

Pigeon House Branch Water Quality Improvement Project Wet Detention  
Pond and Monitoring at Fred Fletcher Park

**PROJECT INFORMATION**

**1. Project Name:** Pigeon House Branch Water Quality Improvement Project: Wet  
Detention Pond Construction and Monitoring at Fred Fletcher Park

**APPLICANT INFORMATION**

**2. Lead Organization** (to be named as grantee)  
City of Raleigh, North Carolina

**Non Profit Registration Number or Social Security Number:** Tax ID No. 56-6000236

**Project Contacts** (name, position, email address)  
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Stormwater Services Manager  
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**Cooperating Organizations** (names of contacts) *N/A*

Is the funding requested to initiate, continue or complete an ongoing, phased project (that is a project greater than three years)? \_\_\_yes X no If yes, name project and grant year of first phase.

*However, the requested funding is part of a larger initiative to improve the waters of PigeonHouse Branch in the City of Raleigh.*

If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)? X yes \_\_\_no If no, explain:

The Lead Organization, as listed on the first page of this form agrees to comply with all requirements specified in the guidance package. (Checking no or exceptions will cause the project to have a lower ranking than similar project by lead organizations that agree to the requirements.):

X Yes \_\_\_No

Is proposal intended to target a specific watershed? X yes \_\_\_ no If yes, complete Part 2 of this form.

Has this or similar proposals been submitted to other funding organizations? \_\_\_yes X  
no If yes, name organization and date submitted.

### **BASIN/WATERSHED INFORMATION**

*If this project involves comprehensive implementation of practices within a specific watershed, you must also complete part 2 of the application.*

**3. DWQ-designated River Basin: Upper Neuse River Basin (11-digit HUC: 03020201080)**

**4. Watershed: Crabtree Creek Watershed (Pigeon House Branch tributary)**

Watershed size (acres): 3,200 acres (Pigeon House)

DWQ Classification: C-NSW

14-digit HU Code: 03020201080020

*(see map in attached Figure 1)*

Is the site in the watershed of a 303(d) listed stream? Xyes \_\_\_no

### **5. Project/Program Abstract:**

The primary objective of this project is to design and construct a wet detention pond for water quality improvement within the urbanized, Pigeon House Branch watershed in order to address state and local water quality concerns. The State has identified Pigeon House Branch on the 303(d) list as non-supporting due to levels of copper, fecal coliform, and low dissolved oxygen.

The City of Raleigh has made Pigeon House Branch a priority for improvements and has already taken steps towards improving the watershed's water quality by installing Best Management Practices (BMPs) and rehabilitating sanitary sewers in the basin. Construction of a wet detention pond at Fred Fletcher Park would be the next important step in this process.

### **6. Project/Program Description & Components:**

The City of Raleigh performed a stormwater management study of the Pigeon House Branch watershed in July 1994 as part of the City's ongoing stormwater management program. The purpose of the study was to provide the City with recommendations for structural and nonstructural improvements that may be made in the drainage basin to alleviate existing and projected future stormwater problems related to flooding, erosion, and water quality. As part of the study, the City identified candidate sites in the watershed that would potentially be suitable for the construction of best management practices – wet detention ponds or extended dry detention ponds – having the desired effect of improving water quality in the watershed.

Following the completion of the Pigeon House Branch study, the North Carolina Environmental Management Commission adopted new rules to support the implementation of the Neuse River Nutrient Sensitive Waters Management Strategy (the

“Neuse Rules”). These rules require municipalities in the Neuse River Basin, such as Raleigh, to take steps to reduce nitrogen pollution coming from non-point source pollution by 30 percent through the use of newly-constructed water quality facilities in developed urban areas and other elements. In addition, the State has listed Pigeon House Branch on the 2002 Impaired Waters List (303d) as a non-supporting stream because of low dissolved oxygen, high copper levels, and high fecal coliform counts.

Faced with these new requirements, the City proceeded with development of preliminary designs for two of the candidate sites identified in the Pigeon House Branch study, including the wet detention pond at Fred Fletcher Park. In addition, the City performed another study (“Pigeon House Branch Updated Water Quality Improvement Plan”) to identify additional candidate sites within the Pigeon House Branch watershed to determine if more cost-effective sites may be available for use. In total, the City studied 12 candidate sites for consideration for either a wet detention or extended dry detention pond. The detailed study determined that the wet detention pond at Fred Fletcher Park was the most cost beneficial site of the 12 locations. This site is most attractive due to its capacity for pollutant removal, location on City-owned property, and the potential aesthetic benefits to the neighborhood and park.

