



2022 Environmental Enhancement Grant Program

Durham County

Neal Middle School Bioretention Project

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I. Project Description and Technical Specifications

Project Goals and Objectives

The EEG Program seeks to preserve and enhance North Carolina's natural resources. Furthermore, it identifies construction, remediation, and restoration as crucial activities for improving water quality. Located in both the Neuse and Cape Fear watersheds, Durham County is subject to the Falls and Jordan Lake Nutrient Management Strategies. As it seeks to meet the requirements of these Strategies, the County adopted a set of guiding principles for its Stormwater Program, including Compliance, Efficiency, Resiliency, and Environmental Justice. Compliance measures may include projects such as construction of new stormwater control measures (SCMs), land conservation, retrofitting existing SCMs, stream restoration, floodplain rehabilitation, and others.

The County has identified a project at Neal Middle School that addresses all four guiding principles. The Neal Middle School Bioretention Project would address runoff, reduce nutrients, and provide an educational opportunity for the school's students to learn more about the importance of water quality protection. This project would direct currently untreated runoff to a new stormwater control measure at the back of the school as well as remedy bank erosion at a nearby outfall. In partnership with Durham Public Schools, and working with Neal Middle School faculty and staff, the County will also seek to create curriculum around the new bioretention area.

Neal Middle School is at the intersection of Baptist Road and Highway 98 near the eastern edge of the Durham City limits. The school is located in the Falls Lake Basin and within the Lick Creek watershed. The Lick Creek watershed has been identified as a high priority watershed for County projects through analysis of impervious areas, riparian corridor assessments, stream restoration analyses, and potential for achieving multiple County priorities. The school site has approximately 5 acres of untreated impervious area located on public property.

A bioretention area is proposed in the open space in the back of the school northeast of the Durham County Sheriff Department Office adjacent to a school access road. The proposed stormwater control measure (SCM) would collect runoff from the school's roof by redirecting the existing roof drains. The surface area for the bioretention area is approximately 4,800 square feet (0.11 acres). Since the bioretention areas would be located on school property, the project would provide the County with an educational opportunity to discuss the water quality benefits of SCMs and their importance. The approximate location proposed for the construction of the bioretention area is shown on the attached exhibit. There is adequate accessibility for this project, but it would likely need to be constructed while school is not in session to minimize impacts to the school community. Potential constraints that were noted include the need for additional infrastructure to divert stormwater to the proposed SCM. Several power poles were identified during the site visit as potential site restrictions and utility conflicts.

Additional project components improvements are proposed based on observations (e.g.,

erosion on the soccer field behind the goal) made during a site visit. To reduce bank erosion and improve bank stability, channel bank stabilization including grading is proposed behind the soccer goal down to the sheriff's office. The stabilization will start at the outfall of the culvert in the back of the school adjacent to the soccer field. It is anticipated that this culvert would be replaced as part of the proposed project. This channel bank stabilization would further reduce sediment and nutrients leaving the school property and making their way into Lick Creek.

Based on evaluation using the NCDEQ Stormwater Nitrogen and Phosphorus (SNAP) tool, the annual percent nutrient reductions achieved by this project are summarized below:

	Annual Nitrogen Reduction (%)	Annual Phosphorous Reduction (%)
Bioretention Area	54.36	6.01

Neal Middle School is a magnet school in Durham County with a STEM-focused curriculum. Its student population is 95.7% minority (47.1% Hispanic, 44.4% Black, 1.3% AAPI, 0.1% American Indian, and 2.7% Mixed Race) and 44.2% of its students qualify for free and reduced lunch. Furthermore, the area in which students are assigned to Neal Middle has a high percentage of Environmental Justice populations, as determined using NEPA and Census data and shown on the included map. With such a high population of minority students, this project is an opportunity to serve an overburdened community, and with the school's focus on STEM education it is an ideal situation for the type of water quality curriculum proposed.

Project Activities

The Durham County Stormwater and Erosion Control Division (S&E) will serve as the lead on the project and will be joined by Durham Public Schools, specifically their Building Services and Construction and Sustainability teams. Additionally, education efforts will be coordinated with Neal Middle School Faculty and Administration. Specific major project activities include:

Project Activities:

1. Memorandum of Agreement with Durham Public Schools/Neal Middle School Administration
2. Develop and advertise RFQ for Design/Build of Bioretention Area
3. Select Firm for Design/Build
4. Finalize Construction Drawings (30% Construction Drawings will be complete in July 2022)
5. Apply for and receive approval for all applicable permits/permissions
6. Construct bioretention area (Mid-June to Late-August)
7. Conduct/receive as-built certification of bioretention area
8. Develop educational curriculum centered around bioretention area
9. Conduct pre- and post-construction water quality monitoring to measure success and as an educational activity.

II. Results Measurement

As the lead agency, the Durham County Stormwater and Erosion Control Division will be responsible for measuring the results of the project. The ultimate measure of the project will be the construction of the bioretention area and channel bank stabilization that will treat runoff from the school and reduce nutrients to local waterways and ultimately Falls Lake. Water quality improvements will be measured through pre- and post-construction sampling that can be conducted by students at Neal Middle School. Educational outcomes will also be measured. Pre- and post-educational testing will be conducted to determine knowledge gain. Participation in the educational curriculum will also be measured.

Interim Measures of Success

- Request for Proposals advertised by the end of February 2023
- Design/Build Firm selected by July 2023
- Initial engagement with Neal Middle School Faculty in September 2023
- Construction Drawings Completed by October 2023
- Water quality sampling begins in January 2024
- Permits and plan approval obtained by March 2024
- Construction of bioretention area begins in June 2024
- Construction completed by beginning of school year in August 2024
- Pre-Education testing in September 2024
- Educational activities begin by October 2024
- Post-Education testing in December 2024
- Water quality sampling ends in December 2024

Timeline

A timeline of project activities and benchmarks is attached to this proposal. The official start date of this project is dependent upon the grant award timeline, however construction of the bioretention area will be scheduled for the 2024 school summer break between early June and the end of August.

