

# Reeds Creek Wetland Restoration Project

Contract #: D05016-3  
County: Iredell  
Cataloging Unit: Catawba 03050101  
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## Mitigation Report



Environmental Services Inc.



Mid - Atlantic  
Mitigation, LLC  
AN EARTHMARK COMPANY

## EXECUTIVE SUMMARY

### **Pre-Construction Site Conditions**

The Reeds Creek Wetland Restoration Site (Reeds Site) is a 14.66-acre tract located southwest of Mooresville, Iredell County, North Carolina off of U.S. Highway 21, approximately 1.3 miles northeast of the U.S. Highway 21 and Interstate 77 intersection. The Reeds Site is immediately adjacent to Lake Norman and is characterized by a variable floodplain associated with Reeds Creek. The property historically was degraded by sand dredging and also used for goat pastureland.

Onsite jurisdictional wetlands existed in portions of the Reeds Creek floodplain and become more abundant within the central portion of the project site, as the site grades into Lake Norman. Water levels within the restoration area were drained due to the presence of man-made berms, spoil piles, and unnatural grade elevations disrupting normal flow patterns and overbank flooding. There were limited areas of existing emergent and scrub-shrub wetlands where wetland hydrology had been impacted yet still met jurisdictional wetland criteria. However, the project goals are to stabilize these communities and to restore more natural wetland-floodplain hydrology. Reeds Creek enters the site from the east where it flows in a westerly direction approximately 1,135 linear feet across the site. Upstream of the project area, Reeds Creek collects surface hydrology from several unnamed tributaries. The calculated drainage area for Reeds Creek as it enters the site is approximately 4.9 square miles (3,136 acres). Further downstream of the site, Reeds Creek flows into Lake Norman prior to draining into the Catawba River.

### **Restoration Plan**

The goals and objectives of the Reeds Creek Wetland Restoration Site are to reestablish the primary wetland functions associated with nutrient removal and transport, sediment retention, wildlife (both aquatic and terrestrial) habitat, and to provide restoration of forested riparian zones and wetland communities that have been historically converted to pastureland. Table 1 below shows the construction sequences.

**Table 1. Timeline of construction sequences**

EVENT	DATE
-Removal of berm	<b>December 2006</b>
-Grading of islands and wetland pockets	<b>December 2006</b>
-Temporary/permanent seeding	<b>Dec. 2006/Feb. 2007</b>
-Restoring the reinforced silt fence (for one growing season)	<b>Jan./Feb 2007</b>
-Planting of woody vegetation	<b>January 2007</b>

### **Post Construction Site Conditions**

As a part of the restoration plan, historic wetlands were restored and jurisdictional wetlands were enhanced and/or preserved. The existing berms and spoil piles adjacent to Reeds Creek were graded down to a more natural elevation and the other existing fill areas were removed. The material was graded to the surrounding landscape to provide microtopographic complexity and planting zones for native bottomland hardwood trees and shrubs. These areas where the topography was enhanced will create diverse habitats instead of the monotypical, flat lake fringe habitat that currently exists in these areas. Surface hydrology will be reintroduced to the restoration areas via more frequent overbank flooding from Reeds Creek. Native woody vegetation will also be established in this area.

Jurisdictional wetlands will be preserved in the permanently impounded area associated with Lake Norman. Jurisdictional wetlands will be enhanced and/or restored in the area south of Reeds Creek. This will include establishing native woody vegetation, removing invasive and non-native vegetation, and slight hydrologic alterations. The area of the Reeds Site that is inundated during most of the growing season due to the rise of Lake Norman water levels will be sustained as herbaceous emergent wetland vegetation. The pre-construction water depth was commonly greater than 2 feet for several months at a time and there is no woody vegetation native to this area that could survive these conditions. However, minor grading adjacent to the wettest areas was done to expand the wetland hydrology and create microtopography planting zones within the contiguous floodplain and wetland area.

The riverine wetland and buffer vegetation community will transition as the system seeks hydrologic and vegetative equilibrium. The existing sediments were unconsolidated and mucky with saturation in some parts of the Reeds Site due to Lake Norman water levels. It is anticipated that settling and subsidence would occur throughout the initial growing season, first through evaporation and then through transpiration as the herbaceous cover (seeded and natural propagation) establishes. Areas that were not saturated/ponded (i.e. fringe areas and/or headwater wetlands) were planted with bare root seedlings to establish a bottomland hardwood riparian wetland community.

