

GEOG 549: WATER AND WATERSHEDS

# **ROCKY BRANCH WATERSHED:**

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## The Path Towards a Functional Greenway

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**4/23/2013**



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## **ABSTRACT**

An asset of RBW is the potential to link Five Points to the Three Rivers Greenway through a greenway; that is, a transportation corridor for bikes and pedestrians. This paper researches the potential for combining transportation functionality with a riparian buffer with a physical banks assessment, real estate assessment, greenway best practices assessment and a greenway/stormwater management assessment.

# 1. Introduction (Jim Olsen)

## 1.1 Overview of topic

Urban watersheds have high levels of impervious surfaces which result in both higher and faster peak storm runoff, and lower base flow (Figure 1.1). Schuler (2000a) identified rooftops and “transport system (roads, driveways, and parking lots)” as the two main contributors of impervious surfaces which prevent stormwater abstraction. Scheueller and Claytor (1997) devised a relationship between imperviousness and stream quality. Sensitive

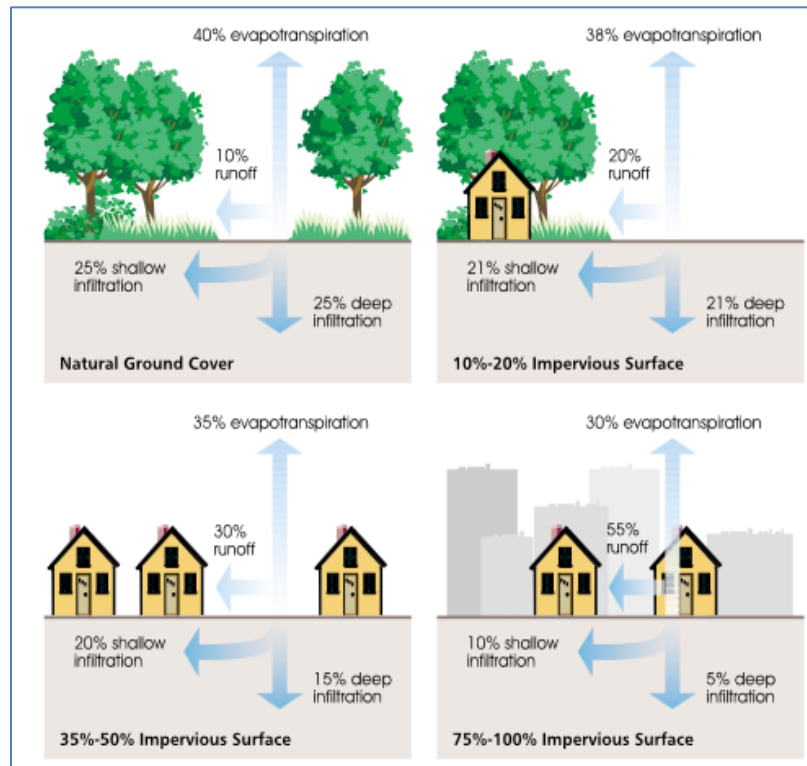


Figure 1.1. Runoff Variability with Increased Impervious Surfaces (FISRWG, 1998)

streams contained 10% or less imperviousness in the watershed, impacted streams ranged from 11-25%, and non-supporting streams were greater than 25% impervious. Over 49% of the Rocky Branch watershed consists of impervious surfaces (Wooten, 2008). This figure places the stream well into the non-supporting category, which is characterized by poor water quality, poor

biodiversity, and the inability to support predevelopment conditions, even with altered stormwater practices and retrofitting (Schueler, 2000a). For non-supporting streams, Schueler suggests that minimizing pollutant loads, increasing stormwater removal efficiency, and **creating greenways** should be primary management goals.

Greenways are typically a long, narrow piece of land, where natural vegetation is encouraged, and are managed for public recreation and slow travel. They are often used to connect networks of open space. The term is derived from “green” in green belt and the “way” in parkway. Greenways differ from green belts or green corridors as they are often connections between areas of conserved habitat for use by wildlife. Greenways when paired with riparian (interface between land and stream) buffers provide a variety of sustainable economic, environmental and social health benefits. They create value and generate economic activity, improve bicycle and pedestrian transportation, improve water quality, provide flood control, and enhance cultural awareness and community identity (Greenways Inc. 2013).

### *1.2 Study Area*

The Rocky Branch Watershed, with a Columbia downtown daily population over 100,000, is the most urbanized watershed in South Carolina (Dawson, 2013). While only 4.2 square miles in size, it contains a large portion of the Columbia Central Business District, all of the Five Points CBD, the University of South Carolina campus, several small urban and suburban neighborhoods and industrial areas. Rocky Branch Creek is approximately four miles long and passes by/through three parks on its way to the Congaree River. The majority of the stream is channelized with limited floodplain access with portions, primarily through Five Points, are piped.