Potential Challenges

The project is anticipated to kickoff internally in January 2023, under the assumption the grant award has been completed by that time. As with any project, obstacles must be anticipated, and a buffer has been incorporated into the end of our timeline to complete the project by December 2024.

Timing is an essential component of this project, as construction must occur during the summer months of the school calendar. For that reason, almost 18 months are built in prior to construction to ensure that an appropriate designer and contractor are selected and all necessary permits and authorizations are attained. As with any construction project, weather will always be a factor. The County is also mindful of other construction-related challenges such as supply chain issues or simply finding a contractor with the availability to do the work.

Other challenges are with developing the appropriate curriculum. Teachers are often overburdened with their day-to-day curriculum development, and Durham County staff do not have expertise in middle school education, so working within the time the Neal Middle School staff have will be critical. Durham County will also seek assistance from both internal parties such as Cooperative Extension or the Soil and Water District and external parties such as Duke University or North Carolina Central University faculty and staff or other educational consultants. Working closely with Durham Public Schools will be essential to the success of this component of the project.

Outcomes

The ultimate outcome of the Neal Middle School Bioretention Project will be cleaner water leaving the school property and entering Falls Lake, an impaired water supply reservoir. As designed, this project will reduce both Nitrogen and Phosphorous loading to Falls Lake by treating over 5 acres of impervious surface. Reduced runoff volumes will also prevent further erosion in a downstream channel of the school. Additional outcomes include a more knowledgeable student body at Neal Middle School on issues of water quality, stormwater, and environmental protection.

III. Project Costs and Budget

Durham County is requesting \$225,000 in EEG funding for this project. Planning level cost estimates for construction of the bioretention area and associated channel stabilization are \$425,000. With an additional \$25,000 earmarked for educational curriculum development and associated signage and materials, the total project cost is \$450,000. Durham County will use its stormwater utility funds to match the EEG funding to cover the remainder of the project costs. Any overrun could also be covered by stormwater utility funds.

IV. Organizational Structure and Management

Durham County Government is a dynamic organization, roughly 2,000 people strong. The County spans 27 different departments and almost 100 program service areas that impact and support the lives of residents. The County's mission is to provide high-quality, fiscally responsible services vital to a safe, healthy, and vibrant community. The lead agency on this project, the Durham County Stormwater and Erosion Control Division (S&E), administers and enforces the sedimentation and erosion control sections of the Durham City/County Unified Development Ordinance and the Durham County Stormwater Ordinance. The Division is responsible for enforcing the Neuse River, Falls Lake, and Jordan Lake nutrient management rules. It is also responsible for maintaining the County's compliance with the rules through stormwater retrofit identification, illicit discharge detection and elimination, and education and outreach activities. Additionally, the Division administers the Durham County Stormwater Utility Fee.

Project partners also include Durham Public Schools, specifically their Building Services and Construction and Sustainability teams, as well as the faculty and staff of Neal Middle School. If needed, Durham County will also seek assistance from Cooperative Extension, the Soil and Water Conservation District, Duke University, or North Carolina Central University.

Current Projects

Durham County S&E, in addition to the day-to-day operations of a permitting agency, is currently working with a consultant team on its Nutrient Management Strategy Development project. This project's goal is to develop project selection criteria for compliance measures with the Falls and Jordan Nutrient Management Strategies, as well as identify potential initial projects for implementation. This project was identified through this process. Implementation of the County's Nutrient Management Strategy will continue for the foreseeable future.

Qualifications

Within the Engineering and Environmental Services Department, staff members with varying subjects of expertise, including professional engineers, project managers, and GIS professionals, will play key roles in successfully completing the project. Staff members from the Stormwater and Erosion Control Division will work closely with Durham Public Schools on the timing and construction details prior and up to installation. Additionally, S&E staff will coordinate with Neal Middle School faculty and staff on development of educational materials and curriculum centered around the new bioretention pond.

The project leads, Ryan Eaves, and McKenzie Myers are each highly experienced in stormwater, water quality, environmental education and grant project management.

Previous Grant Experience

Durham County was awarded an Environmental Enhancement Grant in 2005 for land acquisition and management of 263 acres in the County. This project was successfully completed and resulted in an environmental benefit to water quality through preservation of lands that otherwise would have been available for development and a possible increase of impervious area. Without this project, development could have potentially caused an adverse impact to water quality in our water supply watersheds.

Durham County Stormwater was awarded an Environmental Enhancement Grant in 2021 to fund stormwater education enhancement in collaboration with North Carolina Central University. The County recognizes that communities of color and low-income communities are often the first affected by stormwater concerns such as flooding and water pollution, and some of the last to be educated on what they can do to protect themselves and their property. This grant is funding in the development of an internship program for an NCCU student-intern to assist the County in further reaching overburdened and underserved communities within Durham County.

V. Conclusion

Durham County is committed to protecting our natural resources through concerted efforts to most effectively leverage its residents' dollars to identify and act upon opportunities for protection, improvement, and education. The County Stormwater Program is dedicated to its guiding principles and the Neal Middle School Bioretention Project meets all four. Attaining additional funding through the Environmental Enhancement Grant Program only furthers the ability to meet those goals. EEG funding of a portion of this project frees up dollars to be used in other parts of the County. Furthermore, EEG dollars will be spent on a project that will not only improve water quality in Falls Lake, but the students of Neal Middle School will receive increased understanding of water quality issues and hands-on experience in improving and protecting our environment.

