Jackson Creek Mitigation Bank: 
Benefits and Challenges of an Urban Mitigation Bank

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ABSTRACT. Urbanization and growth rates in the northeast section of Richland County are among the highest in South Carolina and necessitate enhancement and long term preservation of the remaining natural resources. For this reason, enhancement of Jackson Creek and adjacent wetlands and buffers has been identified as a priority by Richland County Council and the Gills Creek Watershed Association. The purpose of the Jackson Creek Mitigation Bank is to enhance the existing streams, wetlands, and buffers along and adjacent to Jackson Creek, within a 34 acre urban area. This unique urban banking model will provide a true watershed approach by funding the construction of best management practices outside the project area and by incorporating County-wide programs and resources to promote low impact development and green space adjacent to the Bank’s boundaries. A number of institutional and technical challenges have hampered the implementation of the proposed Bank, including: securing public funding, educating both regulatory agencies and public entities, urban constraints (hydrology, infrastructure, baseline monitoring, etc.) and landowner negotiations.

(KEY TERMS: Urban mitigation banking, stream and wetland restoration, hydrology, Interagency Review Team, compensatory mitigation)

INTRODUCTION

The Jackson Creek Mitigation Bank (JCMB) is a proposed non-commercial site-specific mitigation bank which will provide compensatory mitigation to governmental entities within Richland County, illustrated in Figure 1, for unavoidable adverse impacts to Waters of the United States resulting from activities authorized under Sections 401 and 404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act. Presently, no active mitigation banks are located in Richland County to provide wetland and stream restoration credits to the Atlantic Southern Loam Plains and Southeastern Floodplain and Low Terraces Ecoregions (EPA Level IV). Furthermore, stream and wetland restoration credits are limited within the Sandhills Ecoregion of Richland County. The JCMB will fill this void by providing a viable and preferred alternative to permittee-responsible mitigation and effectively reducing the risk and uncertainties associated with generating compensatory mitigation (33 C.F.R. § 325 and 322, 2008). In addition, the banking instrument will concurrently address numerous water quality and open space issues in the Jackson Creek and Gills Creek watersheds via: the enhancement and protection of stream and wetland buffers, the implementation of stormwater best management practices (BMPs), stabilization of stream banks and degraded stream channels, the acquisition of green space for preservation and to support public access and recreational use. Note, the Charleston District U.S. Army Corps of Engineers (USACE) has not approved an urban mitigation bank in South Carolina under the Final Rule (2008). If approved the JCMB will provide a template for future urban mitigation banks and facilitate: the preservation and enhancement of natural resources and green space within an urban environment, production of compensatory mitigation and improvement of water quality via the reduction and treatment of urban stormwater runoff.

Figure 1: Richland County, South Carolina (SCDOT Mapping)
OBJECTIVES

Objectives of the JCMB include:

1. Establishing a unique urban non-commercial mitigation bank to provide compensatory mitigation to governmental entities within the incorporated and urbanized areas of Richland County;
2. Improving water quality through stream restoration and wetland and buffer enhancement;
3. Reducing nonpoint source pollution and addressing Total Maximum Daily Loads (TMDLs) for dissolved oxygen and fecal coliform in Gills Creek through BMP construction and retrofits within and adjacent to the proposed JCMB;
4. Long term preservation of natural resources and buffers;
5. Providing green space and public access via the construction of trails adjacent to the JCMB;
6. Promoting Richland County’s objectives for improved planning and sustainable community growth within the Gills Creek watershed; and
7. Providing environmental and conservation educational opportunities for the public and K-12 students.

PROJECT DESCRIPTION

Richland County is strategically located in the center of South Carolina and includes the City of Columbia, the State capital. Jackson Creek (a tributary to Gills Creek) is located in the northeast area of Richland County, the fastest growing area of the County according to the Central Midlands Council of Governments. Rapid population growth and poor land use decisions have caused a significant loss in open space and increased stormwater pollution from these urbanized areas. Further, the County is expected to grow approximately 40 percent by 2035 (Matheny-Burns Group, 2007) placing additional pressure on the existing limited green space and natural resources within this urbanizing environment.

Portions of Gills Creek were placed on the 303-d list of impaired waters and a TMDL for dissolved oxygen (DO) and fecal coliform (FC) was developed in 2010 (Tetra Tech, 2010). No active continuous National Pollutant Discharge Elimination System (NPDES) point source dischargers are permitted in the watershed and therefore stormwater runoff is the most probable source of the water quality impairments. Significant reductions in nonpoint sources contributing to FC loadings and oxygen-demanding materials are needed to address the DO and FC impairments.