Watershed issues surfaced here in 1915 after the city of Columbia diverted the flow of the stream underground to drain and create the Five Points commercial district. Flooding has been a problem ever since (Holleman, 2006). A City of Columbia contract study in 2007 showed that during a 2-year flood event several roads that cross Rocky Branch are inundated including Olympia, Bluff, Dreyfuss, Wheat, Whaley at Main, Sumter, Catawba, and the CE Building Culvert (PB America, Inc., 2007). While some improvements have been made to the creek since 2007, such as the detention pond at MLK park, the issues of flooding still persist.

### *1.3 Purpose*

The purpose of this paper is to develop a baseline physical (Section 2) and real estate (Section 3) assessment that when compared with best practices from other greenways (Section 4) will allow us to formulate multiple course of action (COA) plans for a Rocky Branch greenway (Section 5). The potential for combining transportation functionality with a riparian buffer will be examined along with a study of land availability based on present land use and land conditions. This group will examine land use and perform a stream assessment within a buffer along RBC. They will concentrate on overbank conditions but will also note in-channel conditions such as concrete beds and banks.

## **2. PHYSICAL BASELINE (Gavin Witherspoon)**

### *2.1 Method for Physical Assessments*

When building a greenway that follows along creek, both the stream and the stream bank are very important in the implementation and overall function of the greenway. One of the greatest impacts that affects any bank or flow of water is erosion. Factors such as the slope of the stream bank and the ground cover of the bank can play key roles in the amount of erosion an area

might be suspect to. For this portion of the project, stream bank assessments were taken at different locations along Rocky Branch Creek through pictures and in person observations. Using the in person observations, each location was classified using three values; slope of the bank, ground cover and erosion, as follows:

Ground Cover		Slope of Bank		Erosion Prone	
A	0%-25%	1	Less than 45 degrees	Yes	
B	26%-50%	2	Greater than 45 degrees	No	
C	51%-75%				
D	76%-100%				

Before beginning the field work a starting location and a final location needed to be planned as well as how large or small of distance increments to use between observation sights.



Figure 2.1. Locations of stream assessments with Google Earth.

After getting feedback from Dr. James on the project proposal regarding a starting location, we chose to start just down from the bridge in Maxcy Gregg Park. Once the finishing location of beside the gas station at the bottom of Main Street was chosen, the distance from the starting location to the finishing location was mapped using tools in Google Earth. There was a rough measurement of eight-tenths of a mile from the bridge to the gas station, which lead to the tenth of a mile increment distance between the observation sights. During the observation process distance increments were measured to the nearest tenth of a mile using a pedometer while walking the creek. The location of each observation sight can be seen above in Figure 2.1.

As previously stated, the first sight was just past the bridge in Maxcy Gregg Park on the side towards Pickens Street. One side of the bank at this location was classified as a B2, meaning that it had 26%-50% ground cover and the bank slope was greater than 45 degrees. This bank was also erosion prone and it was visible from the visible roots of the various types of ground cover. The other side of the bank at this location was a C2 which was mainly covered in grass, yet still had a slope that was barely greater than 45 degrees. This location was also fairly prone to erosion which was made visible by the various small natural drainage ditches carved into the bank. The second location on the Blatt side of the Pickens bridge was somewhat of a hybrid location. One bank was an A1 with almost no ground cover and a fairly acute slope. The proneness to erosion for this sight could be a yes or a no because however the banks are not very steep there is a large steep area behind the bank that drains towards it. The other bank at location two was an A2 that also had little to no groundcover but a very steep slope. The bank seemed to be partially man-made with some type of bricks at the bottom that faded to more natural dirt towards the top. If the bank was entire made of the bricks erosion would not be a huge issue, however because of the great slope and the natural top of the bank, it is erosion prone which is



also visible by roots. The third location was on the Navy ROTC side of where Rocky Branch Creek passes under Wheat Street. Both of the banks at this location were classified as C2 with very steep slopes as well as fairly heavy ground cover. Although the ground cover was fairly high at this location it is still classified as erosion prone because of the visible paths of erosion between the larger areas of ground cover, however this location is not a huge concern as compared to others. The fourth location behind the Blatt P.E. Center was a very interesting type of stream bank. Both sides of the stream bank were classified as A2 with steep concrete banks and absolutely no ground cover. Because the banks of the stream at this location were entirely concrete, there is no chance of bank erosion. The fifth location was just off the Blatt side of Sumter Street behind the softball field. Both banks at this point were classified as A1 with very low angled slopes and almost no ground cover. Due to the banks very low slope banks it is not erosion prone despite its very low amount of ground cover. The sixth location was directly behind the 300 Main Building. The stream banks at this location were almost identical to the banks at location four. Just as location four, the banks were classified as A2 and were entirely concrete with absolutely no ground cover. Because the banks of the stream at this location were entirely concrete, there is no chance of erosion. The seventh location was between the parking lot to the right of 300 Main and the Biomass Facility. This location was another hybrid type stream bank. One side of the bank was classified as a B2 with a steep bank and fairly good ground cover at its bottom. This bank had a natural bottom and a top that seemed to be made of what appeared to be power-line poles. Because of its steep natural bottom the bank gets classified as erosion prone which was also visible through visible roots in some of the ground cover. The opposite bank was classified as A2 with no ground cover on a vertical, man-made bank made of the same power-line pole type material as the other side. Due to the vertical man-

made bank it would not be erosion prone. The final location was beside the gas station at the bottom of Main Street. Both banks of the stream at this location are classified as B2 with steep banks and fairly good ground cover. Just as nearly all the other locations, roots were visible along the bank showing that the banks are prone to erosion.

