

# **Mallard Creek Wetland Restoration**

Project No. 239

2006 Monitoring Report: Year 9 of 9



**March 2007**

Submitted to: NCDENR-EEP  
1652 Mail Service Center  
Raleigh, NC 27699-1652

Prepared by: Jordan, Jones, and Goulding, Inc.  
9101 Southern Pine Blvd., Suite 160  
Charlotte, NC 28273

Design Firm: North Carolina Department of Transportation  
1 South Wilmington Street  
Raleigh, NC 27611



---

---

# Table of Contents

## EXECUTIVE SUMMARY

### SECTION I – PROJECT BACKGROUND

1. Location and Setting .....	I-1
2. Mitigation Structure and Objectives .....	I-1
3. Project History and Background.....	I-3
4. Monitoring Plan View.....	I-5

### SECTION II – PROJECT CONDITION AND MONITORING RESULTS

A. Vegetation Assessment .....	II-1
1. Soil Data.....	II-1
2. Vegetative Problem Areas .....	II-3
3. Vegetative Problem Area Plan View .....	II-3
4. Stem Counts .....	II-3
5. Vegetation Plot Photos.....	II-3
B. Wetland Assessment .....	II-4
1. Problem Areas Plan View (wetland) exhibit .....	II-5
2. Wetland Criteria Attainment.....	II-5

### SECTION III – METHODOLOGY SECTION

#### List of Tables

Table I - Project Mitigation Structure.....	I-1
Table II - Project Activity and Reporting History .....	I-4
Table III - Project Contacts .....	I-5
Table IV - Project Background.....	I-5
Table V - Preliminary Soil Data.....	II-1
Table VI- Stem Counts for Planted Species Arranged by Plot.....	II-4
Table VII - Wetland Criteria Attainment.....	II-5

**List of Figures**

Figure I – Project Location and Watershed Map.....I-2  
Figure II – Monitoring Plan View Map.....I-6  
Figure III – Soils Map.....II-2

**List of Appendices**

Appendix A – Vegetation Raw Data

1. Vegetation Survey Data Tables
2. Vegetation Monitoring Plot Photos
3. Problem Areas Plan View

Appendix B – Wetland Raw Data

1. Data Tables for Hydrological Data
2. Precipitation – Water Level Plots for Wells

---

## EXECUTIVE SUMMARY

---

## Executive Summary

The Mallard Creek Mitigation Site is a North Carolina Department of Transportation (NCDOT) project completed in 1994 and that underwent remediation in 1997. The mitigation site consists of two wetland sites (1 and 2) that are separated by Mallard Creek Church Road. The project consists of restoring and creating approximately 10 acres of bottomland hardwood forested wetland. This report serves as the 9<sup>th</sup> and final year of monitoring for the Mallard Creek wetland restoration site.

The wetland restoration consisted of excavating soil, plugging adjacent drainage ditches, and planting appropriate bottomland hardwood forest tree species. There are six pre-established vegetation monitoring plots where stem counts were conducted for planted and transplanted woody vegetation. These plots are shown on the Monitoring Plan View Map (Figure II). Pre-established success criteria require a minimum of 320 live stems per acre for three consecutive years. For the current monitoring year (2006-Year 9), the average density of planted specimens per acre, 400 per acre, exceeds the established success criteria of 320 planted stems per acre. Also, the site has satisfied this criterion for three consecutive years which satisfies the vegetation success goal for the site.

Currently there are 10 groundwater wells and 2 surface water gauges located on the mitigation site. The wells are comprised of Ecotone WL and Ecotone WM series. In addition there is one Infinity rain gauge data logger on site. During the initial assessment conducted in March, six of the original Ecotone WL series gauges were replaced with Ecotone WM series gauges. The gauges were reinstalled at the previous locations. The gauges were set to begin downloading data daily starting March 23, 2006. Furthermore, during a monthly site visit, it was determined that three additional ground water gauges and one surface gauge were malfunctioning. These gauges were replaced in June 2006 and were reinstalled at the previous locations. The rain gauge is malfunctioning; however, at this time, it has not been replaced due to the lack of data logger instruments. Nine of the ten groundwater gauges on site achieved wetland success criteria of saturation within 12 inches of the surface for 29 consecutive days (12.5% of the growing season) during the growing season. Well 8 did not meet this criterion; however, this gauge did experience 24 consecutive days of saturation within 12 inches of the surface.

Overall, the wetland restoration areas appear to be successful in terms of surficial wetland hydrology, survival of planted specimens, and recruitment of woody specimens and has met established success criteria.



---

**SECTION I**  
**Project Background**

---



---

## SECTION I

### Project Background

The background information provided in this report is referenced from the Year 8 Monitoring Report prepared by Soil and Environmental Consultants.

#### 1. Location and Setting

The Mallard Creek Mitigation Site is a project for the North Carolina Department of Transportation (NCDOT) completed in 1994 and that underwent remediation in 1997. The project area is located along Mallard Creek Church Road in Mecklenburg County, North Carolina (Figure I). The mitigation site is comprised of two sites (Sites 1 and 2) that are separated by Mallard Creek Church Road. Site 1 is located south of Mallard Creek Church Road and Site 2 is located north of the road. The wetland restoration is adjacent to Mallard Creek which is within the Rocky River watershed. The project consists of restoring and creating approximately ten acres of bottomland hardwood forested wetland. The restoration site is located within the Charlotte Belt of the Piedmont Physiographic Region.