The initial concept of the JCMB started in 2007 with the development of the Renaissance Plan for the Decker Boulevard/Woodfield Park Area by the Richland County Planning and Developmental Services Department. This neighborhood plan highlighted Jackson Creek as an important resource to Decker Boulevard and included numerous recommendations such as: reclaiming developed areas of the Jackson Creek floodway for recreation and conservation; restoring the streams to a ‘more natural state’; demolishing existing infrastructure; removing fill in the floodplain; retrofitting BMPs; the installation of stormwater retention demonstration projects; and the adoption of LID standards for new development and redevelopment to reduce stormwater impacts.

The JCMB will comprise approximately 34 acres of undeveloped property in Richland County and the City of Forest Acres within the Gills Creek watershed near the intersection of Two Notch Road and Decker Boulevard, illustrated in Figure 2. The project area includes approximately 16.4 acres of palustrine forested and non-forested wetlands; 5,622 linear feet of perennial streams; and 707 linear feet of intermittent streams.

The Richland County Conservation Commission is funding the prospectus and banking instrument development while the Richland County Conservation Department and Stormwater Division (Public Works Department) will sponsor and fund the proposed JCMB.

RESTORATION APPROACH

The JCMB is located in the Sandhills Ecoregion, near the boundary of the Carolina Slate Belt. This complex environment includes a mixture of rolling to hilly terrain with sandy, low-nutrient, soils which support high rates of groundwater seepage. The project area also abuts the Carolina Slat Belt and contains subsurface rock and silt-clay soils with a low groundwater storage capacity.

Ecological and watershed concerns in Jackson Creek, including: sedimentation, water quality, flooding and aquatic ecosystems degradation, will be addressed through a combination of stream, wetland and buffer enhancement as well as the implementation of stormwater BMPs. Stream enhancement will be accomplished by stabilizing erosive banks and restoring natural channel bedform variation by constructing and inducing riffle, step, pool, run, and glide features and associated habitat. Water quality, specifically dissolved oxygen concentrations, will be improved by constructing step pool features and channel bedform variation. Urbanization adversely impacts the frequency and
volume of sediment transported to a receiving water, exposing these systems to dynamic loading and significant deviations from a natural state. To address this dynamic loading, adversely impacted by upstream structures (lakes, BMPs, etc.) and land disturbance activities (construction), the County will perform bedform reconstruction to promote bedform variation, stable channel geometry and channel bed armoring.

The enhancement of riparian buffers is intended to filter runoff from the adjacent commercial and residential properties, thereby improving surface water quality downstream. Buffer enhancement will provide such benefits as: removal of sediment through settling within the floodplain areas, filtering of nutrients and other pollutants as runoff flows through and across floodplain areas, reduction of in-stream nutrients that cause low dissolved oxygen concentrations and eutrophication and reductions in stormwater flows and flooding. Buffer enhancement will be accomplished via invasive species management, implementation of erosion and sediment control measures, and planting of native vegetation.

Based on initial assessments, sufficient groundwater hydrology is apparent in the wetland areas to maintain wetland characteristics. For this reason, wetland enhancement will be accomplished via invasive species management, minor floodplain grading and planting of native vegetation.

In addition to direct stream and wetland enhancement, a true watershed approach will be implemented. BMPs, such as ephemeral pools, slope stabilization, and other soil and erosion control measures will be incorporated within the bank boundaries to provide localized stormwater control and improved water quality. Additional BMPs will be constructed outside the project area, by promoting low impact development (LID) techniques and green space preservation in adjacent parcels. The BMPs and techniques may include constructed wetlands, water quality ponds, preserved and enhanced vegetated corridors, bioretention, permeable pavement, trash racks, and vegetated filter strips with level spreaders.

**DISCUSSION AND RECOMMENDATIONS**

A number of institutional, technical and coordination challenges have hampered and delayed the implementation of the proposed JCMB. As referenced above, the initial concept of the JCMB started in 2007 as part of the County’s neighborhood planning process. A three-year educational process was then required before County Council approved funding for development of the prospectus and banking instrument in 2010. Final funding of the project was not approved by County Council until June 2012 as part of the FY13 County budget. Due to the public funding and management of this project, timelines have been significantly longer than those associated with developing a private mitigation bank, increasing both project cost and complexity. If Richland County and other local governments in South Carolina are to successfully implement urban mitigation banks in the future, streamlined processes to approve project planning and land acquisition and identification of funding sources are needed to avoid project delays and cost escalations.