## *2.2 Physical Assessment Results*

Now that all the findings have been presented, one might ask what do these findings mean and/or why chose to create a method of stream bank assessments rather than using one already established? Starting with the latter question, there are several reasons behind the methods used. First of all, it is easy to get lost in the details and methods used in stream bank assessments such as the Unified Stream Assessment (USA) and the Unified Subwatershed and Site Reconnaissance (USSR). We wanted to simplify the assessment process because the overall goal of our project is not focused only on the stream banks, but rather a greenway that these banks would be located in. Simplifying the assessment process also helps us explain what the results mean. By narrowing the assessment process, we were able to identify areas that were prone to erosion as well as show what factors such as bank slope and ground cover that either aid in the erosion process or help protect against it. Using these findings we can now see which areas do or do not need extra attention when constructing the greenway. The aid to trouble areas will not only help insure the overall function of Rocky Branch Creek for generations to come, but also the greenway.

## **3. REAL ESTATE (John Hutchinson)**

### *3.1 Property Values*

There are a multitude of viewpoints and opinions to be considered in the development of a greenway which passes through a large territory of diverse uses. One unifying perspective of which a majority of people can relate is the effect on real estate property values. The Rocky Branch Creek and its proposed greenway travel through a variety of different Zoning Districts including Commercial, Residential, Industrial, and Planned Unit Development, among others. This may seem to be an obstacle in the construction of the greenway, however, Richland County and the city of Columbia, the major entities involved in funding and carrying out the construction of the greenway are also in charge of zoning and redistricting, therefore, should a parcel of land need to be re-zoned for the greenway to pass, they already have the authority to make those changes without the need to coordinate with other agencies. The entire Rocky Branch Watershed falls under the jurisdiction of City of Columbia Zoning Inspector Rodrick White. This is another aspect that will help simplify the process, some watersheds may extend from one zoning inspector's territory into another's which would require more coordination and greater difficulty for the development of the Rocky Branch Greenway. While zoning may not be a major hurdle in the process of developing the greenway, there are other considerations to be made. One such issue pertains to private land ownership rights. There is a potential need to obtain easements where the greenway travels through private property.

The Appraisal Institute defines an easement as an interest in real property that transfers use, but not ownership, of a portion of an owner's property. It may be thought of as a legal right of way for one landowner "A" to use the property of another landowner "B" without a change in ownership. A large portion of the Rocky Branch travels through The University of South Carolina Campus and City of Columbia property. Examples include the stretches through Martin Luther King Park, Maxcy Gregg Park, and near the USC Swearingen, and Blatt buildings. These

areas would not require easements as the University and the City would in all likelihood be cooperative partners in the development of the Greenway. However, in areas where Rocky Branch Creek passes through private property, it would be necessary to gain the owner's permission to build the pathway. By allowing an easement for the greenway to pass through private property, owners stand to improve their property value, without any action or investment of their own funds.

Not every property owner will see the greenway as an immediate improvement to their property. Such owners may complain that the greenway will bring too much traffic and noise to the area, or that they would prefer privacy over public amenities. While these are rational considerations, it is important for these people to realize that this area is already highly developed and by allowing the greenway to be developed, the City of Columbia as a whole would benefit. To illustrate this point, a reference can be made to the city of Greenville, SC's Trails and Greenways Master Plan. In a document from [www.greenvillesc.gov](http://www.greenvillesc.gov) the correlation between greenways and property values shows that "Residential properties will realize a greater gain in value the closer they are located to trails and greenspace. According to a 2002 survey of recent home buyers by the National Association of Home Realtors and the National Association of Home Builders, trails ranked as the second most important community amenity out of a list of 18 choices. Additionally the study found that trail availability outranked 16 other options including security, ball fields, golf courses, parks, and access to shopping or business centers."

(1)

Many of the advantages of developing greenways and public parks on private land value are anecdotal in nature, the need for quantifiable, objective data showing these effects persist. Several studies on these effects have emerged in recent literature. One such study conducted by

the Department of Agricultural and Applied Economics at Clemson University in conjunction with the Center for Applied Real Estate Education and Research at The University of South Carolina has attempted to show this relationship. The study shows the connection between proximity to different types of parks and housing prices in Greenville, South Carolina. Their findings show that “The value of park proximity is found to vary with respect to park size and amenities. The greatest impact on housing values was found with proximity to small neighborhood parks, with property values as much as 13 percent higher for homes within 600 feet of such parks.”(2) The study also concluded that the positive impact extended to homes as far as 1500 feet from the parks.