To access the site from Interstate-85, take Exit 46 onto Mallard Creek Church Road and head southeast. Continue traveling south on Mallard Creek Church Road and cross US Highway 29. The site entrance is on the left side of the road immediately before crossing Mallard Creek.

#### 2. Mitigation Structure and Objectives

Originally the site was designed in cooperation with Mecklenburg County, with plans to incorporate the mitigation sites into a greenway plan for the area. Mecklenburg Parks and Recreation constructed a boardwalk on Site 2. An additional boardwalk through Site 1 has been proposed upon completion of the Mallard Creek Church Road widening project. The NCDOT oversaw project design and implementation in association with the Charlotte Outer Loop.

**Table I**  
**Project Mitigation Structure**

Segment/Reach	Mitigation Type	Acreage	Comments
Site 1	Restoration/Creation	2.8 ac	Mitigation for Charlotte Outer Loop.
Site 2	Restoration/Creation	7.2 ac	Mitigation for Charlotte Outer Loop.

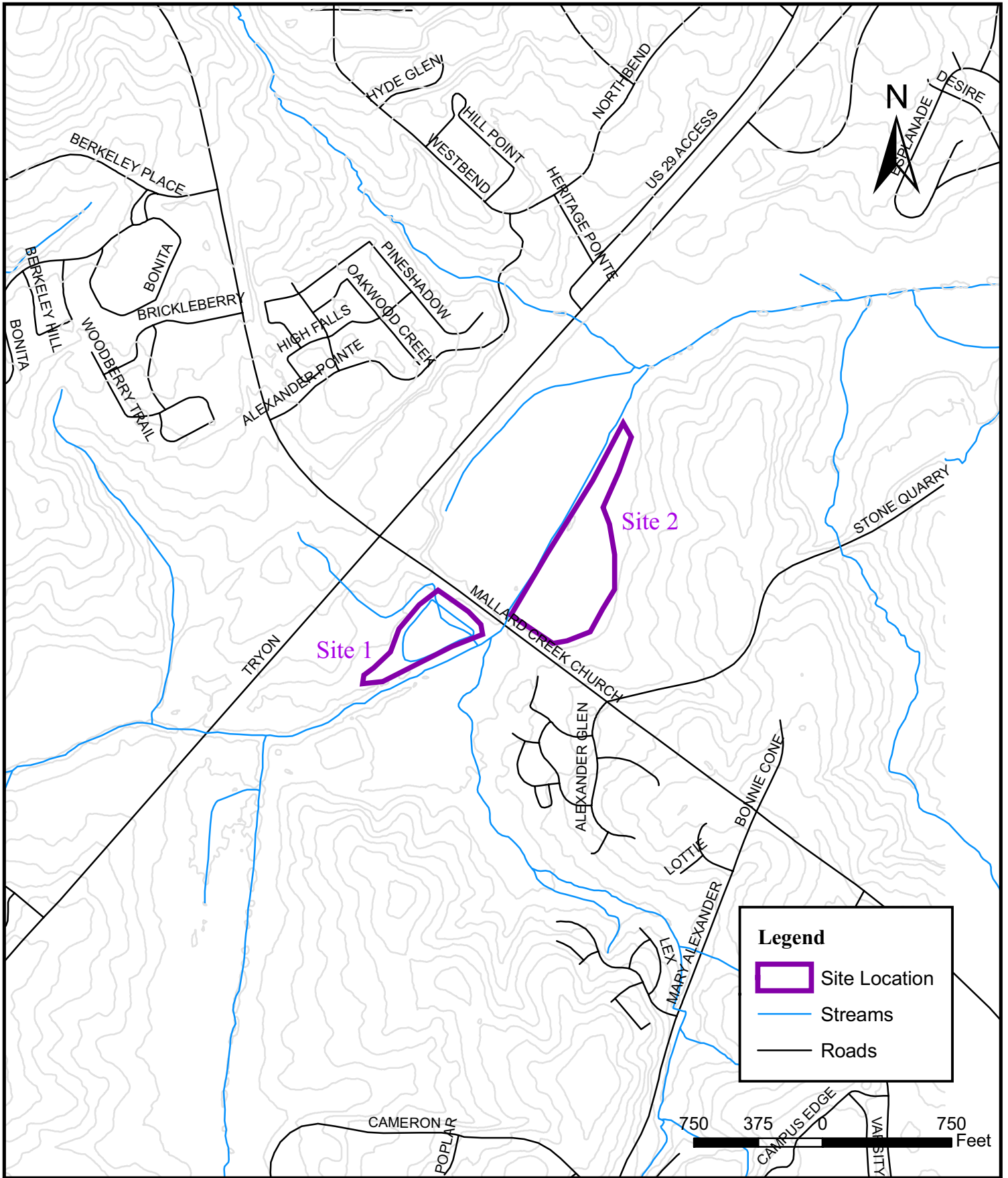


Figure I. Project Location and Watershed Map  
 Mallard Creek Wetland Mitigation  
 Mecklenburg County, NC  
 Monitoring Report Year 9 of 9

Project # 239  
 March 2007





### **3. Project History and Background**

The Mallard Creek site serves as mitigation for wetland impacts associated with the Charlotte Outer Loop (R-211 DA, USACE Action ID 199200013). The project restored approximately 10 acres of bottomland hardwood forested wetlands. The site was initially built and planted in 1994. After the first two years of monitoring, it was concluded that hydrologic and vegetative conditions were not suitable. In order to ensure hydrologic success, the site was remediated by regrading and replanting in 1997. This report serves as the 9th and final year of monitoring. Tables II and III provide detailed project activity, history and contact information for this project. Table IV provides more in-depth watershed/site background for the project.