Pigeon House Branch is almost completely built-out and much of the existing development is older and predates stormwater management regulations. Therefore, there are only limited opportunities for watershed water quality management using land use restrictions and other similar nonstructural BMPs. As a result, implementation of structural BMPs is the most feasible approach to achieve water quality control because of the existing infrastructure and the high levels of impervious ground cover. Although detention basins are among the most effective structural BMPs for controlling pollutants, available areas large enough to construct detention ponds are scarce in Pigeon House Branch. The City wishes to take advantage of the opportunity at Fred Fletcher Park to install a facility that will have a direct benefit to water quality improvement in Pigeon House Branch.

The proposed Fred Fletcher Park wet detention pond is located near downtown Raleigh and would treat runoff from approximately 60 acres of single-family and multi-family land development. The footprint of the pond is approximately one-acre, and would be located completely on publicly-owned land. Therefore, land acquisition would not be necessary for the success of this project. Since the pond is located in a City park, the goal is to incorporate this facility into the landscape of the park to provide a visual amenity for local citizens.

During the preliminary design phase of the Fred Fletcher Park pond, the City sought and received tentative approval from the State as to the permitability of this project. In addition to the studies explained previously, the City has also taken a number of steps to improve water quality in Pigeon House Branch. These include installation of onsite stormwater treatment devices (“packaged wetlands”) at the City’s motor vehicle maintenance facility, rehabilitation of sanitary sewers in the basin, as well as an ongoing public education and information program.

See attached scope of work for tasks and schedule associated with the intended project.

### **7. State NPS Management Program Action Plan Goal(s) supported:**

The proposed project will support the following NPS Management Program Action Plan Goals:

Goal: Protect surface water quality and groundwater quality from urban nonpoint source pollution.

4. Implement Nutrient Sensitive Waters strategies for Tar-Pamlico and Neuse River basins.
5. Enhance state stormwater programs through NPS modeling, monitoring and targeting of priority watersheds.
6. Monitor stormwater BMPs to determine the effectiveness of various management devices and alternatives.

Goal: Document NPS impacts.

1. Perform sampling to determine source, scope, and resultant impact of NPS pollution through physical/chemical and /or biological monitoring.
2. Document findings and conclusions

Goal: Document BMP effectiveness.

1. Perform sampling (e.g. “before and after”) to document the effectiveness of BMPs as they relate to water quality. Use physical/chemical and/or biological monitoring.
2. Document findings and conclusions.

### **8. Quantified Specific Outputs/Deliverables:**

The primary deliverables developed for this project will be:

1. A project report consisting of the project methodology, collected data, design criteria, findings and conclusions.
2. Water quality data collected during the course of the project (approximately 10 to 15 events over one year) will be provided in digital format. Sampling parameters include:
  - i. Routine Sampling Parameters: nutrients (total-P, ortho-P, TKN, NO<sub>2</sub>+NO<sub>3</sub>, NH<sub>3</sub>), metals (lead, zinc, copper, cadmium, iron manganese), total and dissolved solids (TSS, TDS), dissolved oxygen, oxygen demand (BOD-5, COD), total organic carbon.
  - ii. Special Analyses: indicator bacteria (fecal coliforms, E-coli) from grab samples only.

3. A wet detention pond BMP will be constructed in Fred Fletcher Park in the Pigeon House Branch watershed. The BMP will control stormwater from an area of approximately 60 acres consisting of single-family and multi-family residential development.
4. Public information materials, including one brochure and three press releases describing the project, will be developed and submitted with the final report. Press releases will be timed with completion of major project milestones such as completion of design and permitting, completion of BMP construction, and completion of monitoring.
5. Two public meetings with local citizens, the development community, and other interested water quality professional staff will be held over the course of the project. The objectives of the meetings will be to educate local citizens and the development community on the importance of watershed protection and the benefits of this project.

**RFP criteria met by project:** *The design and construction of the Fred Fletcher Park wet detention pond project meets the RFP criteria for restoration of waters listed in Part 5 of the 2002 303(d) list.*