### *3.2 Greenway Impact*

When determining the overall impact a greenway or park could have on property values, it is important to understand some basic principles of Real Estate Valuation. An important concept to consider is the Highest and Best Use Analysis. The idea asserts that in determining the value of a property, the appraiser must consider what the property could be used for in order to produce the greatest possible value, both as a vacant lot, and as an improved property. There is very little vacant property left on the Rocky Branch Creek, therefore in determining the highest and best use, the appraiser would make those determinations based on the properties in their current state of development. Given the existing improvements made to the land, properties along Rocky Branch Creek are not suitable for all types of development. However, the development of a greenway trail through these properties would constitute a realistic highest and best use for such properties. In order to show the potential for property value gain it is beneficial to look at the increases already observed in other cities. The corollaries between what has been

developed in Greenville, SC and what could potentially be developed in Columbia, SC are illustrated in the property value Data below.

### Greenville, SC Greenway Property Appreciation Analysis

Location	Lot size	Building SF	Room Count	Most recent Sale	Prior Sale	Annual Increase
8 Woodland Way Circle Greenville,SC 29601	.88 Acres	3675 sq. ft.	4 bed/3.5 bath	8/12/2010-\$700,000	10/21/2007-\$500,000	13.00%
116 Ridgeland Dr. Greenville,SC 29601	.24 Acres	5320 sq. ft.	5 bed/5.5 bath	8/14/2008-\$975,000	9/11/2003-\$764,073	6.00%
600 University Ridge Greenville,SC 29601	.024 Acres	957 sq. ft.	2 bed/1bath	6/7/2010-\$115,000	3/28/2006-\$85,000	8.00%
<b>Avg. Annual Increase</b>						<b>9%</b>

### Columbia, SC Greenway Property Projected Appreciation Analysis

Location	Lot size	Building SF	Room Count	Assessed Value	Projected Value Post Greenway Construction
1700 Wheat St. Columbia,SC 29205	.12 Acres	4612 sq.ft.	3 bed/3.5 bath	2012-\$649,500	\$707,955
1715 Wheat St. Columbia,SC 29205	.04 Acres	630 sq.ft.	2 bed/1.5 bath	2012-\$51,200	\$55,808
1600 Park Cir. Unit 1210 Columbia, SC 29201	NA	NA	1 bed/1 bath	2012-\$79,400	\$86,546

In Conclusion, as demonstrated by the Data from Greenville, SC there is a significant potential for increase in property value along the proposed Rocky Branch Creek Greenway in

Columbia, SC. Not only would the development of such a greenway improve private property values, it stands to benefit the City of Columbia moreover. The development of parks and trails, is an important aspect for perspective home buyers and business owners in the area. The activity from the greenway would stimulate economic growth as well as improve the overall standard of living for the entire city, effectively making Columbia a more attractive destination for people of all backgrounds and interests.

### Sources

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5. [www.richlandonline.com/services/assessorsearch/assessorsearch.asp](http://www.richlandonline.com/services/assessorsearch/assessorsearch.asp)

## **4. GREENWAYS (Gabrielle Petty)**

### *4.1 Types of Greenways and Case Studies*

There are many different greenways used all over the world and although they cannot always be specifically categorized, they often fall into one of five major project types: “urban riverside/waterfront greenways, recreational greenways, ecologically significant natural corridors, scenic/historic routes, or comprehensive greenway systems/networks” (Little, 1995). General functions of greenways include “water resource protection, pollution abatement, riparian

habitat enhancement and biodiversity, flood hazard reduction, recreation, environmental education, and a myriad of other functions” (Bischoff).

At North Carolina State University, there is an urban creek that runs more than a mile through the heart of the university’s campus. Including the name, this creek shares many similarities with our own Rocky Branch Creek. It, however, has been converted into a greenway dedicated to giving students an experience in ecological education by becoming an accessible outdoor teaching laboratory. It also has been integrated into the campus environment and is enjoyed by people even outside of a scientific environment. Rocky Branch will be completed in three phases, with two of those phases having been completed in 2002 and 2006. The third is being worked currently and is proposed to be done soon. The three different phases work along different segments of the stream. The ultimate goals for the rehabilitation of Rocky Branch (many already accomplished) are to stabilize the creek, improve water quality, create a healthier aquatic and wildlife habitat, and integrate the creek into the campus environment. In 1978, the Division of Water Quality called Rocky Branch Creek as the state’s most polluted urban stream. It was characterized by filled in floodplains, non-natural channelization, and heavy development in its drainage area. Through natural channel design techniques, it now flows through a newly created floodplain. Native vegetation now increases the width of the forested buffer zone. A natural floodplain area has been installed along with three bioretention area and three wetland ponds. All of these features reduce stormwater and help filter it before it enters the creek. There has been a bottomless arch installed for pedestrian and an underpass that connects another trail. During Phase III, the greenway will be linked to the Raleigh greenway system. North Carolina Sea Grant and the NC State University’s Facilities Division have worked together to obtain more than \$5.8 million dollars for the project. The renovation of Rocky Branch Creek



was paid for through a variety of agencies, including NC State University, the Department of Transportation, the Environmental Protection Agency, FEMA, etc (NC State University Stream Restoration Program, 2013).