**Table II  
Project Activity and Reporting History**

<b>Activity or Report</b>	<b>Scheduled Completion</b>	<b>Actual Completion or Delivery</b>
Site 1 & 2: Grading Construction	1994	Oct-94
Site 2 Planted	1995	Feb-95
Year 1 Monitoring	1995	Nov-95
Year 1 Vegetation Monitoring	1995	Sep-95
Year 2 Vegetation Monitoring	1996	Sep-96
Site 1 & 2: Remediation, Grading Construction	1997	Oct-97
Boardwalk Construction	1998	Feb-98
Site 1 & 2: Tree Planting	1998	Feb-98
Gauges Installed	1998	May-98
Initial-Year 1 Monitoring	1998	Nov-98
Year 1 Vegetation Monitoring	1998	Sep-98
Year 2 Monitoring	1999	Nov-99
Year 2 Vegetation Monitoring	1999	Sep-99
Year 3 Monitoring	2000	Nov-00
Year 3 Vegetation Monitoring	2000	Sep-00
Water Main Fixed Adjacent to Site 1	2000	Dec-00
Year 4 Monitoring	2001	Nov-01
Year 4 Vegetation Monitoring	2001	Jun-01
Year 5 Monitoring	2002	Nov-02
Year 5 Vegetation Monitoring	2002	Aug-02
Year 6 Monitoring	2003	Nov-03
Year 6 Vegetation Monitoring	2003	Oct-03
Year 7 Monitoring	2004	Nov-04
Year 7 Vegetation Monitoring	2004	Aug-04
Year 8 Monitoring	2005	Nov-05
Year 8 Vegetation Monitoring	2005	May-05
Year 9 Initial Assessment – 6 gauges replaced	Mar-2006	Mar-06
Year 9 Problem Area Plan View	May-2006	May-2006
Year 9 Initial Vegetation Monitoring	NA	May-2006
Year 9 Four gauges replaced	NA	June-06
Year 9 Vegetation Monitoring	Sept-2006	Sept-2006
Year 9 Draft report	Dec-2006	Nov-06

**Table III  
Project Contacts**

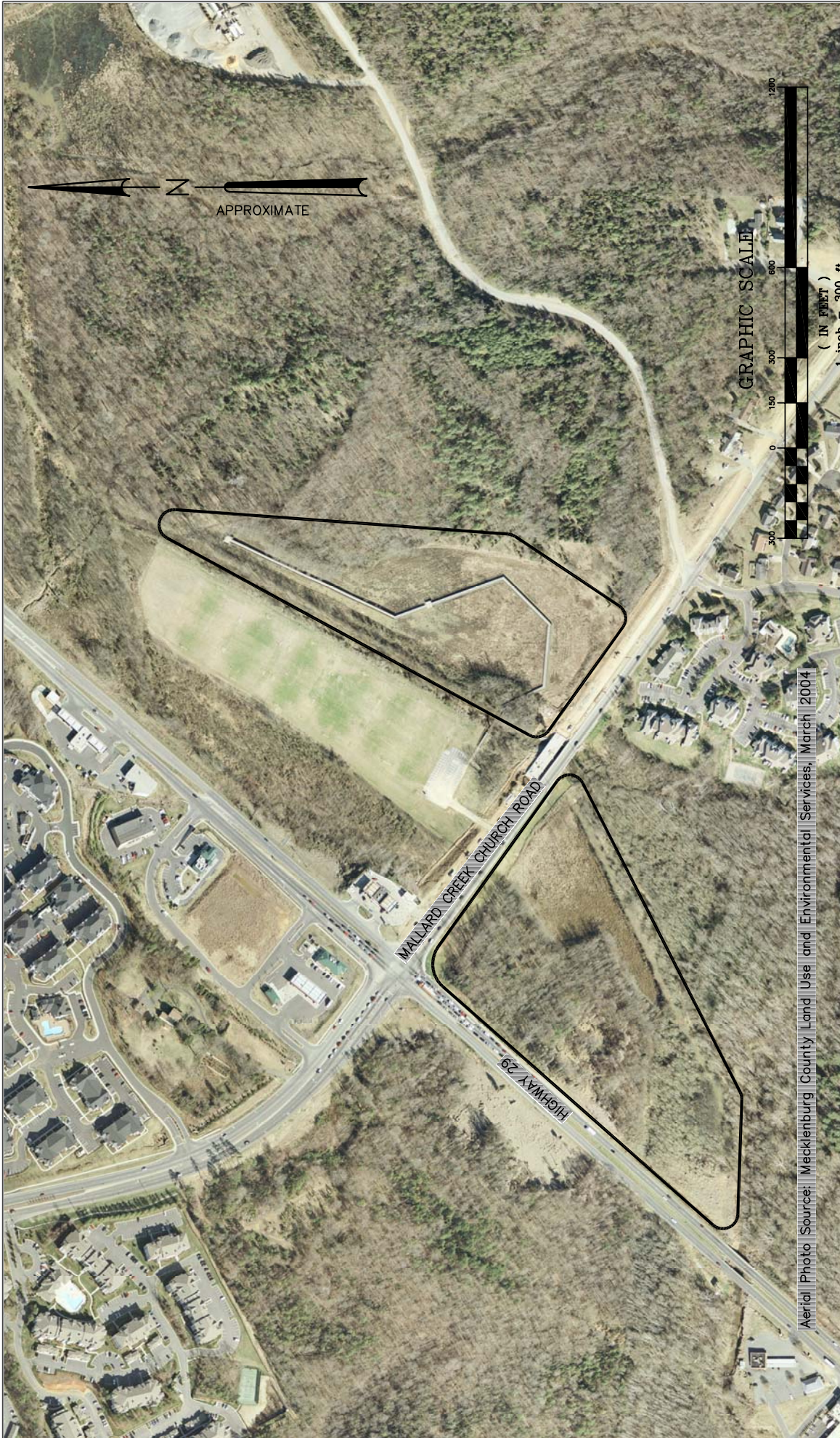
<b>Mallard Creek/Project No. 239</b>	
<b>Designer</b>	NCDOT 1 South Wilmington Street Raleigh NC, 27611
<b>Monitoring Performers</b>	Jordan, Jones, and Goulding, Inc. 9101 Southern Pine Blvd., Suite 160 Charlotte, NC 28273
<b>Vegetation Monitoring, POC</b>	Dan Rice, 678-333-0457