## 9. Project Milestones:

<b>Project Milestones/Deliverables and Payment Schedule</b> (Adjust table as necessary for shorter project period)		
Time Period/Date	Completed Activities/Output delivery	Maximum Amount Payable For the Quarter (Include % of Grant Total/Cumulative Total %/Dollar Amount)
First Year, 1 <sup>st</sup> Quarter Jul – Sep '05	Contract negotiations with DENR, notice to proceed	0%
2 <sup>nd</sup> Quarter Oct – Dec '05	Development of preliminary construction documents, permitting, public meeting (1), conduct progress meeting.	0%
3 <sup>rd</sup> Quarter Jan – Mar '06	Development of final construction documents, permitting, public meeting (2), conduct progress meeting.	0%
4 <sup>th</sup> Quarter Apr – Jun '06	Development of final construction documents, permitting, public meeting (3), conduct progress meeting (continued).	0%
Second Year, 5 <sup>th</sup> Quarter Jul – Sep '06	Bidding of construction project, issue notice to proceed to contractor, first month of construction, interim report number 1.	(23.1% / 23.1% / \$75,768)
6 <sup>th</sup> Quarter Oct – Dec '06	Complete construction, conduct progress meeting.	(66.9% / 90.0% / \$219,432)
7 <sup>th</sup> Quarter Jan – Mar '07	Construction contract close-out, develop protocols for water quality sampling, conduct sampling (weather-permitting), conduct progress meeting, interim report number 2.	(0.0% / 90.0% / \$0)
8 <sup>th</sup> Quarter Apr – Jun '07	Continue water quality sampling (weather-permitting), conduct progress meeting, prepare quarterly water quality monitoring report number 1.	(0.0% / 90.0% / \$0)
Third Year, 9 <sup>th</sup> Quarter Jul – Sep '07	Continue water quality sampling (weather-permitting), prepare interim report number 3, prepare quarterly water quality monitoring report number 2.	(0.0% / 90.0% / \$0)
10 <sup>th</sup> Quarter Oct – Dec '07	Continue water quality sampling (weather-permitting), conduct progress meeting, prepare quarterly water quality monitoring report number 3.	(0.0% / 90.0% / \$0)
11 <sup>th</sup> Quarter Jan – Mar '08	Prepare Final Project Report, conduct progress meeting, prepare interim report number 4, prepare quarterly water quality monitoring report number 4.	(10.0% / 100% / \$32,800)

**10. Funding Requested:**

Source of Funds	Description	Amount
<b>Section 319(h)</b>		
Staff	Labor costs for engineering services	\$0
Benefits	Included in labor costs	n/a
Travel	n/a	n/a
Equipment	Portion of administrative cost (reports, postage)	\$2,000
Construction	BMP construction cost	\$300,000
Other (specify)	Lab analysis cost	\$26,000
<b>Total</b>		<b>\$328,000</b>
<b>Non-Federal Match (to meet 40% obligation)</b>		
Staff	Labor for project management and monitoring activities	\$160,000
Benefits	Included in labor costs	n/a
Travel	Travel required to site and lab	\$3,800
Equipment	Purchase of sampling equipment	\$15,000
Construction	BMP construction cost	\$150,000
Other (specify)	Reports, telephone, postage charges	\$4,500
<b>Total</b>		<b>\$333,300</b>

**Nonpoint Source Section 319(h) Proposal Form - PART 2**

**Implementation/Restoration/Incremental Projects by Watershed**

**1. Name of Watershed:** Pigeon House Branch (Crabtree Creek) – approximately 3200 acres (see map in attached Figure 2)

**2. Watershed size (acres):** Wet Detention Pond at Fred Fletcher Park – 57 acre drainage area

**3. Classification/rank/priority of the watershed:**

*Stream Classification – C NSW*

*Priority - Medium*

**4. Land uses within the watershed (percentage): (Fletcher Pond watershed)**

Agriculture                      Urban (**100%**)

Construction                    Mining

Silviculture                        Other

**5. Within the watershed, list the following: (Fletcher Pond watershed)**

Stream miles **0.3 miles**

Estuary acreage **0.0 acres**

Lake acreage **0.9 acres**

**6. List State designated use(s) that are not being met (that is, fishability, swimmability, etc.):**

*Uses not being met for these Class C waters are secondary recreation, fishability, and wildlife/fish propagation.*

**7. List State water quality standard(s) violated and identify source of information (that is, dissolved oxygen, biochemical oxygen demand, fecal coliform, narrative, etc.):**

*Based on the North Carolina 2002 Impaired Waters List (303(d) list), Pigeon House Branch is non-supporting for copper, fecal coliform, and low dissolved oxygen.*

**8. List pollutants and sources affecting use(s) listed above and identify source of information:**

Pollutants	Sources	Affected Use(s)
ex: Nutrients	ex: Dairies, cropland	ex: Fishability
<b><i>Copper</i></b>	<b><i>Urban runoff/storm sewers Industrial permitted</i></b>	<b><i>Recreation/fishability</i></b>
<b><i>Fecal coliform</i></b>	<b><i>Urban runoff/storm sewers Industrial permitted</i></b>	<b><i>Recreation/fishability</i></b>
<b><i>Low Dissolved Oxygen</i></b>	<b><i>Urban runoff/storm sewers Industrial permitted</i></b>	<b><i>Wildlife propagation/ fishability</i></b>

