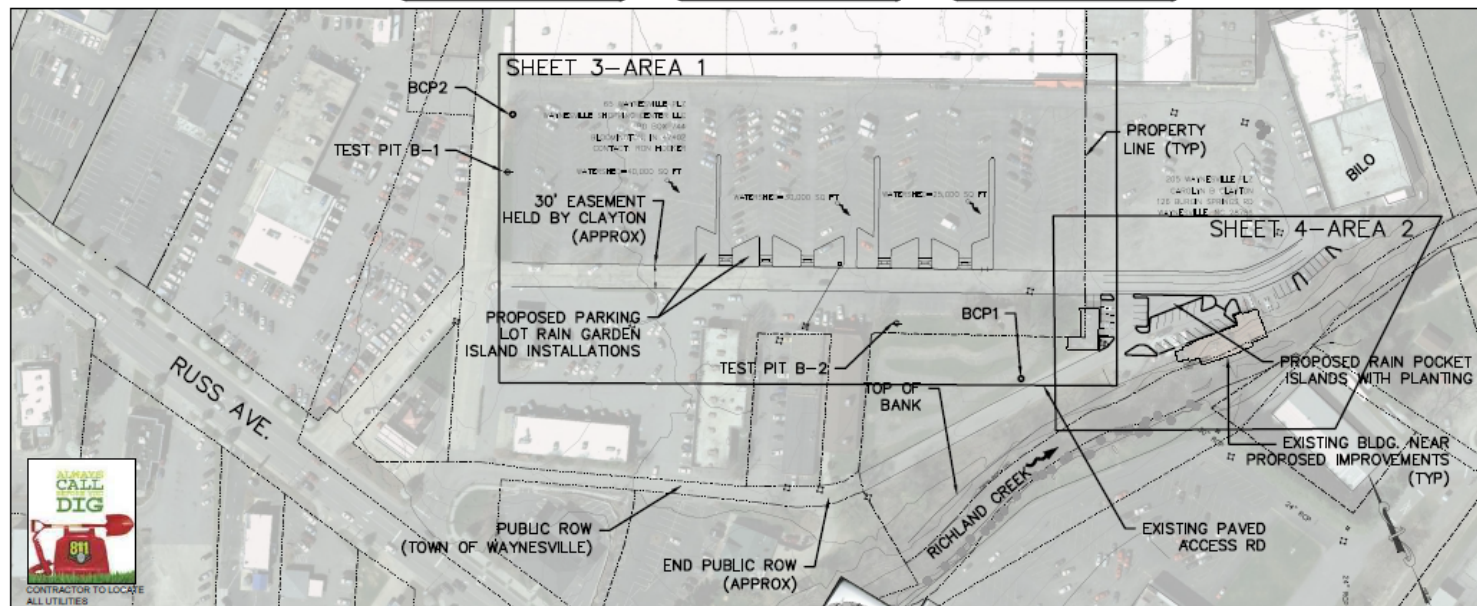
POINT	NORTHING	EASTING	ELEVATION
BCP1	90648.9200	14439.8543	2818.82
BCP2	91188.9211	14528.8297	2823.10

- Description of Work:**
- Area 1**
 - Removal of existing asphalt pavement
 - Installation of rain garden islands with plantings
 - Curb and flume installation
 - Pipe and catch basin installation
 - Asphalt patching
 - Area 2**
 - LID parking lot conversion with restriping
 - Installation of rain pocket islands
 - Curb installation and striping

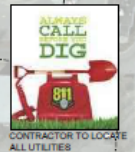


Michael Baker Engineering Inc.
NC Engineering License # 1084
11000 Park Lakeside Blvd., Suite 2000
Atlanta, North Carolina 28608
Phone: 828.350.1408
Fax: 828.350.1409

Baker



1"=CONTOUR INTERVALS (ALL SHTS)



WAYNESVILLE STORMWATER RETROFITS PROJECT
HAYWOOD COUNTY, NC
WAYNESVILLE PLAZA
TITLE SHEET

Prepared for:
Southwestern N.C. Resource Conservation and Development Council Inc.
688 Riverchase Blvd. #200
Waynesville, NC 28786
Phone: 828-462-2978

Revisions

Date	Notes

Project No: 120667
Date: 5/31/13
Title: LID
Drawing: 22222
Sheet: 1 of 9

Septic System Repairs



Thank You!