**Table IV  
Project Background**

<b>Mallard Creek/Project No. 239</b>	
Project County	Mecklenburg County, North Carolina
Physiographic Region	Piedmont
Ecoregion	Charlotte Belt
Cowardin Classification	Palustrine
Dominant soil types	Monacan, Enon, Wilkes
USGS HUC for Project	03050103
Any portion of any project segment 303d list?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reason for 303d listing or stressor?	N/A
% of project easement fenced?	0%

#### **4. Monitoring Plan View**

The monitoring plan view map (Figure II) illustrates the location of vegetation plots, groundwater wells, surface gauges, rain gauge and photo points. There are two vegetation monitoring plots located within Site 1 and four plots in Site 2 for a total of six vegetation monitoring plots. There are three groundwater monitoring gauges on Site 1 and seven on Site 2 for a total of ten. These gauges have been configured to record daily groundwater levels. There are also two surface water gauges, one on each site, and a rain gauge on Site 2. Photographs were taken at pre-established permanent photo points.



DATE : MARCH 2007  
SCALE : 1"=300'  
JOB NO.: 03060-001

NC ECOSYSTEM ENHANCEMENT PROGRAM  
MALLARD CREEK WETLAND RESTORATION

**JORDAN JONES & GOULDING**

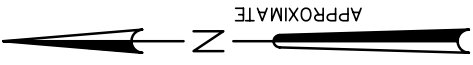
PROJECT NO. 239  
MECKLENBURG COUNTY  
NORTH CAROLINA  
MONITORING  
YEAR 9 OF 9

NOTES:  
1. GENERAL SITE DATA PROVIDED BY NCEEP.  
2. ALL LOCATIONS ARE APPROXIMATE.