The Restoration Summary in Section 1 of this Mitigation Report describes the restoration approach and site conditions in greater detail. Based on the Restoration Plan and As-built drawing, the total area of restored riverine wetland is 4.2 acres, the total area of enhanced wetland is 2.2 acres (additional enhancement areas onsite not included in WMU calculation), and preserved wetland areas (approximately 3 acres) are located on site but are not included in the WMU calculation. The 14.66 acre Reeds Site yields 6.4 acres of restored and enhanced wetland mitigation units or  $WMU = 4.2 + (0/3.0) + (2.2/2.0) + (0/5.0) = 4.2 + 0 + 1.1 + 0 = 5.3$  WMUs. The additional acres are also considered the property of EEP.

**Table 2. Summary of Mitigation Types**

MITIGATION SUMMARY						
MITIGATION TYPE		RESTORATION (1:1)	ENHANCEMENT (1:1.5)	PRESERVATION (1:5)	TOTAL MUs	% RESTORATION
RIVERINE WETLAND	AREA (ACRES)	4.2	2.2	-	5.3	79
	MITIGATION	4.2	1.1	-		

**Monitoring Plan**

The Monitoring Plan will be discussed in detail in Section 2 of this Mitigation Report. Strategies and methodologies laid out in the Monitoring Plan will be followed annually for a minimum of five years. Wetland hydrology and vegetation success will be monitored using self-reading ground water monitoring gages and standardized, randomly placed permanent vegetation plots which will be monitored for species diversity and survival. Monitoring data will be analyzed to determine what remedial actions if any are required and any remedial actions proposed will be detailed in the annual monitoring reports.

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## **1.0 INTRODUCTION**

### **Project Background**

The Reeds Creek Wetland Restoration Site (Reeds Site) is a 14.66-acre tract located southwest of Mooresville, Iredell County, North Carolina off of U.S. Highway 21, approximately 1.3 miles northeast of the U.S. Highway 21 and Interstate 77 intersection. The project site is located in the Catawba River Watershed (USGS 8-digit Hydrologic Unit 03050101, and NCDWQ River Basin 03-08-32). NCDWQ has assigned Reeds Creek within the project site Stream Index Number (SIN) of 11-104(2). The site is immediately adjacent to Lake Norman and is characterized by a variable floodplain associated with Reeds Creek. The Reeds Creek Wetland Restoration Site will provide a minimum of 5.3 riverine wetland mitigation units (WMUs) to the North Carolina Ecosystem Enhancement Program (EEP).

### **Restoration Summary**

The total area of restored riverine wetland is 4.2 acres, and the total area of enhanced riverine wetland is 2.2 acres. Overall, the project will restore, enhance, and/or preserve approximately 14.66 acres of forested and emergent wetlands and upland buffer, of which 5.3 will be provided as riverine wetland mitigation units (WMUs) to the North Carolina Ecosystem Enhancement Program (EEP). The goals and objectives of the Reeds Creek Wetland Restoration Project are to restore the hydrologic functions, the native vegetation of the degraded and drained wetlands, flood retention and water quality functions within the Reeds Creek watershed of the Catawba River Basin (HUC 03050101). A Project Location Map is provided in Figure 1.

Grading of the Reeds Site was completed December 2006. The existing berms and spoil piles adjacent to Reeds Creek were graded down to a more natural elevation and the other existing fill areas were removed. The material was graded to the surrounding landscape to provide microtopographic complexity and woody planting zones. These areas where the topography was enhanced will create diverse habitats instead of the monotypical, flat lake fringe habitat that previously existed. Surface hydrology will be reintroduced to the restoration areas via more frequent overbank flooding from Reeds Creek. Native woody vegetation has been established in this area.

Jurisdictional wetlands were preserved in the semi-permanently impounded area associated with Lake Norman. Jurisdictional wetlands were enhanced and/or restored in the area south of Reeds Creek. Minor grading adjacent to the wettest areas was done to expand the wetland hydrology and create microtopography within the contiguous floodplain and wetland area.