Little Sugar Creek is an urban stream that starts in northeast Charlotte. It passes through many industrial, residential and urban areas. Like our own Rocky Branch Creek, it has been the cause of many floods in the city and was deemed to have the worst water quality in the state. The county's Storm Water Services and Parks and Recreation Department started a restoration of the stream that started with planning in 2001. Some goals of the project include uncapping covered sections of the creek, removing flood-prone buildings in floodplains, reduce pollution levels, reshape the path and banks of the stream, restore natural beauty, and create a natural open space to connect people in an urban setting while providing educational opportunities for schools and the general public. Currently, nine sections of the over 20 mile stream have been restored and 5.54 miles of greenway trails have been created. The stream is the cleanest it has been in 50 years. So far, many goals have been accomplished by removing flood-prone buildings, parking lots and structures that cover the creek, restoring riparian buffers and natural floodplains, creating two wetlands and rain gardens, and connecting neighborhoods, schools, and urban areas. Eventually, the county will like to have the whole creek restored and create greenway paths that reach all the way to the South Carolina border. Costs so far have totaled \$43 million with land acquisition accounting for \$17 million. The majority of funds have come from state and private sources (Mecklenburg County Government, 2012).

Rocky Branch Creek at NC State University and Little Sugar Creek Greenway bear many similarities to our own Rocky Branch Creek, which demonstrates that our goals for a Rocky Branch Creek Greenway are not unattainable. Gavin Witherspoon did an assessment of Rocky

Branch Creek starting at the bridge in Maxcy Gregg Park and surveyed every tenth of a mile until the stream reached just beyond the Kangaroo gas station on Whaley St (0.8 miles total). Based on his findings, this area of Rocky Branch creek is similar to Rocky Branch Creek in NC and Little Sugar Creek being that all have been heavily urbanized and are severely polluted as a result of this urbanization. Modeling after the restoration of these streams, the best methods would be to remove buildings in floodplain areas to restore the natural floodplain, restore riparian buffers, and install bioretention ponds and wetlands. Trails along the stream could be installed and a congregation/park area could possibly be installed across the street from the band building where a parking lot currently sits. Restoring the natural floodplain will reduce the impact of floods and restoring the riparian buffers will reduce bank erosion which in turn improves water quality. The wetlands and bioretention ponds will help to reduce stormwater, improve water quality and create a healthy aquatic habitat for organisms. A greenway could easily be integrated into the university and city since the stream runs through many parts of campus and a few popular parks. Many other methods would have to be executed to restore the stream but these major goals would greatly improve Rocky Branch Creek and serve as a successful greenway.

#### *4.2 Suggestions for our RB Greenway*

The area of Rocky Branch focused on by myself and accessed by Gavin for a potential greenway was the portion of the creek flowing from the bridge at Maxcy Gregg Park to under the bridge at Main and Whaley Streets. The subwatershed the stream flows through in this area is the USC Campus (Figure 4.1). This portion of the stream is variable, as it flows through a variety of environments, for example, a park with less impervious surfaces, to just under a bridge



**Figure 4.1: Map of the Rocky Branch subwatersheds (James, 2012).**

surrounded by a high percentage of impervious surfaces. John Wooten (2008) calculated the imperviousness of the entire watershed to be 49% and based on zoning classifications, estimated the future percentage of imperviousness to be 65.9%. This portion of the watershed is majorly zoned as general commercial (Wooten, 2008). In terms of the whole watershed, “general commercial had the highest percent imperviousness of all land uses” (Wooten, 2008). Based on these factors, it can be assumed that this subwatershed of Rocky Branch has a high percentage of impervious surfaces, compared to other subwatersheds of Rocky Branch. Since 2008 (Wooten’s study), many construction projects and the addition of new buildings, parking lots, etc. have occurred in the USC Campus subwatershed, so it can be assumed that the percentage of impervious surfaces in this area has increased. A greenway would be very feasible because it would reduce the percentage of impervious surfaces in this area. This in turn reduces the

intensity of flood events, helps improve water quality of the stream, as well as a number of other things. Wooten also concluded that “due to the high level of imperviousness, restoration is not feasible and rehabilitation is unlikely; Rocky Branch Creek is best suited for enhancement projects, such as construction of a greenway” (2008).