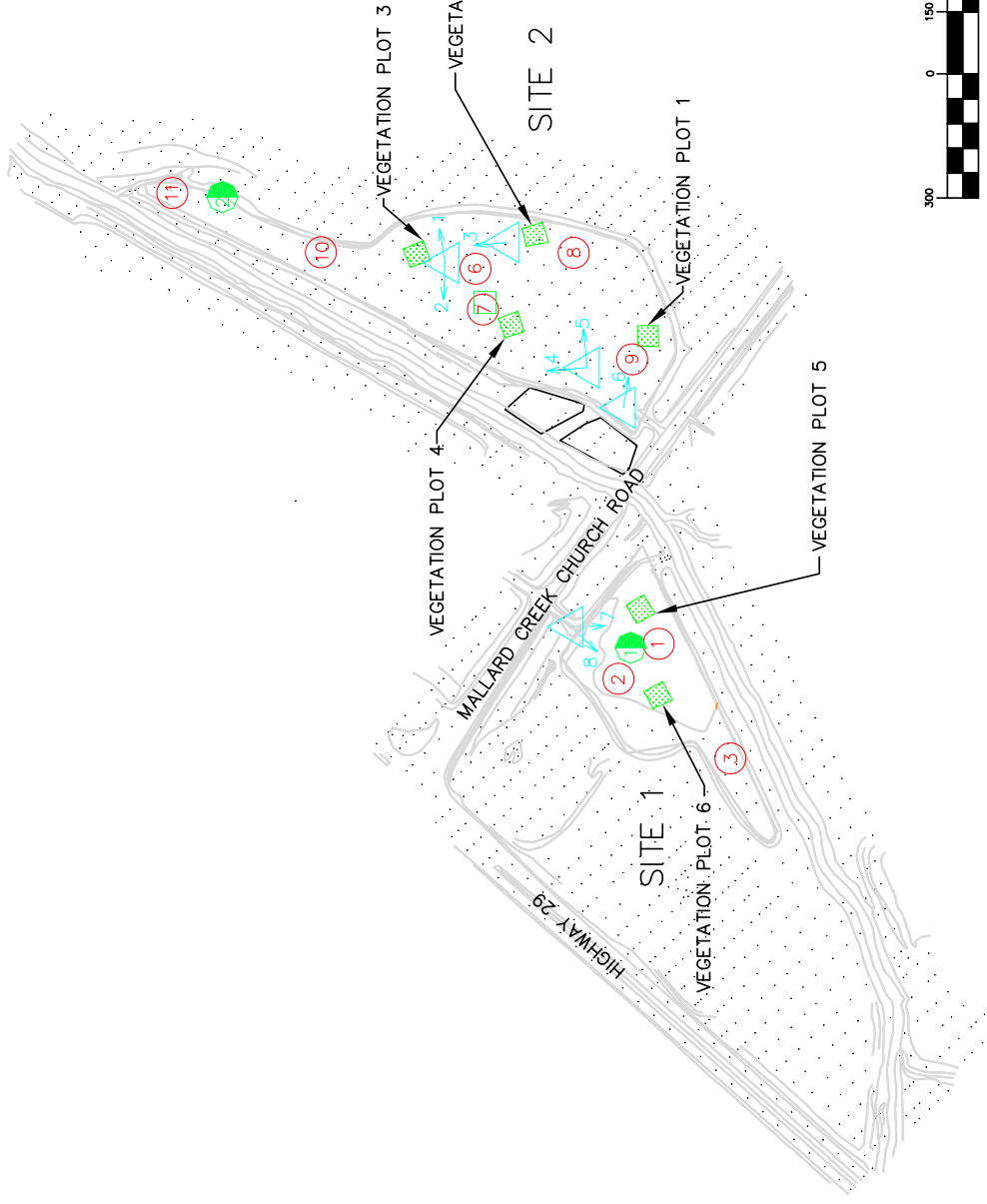
ECOSYSTEM ENHANCEMENT PROGRAM

APPENDIX A3  
PROBLEM AREAS PLAN VIEW

FIGURE KEY



LEGEND	
	VEGETATION PLOT
	PHOTO POINT
	RAIN GAUGE
	WELL
	MANHOLE
	SURFACE GAUGE



GRAPHIC SCALE  
( IN FEET )



NOTES:  
1. GENERAL SITE DATA PROVIDED BY NCEEP.  
2. ALL LOCATIONS ARE APPROXIMATE.

PROJECT NO. 239  
MECKLENBURG COUNTY  
NORTH CAROLINA  
MONITORING  
YEAR 9 OF 9



NC ECOSYSTEM ENHANCEMENT PROGRAM  
MALLARD CREEK WETLAND RESTORATION  
FIGURE II  
MONITORING PLAN VIEW MAP

DATE : MARCH 2007  
SCALE : 1"=300'  
JOB NO.: 03060-001  
FIGURE 1 OF 1

**SECTION II**  
**PROJECT CONDITION AND MONITORING RESULTS**

## SECTION II

### Project Condition and Monitoring Results

The following monitoring results are from the 2006 (year 9) survey completed in 2006.

#### A. Vegetative Assessment

The Mallard Creek Wetland Restoration project consists of two planted sites along Mallard Creek in Mecklenburg County, North Carolina. The two sites are divided by a four lane roadway, Mallard Creek Church Road. Site 1 is the smaller of the two sites and is situated southwest of the road and stream intersection. Site 2 is slightly larger and is situated northeast of the road and stream intersection. Site 1 has three ground water gauges, one surface gauge, and two vegetation plots. Site 2 has seven groundwater gauges, one surface gauge, one rain gauge, and four vegetation plots. The vegetation plots were established by NCDOT and are marked by yellow NCDOT federal highway markers at each plot corner. Please refer to the Plan View Map (Figure II) for the location of gauges and vegetation plots. Success criteria require a minimum of 320 live stems per acre for three consecutive years. Please refer to Appendix A1 for raw data collected during vegetation plot monitoring.

#### 1. Soil Data

Soils on the Mallard Creek site primarily consist of the Monacan series, with adjacent areas consisting of the Enon and Wilkes series (Figure III). Generally, Monacan soils are found along the floodplains of streams or drainageways, while the Enon and Wilkes soils are found on adjacent upland slopes. Enon soils are very deep, well-drained soils on ridges and side slopes of the Piedmont uplands. The soils are formed in clayey residuum weathered from mafic or intermediate igneous and metamorphic rocks such as diorite, gabbro, gneiss, and schist of the Piedmont uplands. Slopes range from 2 to 15 percent for the Enon series. Monacan soils are very deep, well-drained to somewhat poorly drained soils found along stream corridors. These soils are formed in recent alluvium sediments of the Piedmont and Coastal Plain. Slopes are generally less than 2 percent. Wilkes soils are shallow, well-drained soils adjacent to drainageways. They are formed in residuum weathered from intermediate and mafic crystalline rocks on the Piedmont uplands. Slopes range from 15 to 25 percent for the Wilkes series. Due to soil excavation during construction, it is likely that the on-site soils were altered. Please refer to Table V for a summary of soil data.