The riparian wetland and buffer vegetation community will transition as the system seeks its hydrologic equilibrium. The initial planting/seeding of the site was completed in

January 2007 to establish herbaceous cover of exposed bare soils with the expectation that the initial growing season will allow for evapotranspiration to dewater lake bottom sediments. These sediments were initially unconsolidated and mucky with saturation due to Lake Norman water level fluctuations. While water level fluctuations are still anticipated, the areas and duration of inundation can only be determined through post-construction observation and monitoring. It is anticipated that settling and subsidence would occur throughout the initial growing season, first through evaporation and then through transpiration as the herbaceous cover (seeded and natural propagation) established. Areas that are not saturated/ponded (i.e. fringe areas and/or microtopographic mounds) were planted with bare root seedlings to establish a bottomland hardwood riparian wetland community. Additional plantings may occur as needed, as the site continues to consolidate and settle and inundation patterns are determined.

In order to stabilize the newly constructed wetlands and flood plain areas, both temporary and permanent grass seed were applied to all restored areas. A silt fence will remain along the Reeds Creek Channel until the site has obtained 90% herbaceous cover. The types of seeds used were: *Leersia oryzoides* (Rice Cut grass); *Panicum clandestinum* (Deertongue grass); *Panicum virgatum* (Switchgrass); *Trisacum dactyloides* (Gama grass), *Juncus effusus* (soft rush) and *Secale cereale* (Annual rye). Three hardwood planting zones were established as follows: Zone 1-Swamp Forest Zone, Zone 2-Bottomland Forest Zone, and Zone 3-Levee Forest Zone. The location of each Zone is identified on the As-built plan located in Attachment A. Approximately 400 stems per acre were planted throughout the project. Livestakes were installed in some of the wetter areas but further livestaking along Reeds Creek may be necessary as the new streambank/floodplain area stabilizes with its associated wetlands, particularly after removal of the silt fence. The planted species and associated wetland indicator status are summarized in Table 2.

**Table 2: Approximate Number of Planted Species**

<b>Reeds Creek Wetland Restoration Project</b>			
<b>Scientific name</b>	<b>Indicator Status</b>	<b>Number of Species Planted</b>	<b>Type of material</b>
<i>Betula nigra:</i>	FACW	500	bareroot
<i>Cornus amomum</i>	FACW+	250/50	bareroot/livestake
<i>Fraxinus pennsylvanica:</i>	FACW	500	bareroot
<i>Liriodendron tulipifera:</i>	FAC	250	bareroot
<i>Quercus lyrata</i>	OBL	500	bareroot
<i>Quercus michauxii:</i>	FACW-	500	bareroot
<i>Quercus pagodafolia</i>	FAC+	500	bareroot
<i>Quercus phellos:</i>	FACW-	500	bareroot
<i>Salix nigra</i>	OBL	50	livestake
		<b>Total : 4,100</b>	

It is likely that there will be pockets of ponded and/or saturated areas that will remain throughout the initial growing season. These areas will be identified after the initial growing season and will likely remain as herbaceous emergent wetland vegetation, or will be planted with supplemental containerized plants as appropriate prior to the second growing season. These emergent areas will increase the overall diversity of the restored ecosystem and will be noted in the monitoring report.

## **2.0 MONITORING PLAN**

The Reeds Site will be monitored annually for the next five years (October 2007 through October 2011) by Mid-Atlantic Mitigation, LLC (MAM). MAM will be monitoring the Reeds Site every year and will submit a monitoring report to the NCEEP by December 31<sup>st</sup> of each calendar year. The Reeds Site will be monitored in regard to hydrology and vegetative survival in accordance with the ACOE Compensatory Hardwood Mitigation Guidelines (1993) and in coordination with the EEP. Included in this report photographs taken at the time of the As-built survey and can be found in Attachment B. Photo locations are included on the As-built plans (Attachment A) and will be included in the annual monitoring reports.