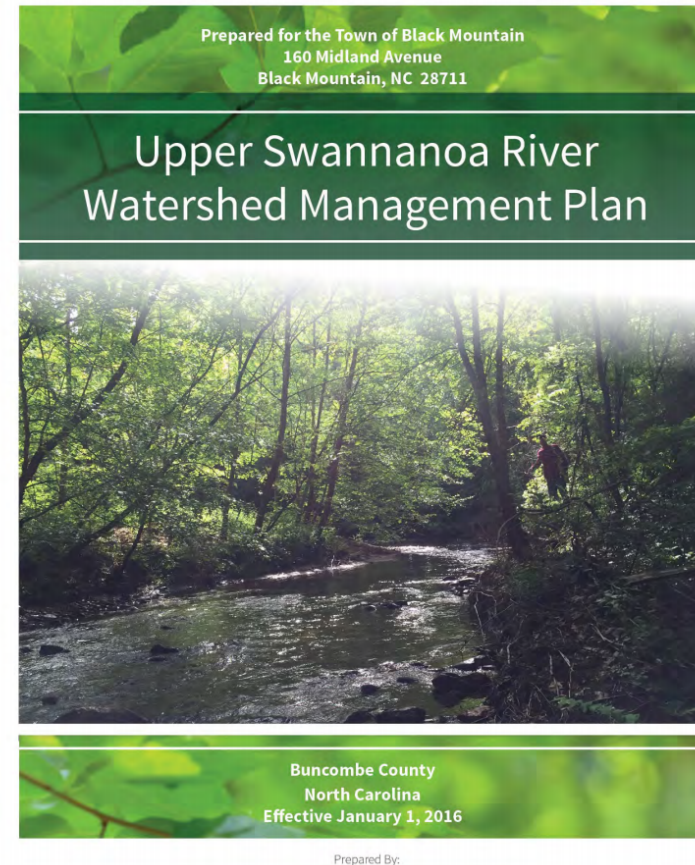
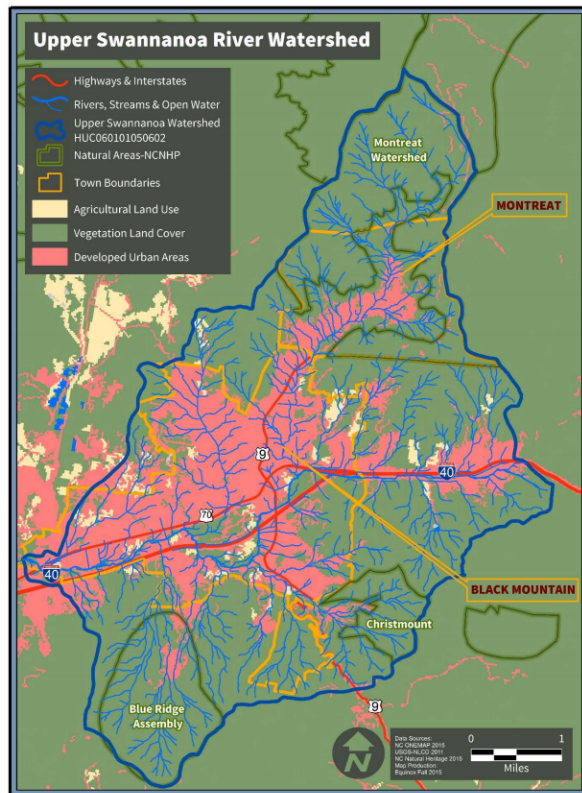


Watershed Planning and Stormwater Inventory

Partnership and Collaboration

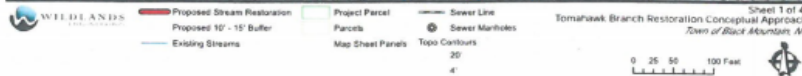
Watershed Restoration Plan

- ▶ Funded in part by 205J grant
- ▶ Partnered with Land of Sky



Implementation

- ▶ Tomahawk Branch Stream Restoration
 - ▶ Funded in part by NCDWR Funding
 - ▶ Underway now with design/permitting
- ▶ SCM projects
 - ▶ Funded in part by 319H Funding
 - ▶ Partnered with Land of Sky