**Table V**  
**Preliminary Soil Data**

<b>Series</b>	<b>Max Depth (in)</b>	<b>% Clay on Surface</b>	<b>K Factor</b>	<b>T Factor</b>	<b>OM %</b>
<b>Enon</b>	72	5-20	0.24	5	0.0 – 2.0
<b>Monacan</b>	80	7-27	0.43	5	0.0 – 3.0
<b>Wilkes</b>	48	5-20	0.24	2	0.0 – 2.0

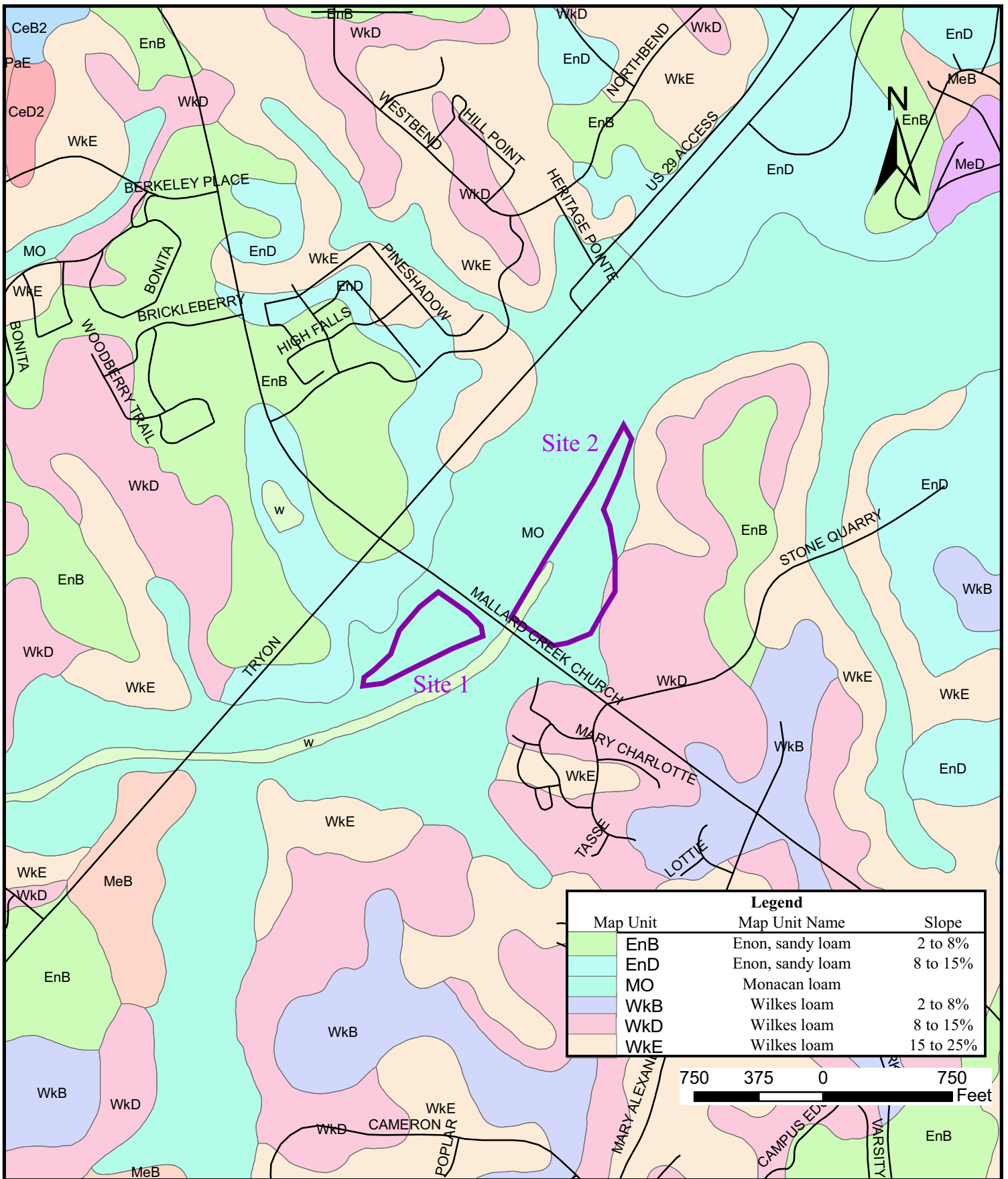


Figure III. SOILS MAP  
 Mallard Creek Wetland Mitigation  
 Mecklenburg County, NC  
 Monitoring Report Year 9 of 9

Project # 239  
 March 2007





## **2. Vegetative Problem Areas**

No vegetation problem areas were identified during 2006 (Year 9) monitoring. Refer to the Stem Counts section below for detailed information regarding vegetation success.

## **3. Vegetative Problem Area Plan View**

No vegetation problem areas were identified during 2006 (Year 9) monitoring.