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## **5. CONCLUSION: TOWARDS A RB GREENWAY (Jim Olsen)**

### *5.1 Inventory of existing trails in the RBW*

There are two primary trail systems that intersect with the Rocky Branch Watershed. The first, conceived in 1994, is the Palmetto Conservation’s Palmetto Trail which is a 425 mile series

of hiking and biking trails and connect the mountains with the sea. It is one of only 16 cross-state trails in the United States and currently is two-thirds complete with nearly 315 miles open to the public. The trail is being built as a series of “passages” that can be accessed for short single-day trips, or multi-day trips. The trail features the diverse physiography of the state and has segments that range from primitive pathways to urban greenways. The Capital City Passage of the Palmetto Trail crosses the Rocky Branch creek on Wheat Street (Figure 5.1). The eastern edge connects with the Fort Jackson Passage. The western end terminates at Riverfront Park. It is a 7.5 mile long segment that is ideal for hiking or biking. This section does not allow for horses or motorized vehicles. The trail is marked with 14 signs that delineate the path with kiosks just inside of Gate 1 at Fort Jackson and inside the main gate at Riverfront Park. Downloadable maps of the passage are also available on the Palmetto Conservation website (Palmetto Conservation. 2013)

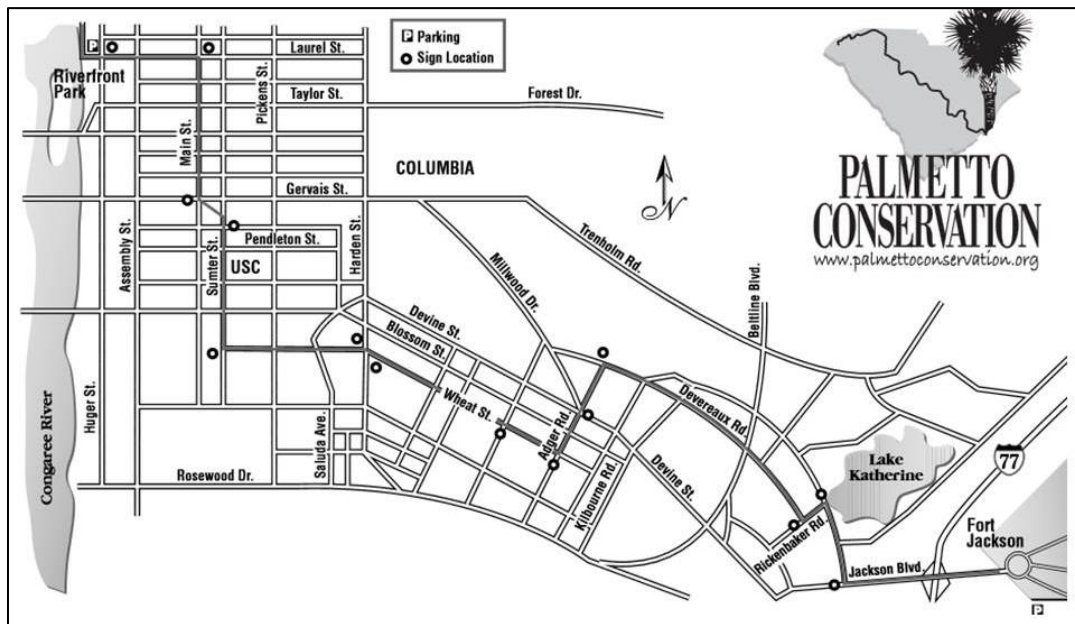


Figure 5.1. Capital City Passage of the Palmetto Trail (Palmetto Conservation, 2013)

The second trail system in the watershed is the River Alliance’s Three Rivers Greenway (Appendix A), which currently has 9.5 mile of its planned 12 mile trail completed. The trail was

proposed in 1996 to be a linear park system to link people to the rivers. Two years later the first segment, a ½ mile long 8-foot wide concrete pathway, lighting, trash receptacles, water fountains, canoe and kayak access points, picnic benches, overlooks, public restrooms and parking was constructed. Named Granby Park, the trail was an immediate success and set the standard for common elements in future linkages (“The River Alliance - Columbia, SC” 2013). A 1.25 mile extension was added to connect USC, Olympia Park, Olympia and Granby Mills to Granby Park section. According to Michael Dawson, Chief Executive Officer of the River Alliance, this addition was instrumental in having the Olympia and Granby Mills redeveloped, which improved the \$400,000 industrial properties into \$35,000,000 residential properties (Dawson 2013).