While unique in South Carolina, urban mitigation banking is more common in other Southeastern states. Urban mitigation banks have been established in North Carolina, Georgia and Virginia. The Elizabeth River watershed encompasses approximately 300 square miles within the cities of Chesapeake, Norfolk, Portsmouth and Virginia Beach, VA. Industrial and urban development has led to significant environmental degradation to the Elizabeth River and the adjacent ecosystems. The Elizabeth River Restoration Trust (ERRT) in-lieu fee program was established in 2003 via a Memorandum of Understanding (MOU) between the Virginia Department of Environmental Quality, USACE – Norfolk District and The Elizabeth River Project with a goal of ‘no-net-loss’ of aquatic resources and to achieve improvements in the environmental and aquatic health of the Elizabeth River watershed.

In June, 2004 Charlotte-Mecklenburg Storm Water Services established the City of Charlotte Stream and Wetland Mitigation Bank which was the first utility to implement the mitigation banking concept for stormwater utility work. The Bank is intended to provide compensatory mitigation for City of Charlotte and Mecklenburg County public projects, located within the jurisdictional limits of the County.

Gwinnett County, GA developed an umbrella banking instrument in 2003 through the USACE – Savannah District. Credits generated by this bank are available to various Gwinnett County Departments, the County School Board, GDOT and the commercial sector. Revenues assist in implementing Gwinnett’s watershed management program and fund stream and wetland restoration projects within the limits of the County. The County has one approved Banking site and two pending approvals.

The JCMB draft Prospectus document, developed by Tidewater Environmental Services, was submitted to the Interagency Review Team (IRT) for review in March 2011. Unlike Georgia, North Carolina and Virginia, no urban mitigation bank has ever been approved in South Carolina and to date only one mitigation bank has been approved under the Final Rule (April, 2008). Being the first project of its kind in the State, the project team has worked diligently since March 2011 to educate and concisely communicate the dual project objectives.
(generating compensatory mitigation and providing water quality improvements) to the IRT, State and local agencies to garner regulatory support and ultimate approval of the first urban mitigation bank in the State. If urban mitigation banks are to receive approval in South Carolina going forward, it is recommended the IRT closely examine such banks in other states to better understand the dual mitigation and water quality benefits of these banks.

One important technical factor associated with urban banks is the relationship between urban hydrology and functional lift. Urbanization results in hydromodification of in-stream hydraulics and rapid adjustment of channel morphology thereby disturbing natural geomorphic and ecological processes in stream systems (Neff et. al., 2010). From a design perspective the urban environment has contributed to reduced instream water quality and increased stormwater runoff. Sediment supply to the receiving water bodies has also been negatively impacted. The general protocols used to monitor stream enhancement and restoration typically rely on a reference stream to complete a pre-design assessment and post-project comparison. This is difficult since urbanizing and urban systems rarely have reference systems and the return to a pristine (pre-development) condition through restoration is highly improbable. Thus, innovative assessment, design and post-project comparisons must be utilized, communicated to and validated by the IRT in urban environments to accurately quantify and assess existing conditions and functional improvements provided via enhancement activities.

Lastly, landowner negotiations to acquire the required stream and wetland buffers through either easements or fee simple purchases have been difficult and lengthy. The approximately 34 acre JCMB area is comprised of portions of 14 parcels ranging in size from 0.1 up to 18.4 acres. The seven landowners range from individuals to large commercial developers. A large majority of the JCMB is located in the floodway and 100-year floodplain of Jackson Creek. As a result, development in these areas is restricted by state and local ordinances and often more costly and risky. However, the buffer configuration isolates portions of the 14 parcels, most of which are zoned commercial, potentially restricting their future development and value. As a result, negotiations with the landowners are ongoing and have required significant County staff resources to communicate both the public benefits of the project and the probable landowner benefits resulting from the enhancement of the Decker Boulevard Corridor. Therefore, landowner negotiations and buy-in have been exceedingly more complex and lengthy compared with non-urban mitigation banks consisting of a single or limited number of landowners.

Despite these institutional, funding, technical, and coordination challenges, the proposed JCMB model will be an important first step in South Carolina to bring together compensatory mitigation and water quality improvement in an urban environment.

LITERATURE CITED


Compensatory Mitigation for Losses of Aquatic Resources: Final Rule (33 CFR Parts 325 and 332, April 10, 2008)


Neff, K.J., Schwartz, J.S., Dodson, A.B., Hamrick, M.S. A Modeling Approach to Restoring Pool-Riffle Structure in an Incised, Straightened Channel of an Urban Stream. Session in the Hydraulics and Waterways Section; World Water and Environmental Resources Congress of the American Society of Civil Engineers and Environmental and Water Resources Institute; Providence, Rhode Island; May 2010.