## **4. Stem Counts**

JJG conducted the initial vegetative assessment and vegetative plot analysis in May 2006. In addition, a follow-up survey was conducted in September 2006. All findings were the same as noted in May 2006. The six vegetative plots on the two sites were established previously by NCDOT. Trees planted within the plots consist of green ash (*Fraxinus pennsylvanica*), black gum (*Nyssa sylvatica*), overcup oak (*Quercus lyrata*), and water oak (*Quercus nigra*). In addition, natural recruitment vegetation was also monitored within these plots. Species encountered were sweet gum (*Liquidambar styraciflua*), cottonwood (*Populus deltoides*), river birch (*Betula nigra*), box-elder (*Acer negundo*), American sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), and red maple (*Acer rubrum*).

Based on the number of initially planted stems per plot, an overall survival rate of 60% was met. A review of the average number of planted species per plot reveals approximately 20 stems per plot. Assuming 20 stems per plot and a plot size of 0.05 acre, the site has an average stem density of 400 stems per acre. The vegetation success criterion of 320 stems per acre for three consecutive years was satisfied for Year 9 of this project. Although monitoring plots 4, 5, and 6 had survival rates less than 60%, these plots have a large number of natural volunteer species that would increase the percentage if included. Furthermore, there were many volunteers counted within all plots. Including these stems would also increase the overall survival percentage. A calculation of planted and natural volunteer stems indicates an average number of 63 stems per plot. A review of both planted and natural volunteer stem density indicates a stem count of 1,260 stems per acre. The success criterion of 320 stems per acre for three consecutive years has been satisfied; therefore, the Mallard Creek Wetland Restoration Project has attained success criteria for vegetation requirements. Please refer to Table VI for a summary of vegetation monitoring data.

## **5. Vegetation Plot Photos**

Please refer to Appendix A2 for photographs of the monitoring plots.

**Table VI**  
**Stem Counts for Species Arranged by Plot**  
**Mallard Creek Wetland Restoration Project No. 239**

<b>Planted Stems</b>	<b>Plots</b>						<b>Year 9</b>
<b>Species</b>	<b>Plot 1</b>	<b>Plot 2</b>	<b>Plot 3</b>	<b>Plot 4</b>	<b>Plot 5</b>	<b>Plot 6</b>	<b>Totals</b>
<i>Nyssa sylvatica</i>	7	2	7			1	<b>17</b>
<i>Fraxinus pennsylvanica</i>	11	9	12	7	18	18	<b>75</b>
<i>Quercus lyrata</i>	2	11	7	3			<b>23</b>
<i>Quercus nigra</i>		1		2	1		<b>4</b>
<b>Totals</b>	<b>20</b>	<b>23</b>	<b>26</b>	<b>12</b>	<b>19</b>	<b>19</b>	<b>119</b>
<b>Initial Planted Totals</b>	<b>31</b>	<b>27</b>	<b>35</b>	<b>31</b>	<b>38</b>	<b>36</b>	<b>198</b>
<b>Percent Survival</b>	<b>65%</b>	<b>85%</b>	<b>74%</b>	<b>39%</b>	<b>50%</b>	<b>53%</b>	<b>60%</b>
<b>Volunteer Stems</b>							
<b>Species</b>	<b>Plot 1</b>	<b>Plot 2</b>	<b>Plot 3</b>	<b>Plot 4</b>	<b>Plot 5</b>	<b>Plot 6</b>	<b>Totals</b>
<i>Betula nigra</i>	2	2	3				7
<i>Salix nigra</i>	25	7		4	10	20	66
<i>Acer negundo</i>	6		9		25	14	54
<i>Acer rubrum</i>	4		6			9	19
<i>Populus deltoides</i>	2		15		5		22
<i>Platanus occidentalis</i>		3	7		15	12	37
<i>Liquidambar styraciflua</i>						3	3
<i>Nyssa sylvatica</i>			2	1			3
<i>Fraxinus pennsylvanica</i>	11	8	8	5	10	2	44
<i>Quercus nigra</i>	3						3
<b>Totals</b>	<b>53</b>	<b>20</b>	<b>50</b>	<b>10</b>	<b>65</b>	<b>60</b>	<b>258</b>

## B. Wetland Assessment

Ten groundwater monitoring gauges, two surface gauges, and one rain gauge were installed in previous monitoring years at the Mallard Creek Wetland Restoration project. During the course of 2006 monitoring, eight groundwater gauges and the two surface gauges were replaced. The monitoring gauges were downloaded monthly from March to November in order to capture hydrological data during the 2006 growing season. The target hydrological characteristics include saturation or inundation for at least 12.5 percent of the growing season in the lower landscape (floodplain) positions.

The gauges are programmed to download ground water levels daily. In order to attain hydrologic success, ground water levels must be within 12-inches of the ground surface for 29 consecutive days, which is 12.5% of the March 22 to November 11 (235 days) growing season.

## 1. Problem Areas Plan View (Wetland)

There are 10 groundwater wells and 2 surface water gauges located on the mitigation site. During the initial assessment conducted in March, six of the original Ecotone WL series gauges were replaced with Ecotone WM series gauges. The gauges were reinstalled at the previous locations. During preparation of the Problem Areas Plan View (Appendix A3), it was noted that three additional ground water gauges and one surface gauge were malfunctioning. These gauges were replaced in June 2006 and were reinstalled at the previous locations.