*Source of information for above table is the State 303(d) list*

**9. Estimate pollutant(s) control needed to achieve water quality goal:** *The wet detention pond is design to state standards which are predicted to reduce TSS by 85 to 90 percent and Total Nitrogen by 30 to 40 percent. Buffers will also be installed to create a natural filter of overland flow into the pond.*

**10. Best management practices/controls to be implemented:**

*wet detention pond approximately 1 acre pond controlling a 57 acre drainage area*

**11. Estimate improved water quality:**

Stream miles improved  
Estuarine acres improved  
Lake acres improved

*The construction of the Fred Fletcher Park wet detention pond, incorporated with the additional measures already implemented by the City of Raleigh, is intended to improve the overall water quality level of the Pigeon House Branch watershed.*

**12. Monitoring design (provide monitoring plan in final submittal):**

Paired watersheds  
Single downstream  
Upstream/downstream *chosen sampling method*

No monitoring  
Other

**13. Monitoring program elements:**

Not applicable  
Chemical/physical *yes*  
Biological *yes*  
Sediment *yes*  
Habitat  
Volunteer Citizens

**14. Funding requested from Section 319 (include non-federal match):**

	<b>319 (h) Funding</b>	<b>Non-federal Match*</b>
BMP Implementation <sup>1</sup>	\$300,000	\$150,000
Monitoring	\$26,000	\$42,000
Project Management/Design <sup>2</sup>	\$0	\$120,000
Public Education	\$0	\$13,000
Other (specify) <sup>3</sup>	\$2,000	\$8,300
<b>TOTAL</b>	<b>\$328,000 (49%)</b>	<b>\$333,300 (51%)</b>

\*Note: Of the total project funds, a minimum of 40% must come from non-federal sources.

NOTE: 1) BMP Implementation costs include the cost of construction only  
2) Project management costs include design, permitting, reports/deliverables, and overall project/construction management  
3) Other costs include other direct cost items such as travel, telephone, printing, etc.

## **PROJECT SCOPE OF WORK**

This project scope of work will be performed by the City of Raleigh, with assistance from a consulting engineer as appropriate. The work consists of six tasks, as described in detail below.

### ***TASK 1: FRED FLETCHER PARK WET DETENTION POND FINAL DESIGN/PERMITTING SERVICES***

The City of Raleigh previously contracted CDM to develop preliminary design plans for the Fred Fletcher Park wet detention pond. The preliminary plans included a topographic site survey, a geotechnical study, preliminary design calculations and drawings, and an estimate for the cost of construction. The final design plans will be based on the initial work completed previously. Subtasks for discussed below:

#### 1.1 Review of Preliminary Design Plans

Since the preliminary plans were developed in 2000, the City will review the plans to verify that all previous design assumptions are still valid for the proposed design.

#### 1.2 Final Design Plans

The City or their consultant will include the design of the Fred Fletcher Park wet detention pond in accordance with the preliminary layout developed by CDM. Plan sheets shall be prepared at a horizontal scale of not smaller than 1" = 50'. All drawings shall be standard 24" x 36" sheets. Proposed easements, both temporary and permanent, shall be shown on the drawings.

#### 1.3 Contract Documents

The City or their consultant will include preparation of final contract documents for construction, including plans, specifications, and contract forms. The engineer shall provide up to 20 sets of contract documents for the project to the City for distribution.

In the final design, the engineer will prepare the following construction documents:

- Complete contract and bidding documents
- Detailed technical specifications covering items to be furnished by the contractor
- Detailed construction drawings

#### 1.4 Permits

The City or their consultant will obtain all required permits. The engineer will be responsible for providing assistance with and preparing applications for reviews, approvals, and permits with respect to the engineer's design, drawings, and specifications. During the preliminary design phase, the City met with and received tentative approval from DWQ for the Fred Fletcher Park wet detention pond. The City

has Permit applications included under this scope shall be limited to erosion control permits, dam safety permits (depending on the size of the embankment), Section 404 (from the US Army Corps of Engineers), and Section 401 (from NCDWQ).