### *5.2 Funding and the Penny Tax*

Because local governments are experiencing a fundamental new fiscal reality, greater effort must be made to secure funding for greenway projects. For the Three Rivers Greenway there have been two paths to funding. For the Lexington County west side of the Congaree River money for the Three Rivers Greenway is collected in the cities of Cayce and West Columbia from tax increment districts. On the east side of the river, the City of Columbia and Richland County approved a proposal to extend the 1986 “Congaree Vista” Tax Increment District to fund projects (“History of the Greenway: Evolution of the Three Rivers Greenway” 2013) only to see the Columbia City Council divert the collected monies into the new addition for the EdVenture Children’s Museum and a bluff top “esplanade” for the private CanalSide residential development (Moore 2013). To raise more money for transportation related initiatives, Richland County sought, and had approved by voters a “Penny Tax” that earmarks funds for transportation improvements. According to the “Say Yes 2 the Penny” website, most of the tax collected would

go towards motor vehicle road improvements and the bus system, but the sales-tax would also generate \$28M for sidewalks, \$20M for bikeways, \$3M for crosswalk safety, and \$7M for greenways.

While official allocation and prioritization for projects will come from the newly formed Transportation Penny Advisory Committee, the county has already identified high priority greenways and assigned initial cost estimates. A 1.7 mile long Rocky Branch greenway from “Rock Branch to Haywood Street” is one of the 19 greenway projects on this list. Cost estimates for all projects total \$20.9M, with the Rocky Branch segment coming in at \$901K. These costs were made with the assumption that the paths would be a paved, eight to ten feet wide, and have lights, signs, and call boxes. Estimates did not include right of way or any other riparian treatments. Because there is not a Haywood Street in Columbia, it is the author’s opinion that the intent was to upgrade the Heyward Street segment of the Three Rivers Greenway as it connects the Olympia and Granby Mills buildings, Olympia Park, the USC Greek Village and Granby Park.

### *5.3 Proposed RB Greenway COAs*

There are two primary options that could allow for connectivity between the Three Rivers Greenway and the Palmetto Trail. The first option is to use the Three Rivers Greenway Granby extension and urban Palmetto Trail model and use existing roads and hardscape to connect green spaces. There are two options (COA1a and COA1b) with this idea of using existing infrastructure features. **COA1a** - Connectivity could be achieved by erecting wayfinding street signage only (and perhaps painting a blue line similar to the red striped “Freedom Trail” in Boston) that would link the existing Granby extension to Five Points and subsequently the Palmetto Trail. For an estimated \$20K in signage, design, permitting and paint, this would be

the least costly option to connect Five Points to the river. For additional money there could be information kiosks added or interpretive signage that described issues that urban streams like Rock Branch Creek suffer. This option would not provide any flood prevention relief and, apart from an educational impact, would do little to affect water quality. It would however provide a quick win and establish a corridor that could be enhanced as more money became available.

**COA1b** - For approximately \$20M this same street passage of the Rocky Branch Greenway (from Maxcy Gregg Park to the Mill Villages) could be enhanced as a pedestrian corridor with expanded bike lanes and pedestrian improvements. It would feature LID bump-outs to aid in storm water management, but would slow down vehicle traffic on the SCDOT “connector” roads of Whaley, Main and Sumter Streets and also reduce the amount of available street parking.

COA2 - On the other end of the funding spectrum is the inclusion of a true riparian buffer and trail system that follows a more natural path of the creek. This option would require the raising of several buildings on the University of South Carolina campus that boarder the creek. This option follows the 2010 USC Master Plan (Figure 5.2) suggested route and allows for a substantial riparian buffer to be created, reinstated floodplain, and construction of a series of retention and detention ponds to help reduce flooding and improve water quality.





**Figure 5.2. Notional South Campus and greenway from the 2010 USC Master Plan (Sasaki, 2010)**

While the focus of this effort was to facilitate the expansion of the university by filling needs of expanded green space for athletic fields and student housing, the trail also functions as a viable flood mitigation project and riparian buffer. The placement of ponds and expansion of green space into the floodplain mirror very closely the recommendations made by PB America's Inc. 2007 Rocky Branch Watershed Study that was commissioned by the City of Columbia. This study created designs that were tested with hydrolic models for the 5-, 10-, and 25-year flood events. They reported that the USACE had approved a Section 14 study with the City of Columbia that allowed the Blatt P.E. Center, and the Olympia and Sumter headwall sections of the creek to fall under Emergency Stream bank and Erosion Protection

authority. To meet 25-year conveyance, additional work would be needed to raise roads near areas that would be worked. The estimated cost of creating the MLK, Maxcy Gregg Park and USC Campus Ponds was \$7M. Even with additional costs of land acquisition (for the riparian buffers) and the \$1M per mile pedestrian and bike path (with lights, signage, and call boxes) this option would still be cheaper than alternative engineering methods to reduce bank erosion. For example, a proposed stormwater tunnel addition at Sumter Street would alone cost \$15M in design and construction. The overall execution of COA2 with land acquisition, raising of buildings and construction of an ADA compliant trail system is estimated at \$500M. When compared to the anticipated Penny Tax total pedestrian budget of \$20M this effort seems unlikely. However, the long term improvements to quality of life, reduction of flooding along the creek, improved land values (and subsequent tax base), and ability to provide USC with and improved sense of place with functional land-use capabilities make this option worth exploring in more detail.