Tomahawk Branch Restoration Conceptual Approach
Town of Black Mountain, NC

Sheet 1 of 4

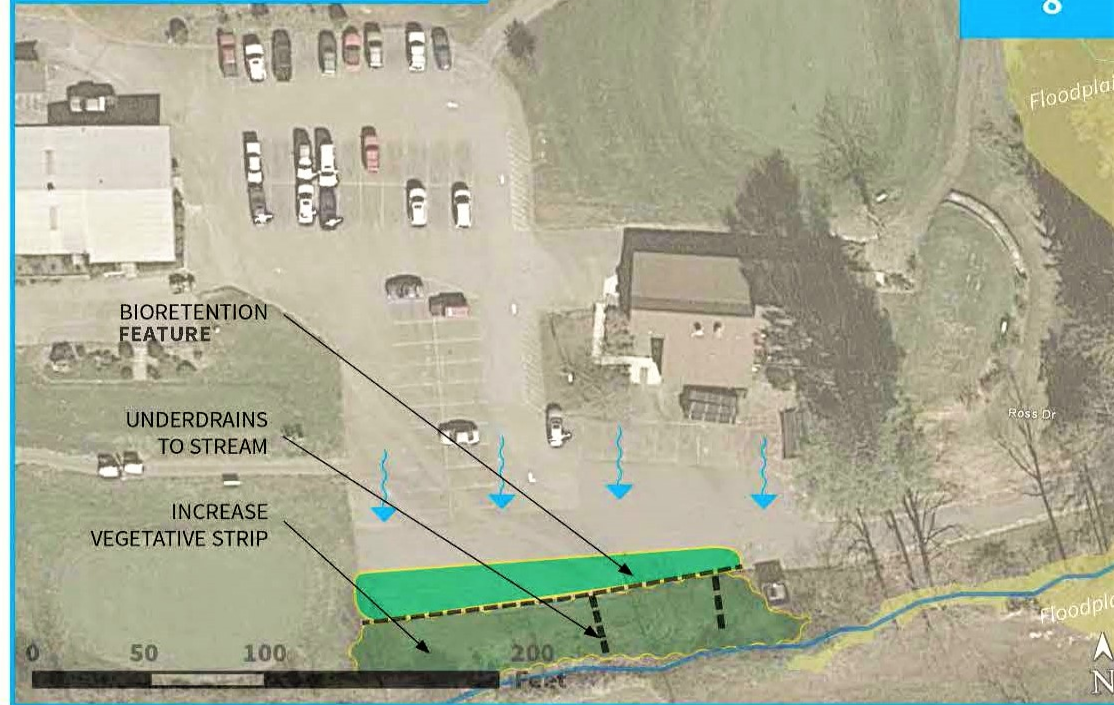
Tomahawk Branch

- Incised banks
- Loss of floodplain benches
- Poor flood control function



BLACK MOUNTAIN GOLF COURSE PARKING

SITE 8



Site Notes:

Reduction of parking (already limited) would be required. Bioretention would rely on surface overflow, and underdrains would daylight into stream corridor. Depth would be limited to underdrain daylight elevation and depth to water table. It is possible to increase a vegetated strip within the bioretention.



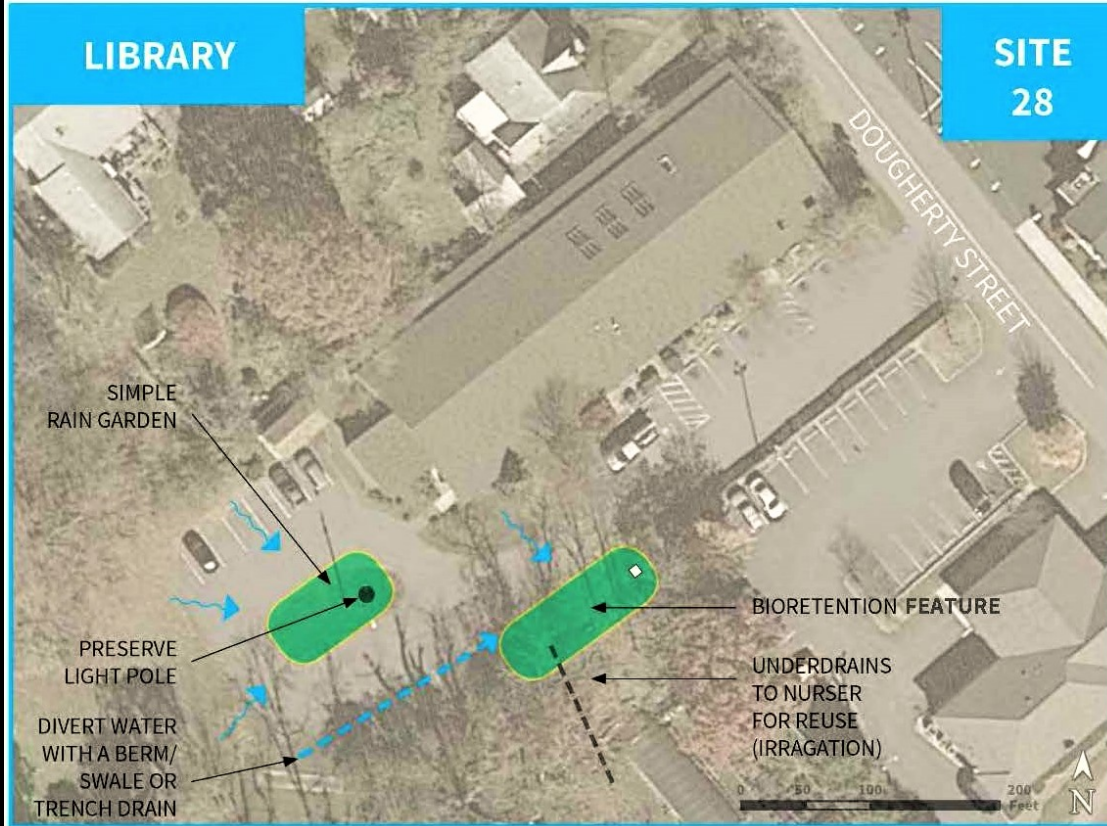
Example of vegetated strip.



Example of bioretention feature.

Example of vegetated strip.





Site Notes:

Informal grass parking area to be converted to bioretention. Existing yard inlet can receive overflow, but is too shallow to tie to underdrain. Underdrains can potentially provide treated stormwater for irrigation re-use (although quantity of effluent will be nominal).





Site Notes:

Top of watershed contributing to downtown infrastructure issues. Greenstreet treatments to accommodate driveways, and on-street parking. Use traffic calming techniques with integrated stormwater treatment.



Stormwater Mapping

- ▶ Contracted with Land of Sky
- ▶ Took approximately 5 months to complete
- ▶ Helps with identification
- ▶ Helps with NPDES permit requirements