### **Hydrology**

The minimum requirement to judge establishment of successful wetland hydrology will be adherence to USACE guidelines (United States Army Corps of Engineers 1987) including saturation within the upper 12 inches of the surface of the soils for a period of approximately 24 consecutive days during the growing season (239 days). Further success of the restoration and enhancement of wetland hydrology will be measured by improvements to the frequency and duration of flood flows, groundwater levels, flood storage, and surface water infiltration. Hydrology will be measured using Infinities self-reading groundwater monitoring gages that were installed at the beginning of the restoration efforts. The gages will monitor water table elevations on a daily basis using continuous recorder dataloggers through the monitoring period. There are three 3 gages located on the Reeds Creek Site. Gages 1 and 2 are located in restoration areas and Gage 3 is located in the enhancement area in the same location as the pre-construction gage.. There are both mature forested and emergent areas of preservation which were not included in the project area per the original restoration plan adjacent to the small unnamed tributary entering the site from the southeast corner and flowing into the cove for the Huntington neighborhood. There is a 4<sup>th</sup> gage located in the preservation/fringe area of the site to be used as an on site reference. The data will be downloaded once a month throughout the monitoring period. A USGS rain gage located on Lake Norman (Gage #35301408052495 CRN-42 Norman Shores) will be used to monitor the amount of rainfall. This will be correlated with the Ground water data. Lake Norman lake levels will also be monitored if the site becomes inundated from high lake levels.

### **Vegetation**

The prevalent vegetation should consist of macrophytes that typically are adapted for life in saturated soil conditions. These species should have the ability to grow, compete,



reproduce, and persist in anaerobic soil conditions. A maximum of 15% nuisance vegetation in wetland areas with planted and volunteer vegetation will successfully indicate establishment of native wetland vegetation. Study plots showing that the composition and density of vegetation in the restoration areas compares closely to the reference areas will indicate restoration success for vegetation. The initial success of riparian and wetland vegetation will be evaluated based on herbaceous ground cover as the site is stabilized in the initial growing season, as well as planted woody vegetation. At the year-two growing season, success will be gauged by stem counts of planted species. Stem counts of over 320 trees per acre after 3 years, and 260 trees per acre after 5 years will be considered successful. Photos taken at established photo points should indicate maturation of riparian vegetation community. Photographs will help to capture the health of the planted vegetation and the severity of the invasive or exotic species that are found within the site. Permanent vegetative plots have been established at 2 random locations and sample each planting zone. The success of vegetation plantings will be measured through stems counts. These plots will be used to sample both the riparian buffer and restored wetlands. Each plot will cover 100 square meters for tree counts. Within each plot, a 1 meter plot will be sampled to measure herbaceous coverage. During the counts, the health of the vegetation will be noted. In addition to stem counts, the samples will inventory species diversity to allow for comparison between the reference and restoration wetlands and track the percent cover of nuisance species. The vegetation survey will occur during the growing season. Vegetative plots are shown on the As-built Plan.

### **Photo Reference Points**

There are 7 permanent photo reference points located throughout the Reeds Site and will be included in each monitoring report. Two of the photo reference points are located in the southwest corner of each vegetation plot and it will include two photographs taken from each point; one showing the health of the vegetation plot and one showing the 1 meter plot within the vegetation plot. All the Photographs will help to capture the health of the planted vegetation, the degree of wetness that the wetland takes on over time (e.g. standing water).

## **3.0 MAINTENANCE AND CONTINGENCY PLANS**

All of the proposed 5.3 riverine WMUs have been generated through project implementation. A summary of the deliverables are presented in Table 2. If standards are not met as indicated in the Monitoring Plan of this Mitigation Report appropriate remedial activities to satisfy USACE and NCEEP will be developed, approved, and performed. The site will be monitored for longer than five years should success criteria not be met within the original monitoring period. The site will be monitored for at least 5 years.