***TASK 2: CONSTRUCTION/BIDDING SERVICES FOR FRED FLETCHER  
PARK WET DETENTION POND PROJECT***

The construction phase of the project will commence with execution of a contract for construction work on the Fred Fletcher Park wet detention pond project and will terminate upon the engineer's submission of reproducible record drawings of all work performed under the project. Work under this phase shall consist of the following:

**2.1 Bidding Services**

The City or their consultant will advertise the project and award construction contract documents to the lowest bidder.

**2.2 Preconstruction Conference**

The engineer and the City will attend and conduct a preconstruction conference with the contractor to review project requirements.

**2.3 Construction Observation**

The City will provide a part-time inspector to check construction for compliance with plans and specifications. The engineer will also perform periodic construction observations on an as-needed basis. The City will provide photographic documentation of the progress of work for review by the Clean Water Management Trust Fund (CWMTF).

**2.4 Review of Monthly Statements**

The City, with assistance from the engineer, shall prepare and verify contractor's monthly estimates of the quantity of work performed. Upon completion of the construction contract, the engineer shall assist the City to prepare a final estimate pertaining thereto, the amount due to the contractor according to the terms of such contract, and shall certify to the completeness of the work of the contractor and his general conformity to the plans and specifications of the project.

**2.5 Shop Drawings**

The engineer shall review and approve, or take other appropriate action on shop drawings, product data, or samples as submitted by the contractor. This shall be done with reasonable promptness so as to cause no delay in construction.

**2.6 Contract Change Orders**

The engineer shall advise the City on issuing change orders if required. The engineer shall prepare change orders and recommend action to the City. No change shall be made until a change order has been prepared by the engineer and approved by the City, except in the case of emergency, endangering life and property.

### ***TASK 3: WATER QUALITY MONITORING***

Under this task, a water quality monitoring program will be developed to monitor the pollutant removal effectiveness of the Fred Fletcher Park wet detention pond.

#### **3.1 Water Quality Sampling**

The sampling procedure will follow an upstream/downstream monitoring approach to demonstrate the effectiveness of the proposed project at reducing the non-point source pollutant loadings in the Pigeon House Branch. Monitoring stations will be located at inflow points and at the Fred Fletcher Park wet detention pond outflow and water quality monitoring will be conducted during storm events and dry weather to estimate the pollutant removal efficiency.

#### **3.2 Selection of Sampling Parameters and Frequency**

- Routine sampling parameters will include nutrients(total-P, ortho-P, TKN, NO<sub>2</sub>+NO<sub>3</sub>, NH<sub>3</sub>), metals (lead, zinc, copper, cadmium, iron manganese), total and dissolved solids (TSS, TDS), dissolved oxygen, oxygen demand (BOD-5, COD), and total organic carbon.
- The following special analyses will be performed: indicator bacteria (fecal coliforms, E-coli) and organics (TTHMFP, HAA5FP)
- Synoptic sampling at inflow and outflow stations during 10-15 storm events

### ***TASK 4: PROGRESS MEETINGS***

Project progress meetings will be held over the course of the project every four months. Project team members, including representatives from the City of Raleigh, NCDWQ and other appropriate State agencies may be in attendance. The City will develop and distribute meeting minutes for each meeting.

### ***TASK 5: REPORTS/DELIVERABLES***

The project will include a final report, semi-annual interim project reports, and monitoring reports. Contents of these reports are described below:

*Preliminary Design Letter Report:* A letter report will be submitted describing the location and preliminary design criteria for the proposed Fred Fletcher Park wet detention pond.

*Interim Reports:* The semi-annual interim reports will describe the results of task progress since the last interim report.

*Water Quality Monitoring Reports:* The City will produce quarterly summary preliminary data reports and annual water quality assessments reports to document the results of the water quality monitoring.

*Final Report:* The final report will describe the results of the year of water quality monitoring, as well as additional results and conclusions of the project. Analysis of the water quality monitoring data will be provided, including interpretation of the pollution removal efficiency of the Fred Fletcher Park wet detention pond. A summary of issues related to the construction of the Fred Fletcher Park wet detention pond will also be provided. The final report shall contain the following: an abstract; an evaluation of the success in preventing and controlling nonpoint source pollution; an estimate of the water quality improvement (e.g., pollutant load reductions); a summary of the costs for installation, operation, and maintenance of the Fred Fletcher Park wet detention pond and any estimated economic returns to the landowner; a technology transfer plan; and photodocumentation of project successes.

#### ***TASK 6: PUBLIC INFORMATION***

The City will conduct a public information program related to the construction of the Fred Fletcher Park wet detention pond. A minimum of two public meetings will be advertised and held to present the project to the public and receive public input. Press releases will be prepared and distributed to mark major project milestones. Also, an educational brochure will be developed and distributed during the project.