In summary, our group has identified three possible COAs going forward. They range from \$20K that would provide a “grey trail” linkage from Five Points to the Congaree River via sidewalks and streets to a true riparian greenway at a cost of \$500M that would address the many of the problems and threats facing Rocky Branch. We highly recommend any greenway effort going forward be built on top of a riparian buffer system and follow the originally recommendations made by the River Alliance (2003) in their EPA Watershed Initiative Grant:

1. Detailed analysis and measurements of the biological, hydrological and environmental characteristics of the creek.
2. Redesign of the channel and stormwater retrofits to return it to a more natural state, minimizing flooding and improve water quality.

### 3. Implementation of the design.

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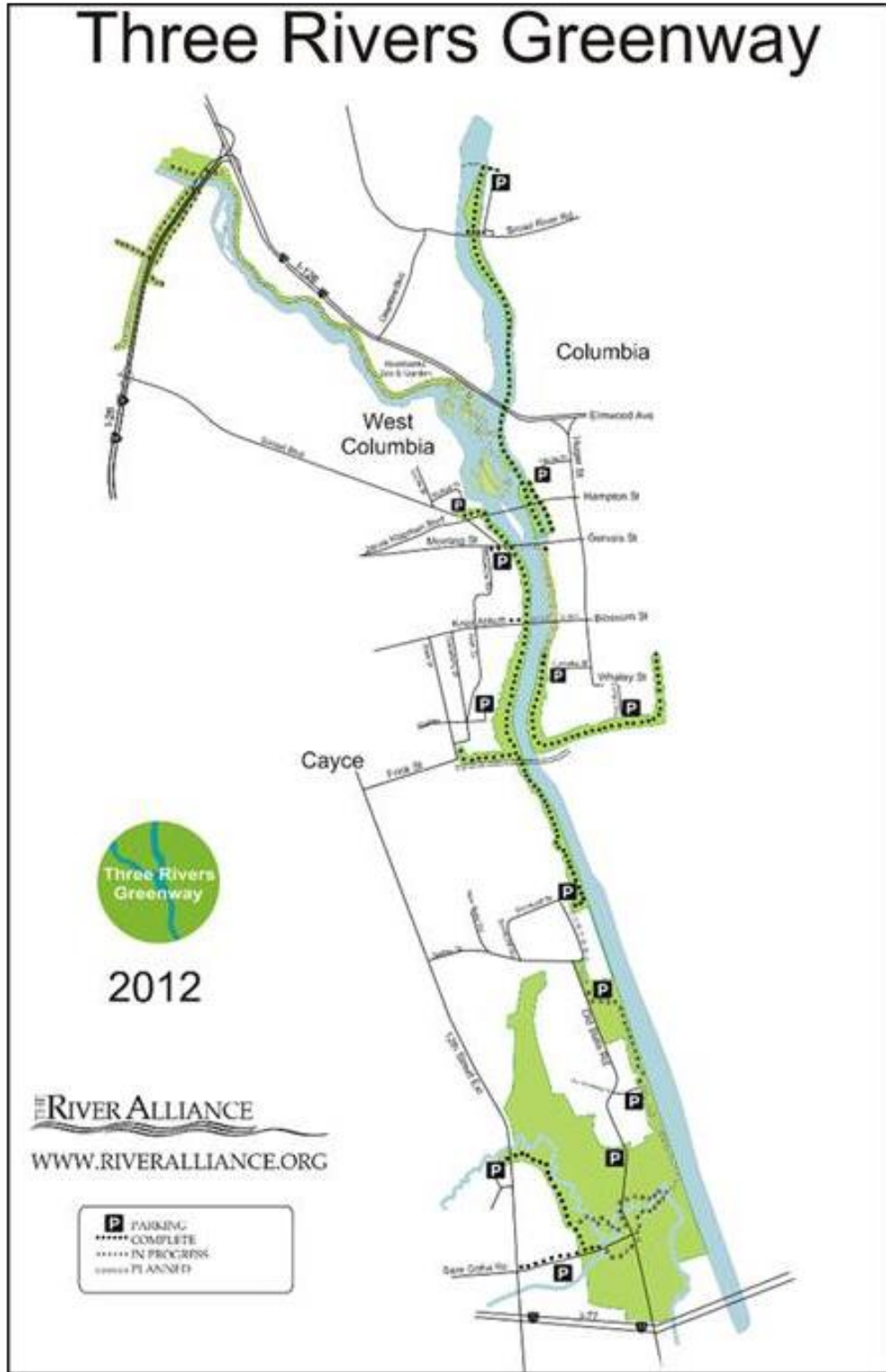
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Appendix B – Palmetto Trail : Capital City Passage