#### 4.0 REFERENCES

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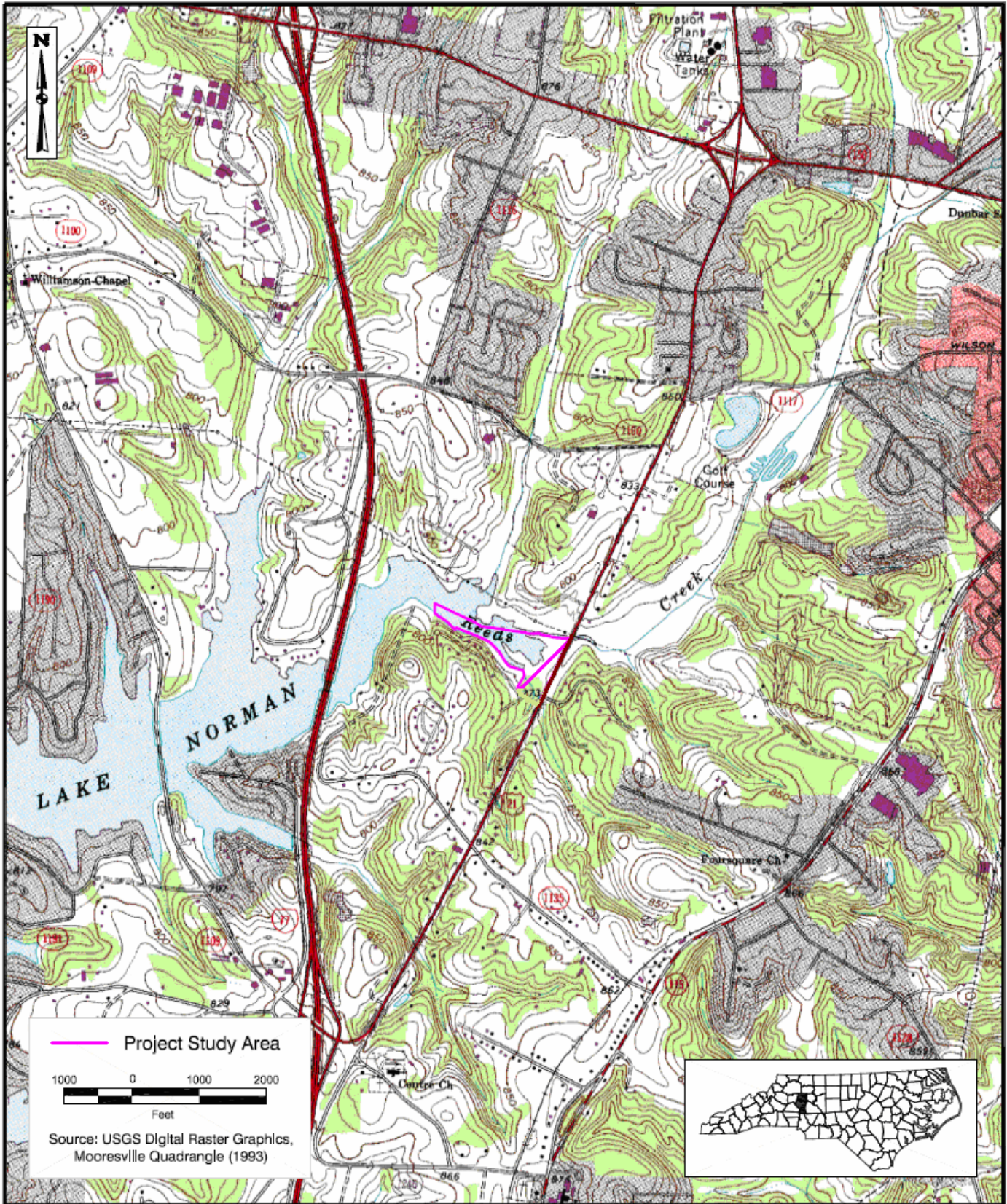
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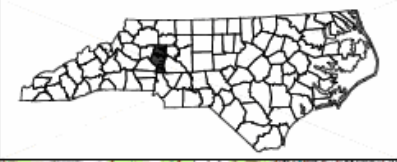
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— Project Study Area  
 1000 0 1000 2000  
 Feet  
 Source: USGS Digital Raster Graphics,  
 Mooresville Quadrangle (1993)



Location Map  
 Reeds Creek Wetland Restoration Site  
 Iredell County, North Carolina

Figure: 1  
 Project: D05016-3  
 Date: April 2007

ATTACHMENT A:

AS-BUILT PLANS

ATTACHMENT B:

PHOTO LOG





Photo Point 1 – Facing NE



Photo Point 2 – Facing N





Photo Point 3 – Facing N



Photo Point 4 – Facing W



Photo Point 4 – Facing E



Photo Point 5 – Facing S





Veg Plot A – Facing NE



Veg Plot A – Herbaceous sampling corner post construction





Veg Plot B – Facing NW



Veg Plot B – Herbaceous sampling corner post construction



Site overview from bridge on Hwy 21