## 2. Wetland Criteria Attainment

Nine of the ten groundwater gauges on site achieved wetland success criteria of saturation for 29 consecutive days during the growing season. Well 8 was the only gauge that did not meet this criterion; however, this gauge did experience 24 consecutive days of saturation within 12 inches of the surface. The rain gauge has malfunctioned as previously reported resulting in a lack of precipitation data. However, the rain gauge data from the Back Creek site located approximately one mile south of Mallard Creek was used as comparison. Please refer to Table VII for a summary of gauge success and to Appendix B for the data and charts illustrating water levels as compared to precipitation.

**Table VII**  
**Wetland Criteria Attainment**  
**Mallard Creek Restoration Project No. 239**

<b>GAUGE ID</b>	<b>GAUGE HYDROLOGY MET (Y/N)</b>	<b>VEGETATION PLOT ID</b>	<b>VEGETATION SURVIVAL THRESHOLD MET (Y/N)</b>
MC-1	Yes	Plot 1	Yes
MC-2	Yes	Plot 2	Yes
MC-3	Yes	Plot 3	Yes
MC-4	Yes	Plot 4	Yes
MC-5	Yes	Plot 5	Yes
MC-6	Yes	Plot 6	Yes
MC-7	Yes		
MC-8	No		
MC-9	Yes		
MC-10	Yes		

**SECTION III**  
**METHODOLOGY**

## **SECTION III**

### **Methodology**

The restored wetland systems (Site 1 and 2) were traversed entirely. Areas of interest and hydrology gauges were field mapped, and located with a GPS unit. The GPS data was incorporated into base map data provided by NCEEP to produce Figure II. Vegetation plots were assessed in May and September, 2006 for planted and natural recruitments of woody species. The monitoring gauges were downloaded monthly from March to November in order to capture hydrological data during the 2006 growing season.

## **APPENDIX A\***

- 1. Vegetation Survey Data Tables**
- 2. Vegetation Monitoring Plot Photos**
- 3. Problem Areas Plan View**

\*Raw data tables have been provided electronically.

**Mallard Creek Wetland Restoration Project**

<b>Planted Stems Species</b>	<b>Plot 1</b>	<b>Plot 2</b>	<b>Plot 3</b>	<b>Plot 4</b>	<b>Plot 5</b>	<b>Plot 6</b>	<b>Totals</b>
<i>Nyssa sylvatica</i>	7	2	7			1	17
<i>Fraxinus pennsylvanica</i>	11	9	12	7	18	18	75
<i>Quercus lyrata</i>	2	11	7	3			23
<i>Quercus nigra</i>		1		2	1		4
<b>Totals</b>	<b>20</b>	<b>23</b>	<b>26</b>	<b>12</b>	<b>19</b>	<b>19</b>	<b>119</b>
<b>Volunteer Stems Species</b>	<b>Plot 1</b>	<b>Plot 2</b>	<b>Plot 3</b>	<b>Plot 4</b>	<b>Plot 5</b>	<b>Plot 6</b>	<b>Totals</b>
<i>Betula nigra</i>	2	2	3				7
<i>Salix nigra</i>	25	7		4	10	20	66
<i>Acer negundo</i>	6		9		25	14	54
<i>Acer rubrum</i>	4		6			9	19
<i>Populus deltoides</i>	2		15		5		22
<i>Platanus occidentalis</i>		3	7		15	12	37
<i>Liquidambar styraciflua</i>						3	3
<i>Nyssa sylvatica</i>			2	1			3
<i>Fraxinus pennsylvanica</i>	11	8	8	5	10	2	44
<i>Quercus nigra</i>	3						3
<b>Totals</b>	<b>53</b>	<b>20</b>	<b>50</b>	<b>10</b>	<b>65</b>	<b>60</b>	<b>258</b>

Prepared For:



Mallard Creek Wetland Restoration  
Year 9 of 10

Date: March-2007  
Project No.: 239



**Appendix A1. Vegetation Survey Data Tables**



**Monitoring Plot 1 / May 15, 2006**



**Monitoring Plot 2 / May 15, 2006**



**Monitoring Plot 3 / May 15, 2006**

Prepared For:



Mallard Creek Wetland Restoration  
Year 9 of 9

**Appendix A2. Vegetation Monitoring Plot Photos**

Date: March-2007

Project No.: 239



**Jordan  
Jones &  
Goulding**  
INCORPORATED





**Monitoring Plot 4 / May 15, 2006**



**Monitoring Plot 5 / May 15, 2006**



**Monitoring Plot 6 / May 15, 2006**

Prepared For:



Mallard Creek Wetland Restoration  
Year 9 of 9

Date: March-2007

Project No.: 239



**Appendix A2. Vegetation Monitoring Plot Photos**



DATE : MARCH 2007  
 SCALE : 1"=300'  
 JOB NO.: 03060-001

NC ECOSYSTEM ENHANCEMENT PROGRAM  
 MALLARD CREEK WETLAND RESTORATION

**JORDAN JONES & GOULDING**

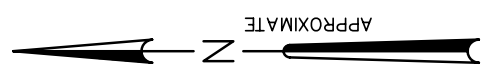
PROJECT NO. 239  
 MECKLENBURG COUNTY  
 NORTH CAROLINA  
 MONITORING  
 YEAR 9 OF 9

NOTES:  
 1. GENERAL SITE DATA PROVIDED BY NCEEP.  
 2. ALL LOCATIONS ARE APPROXIMATE.

ECOSYSTEM ENHANCEMENT PROGRAM

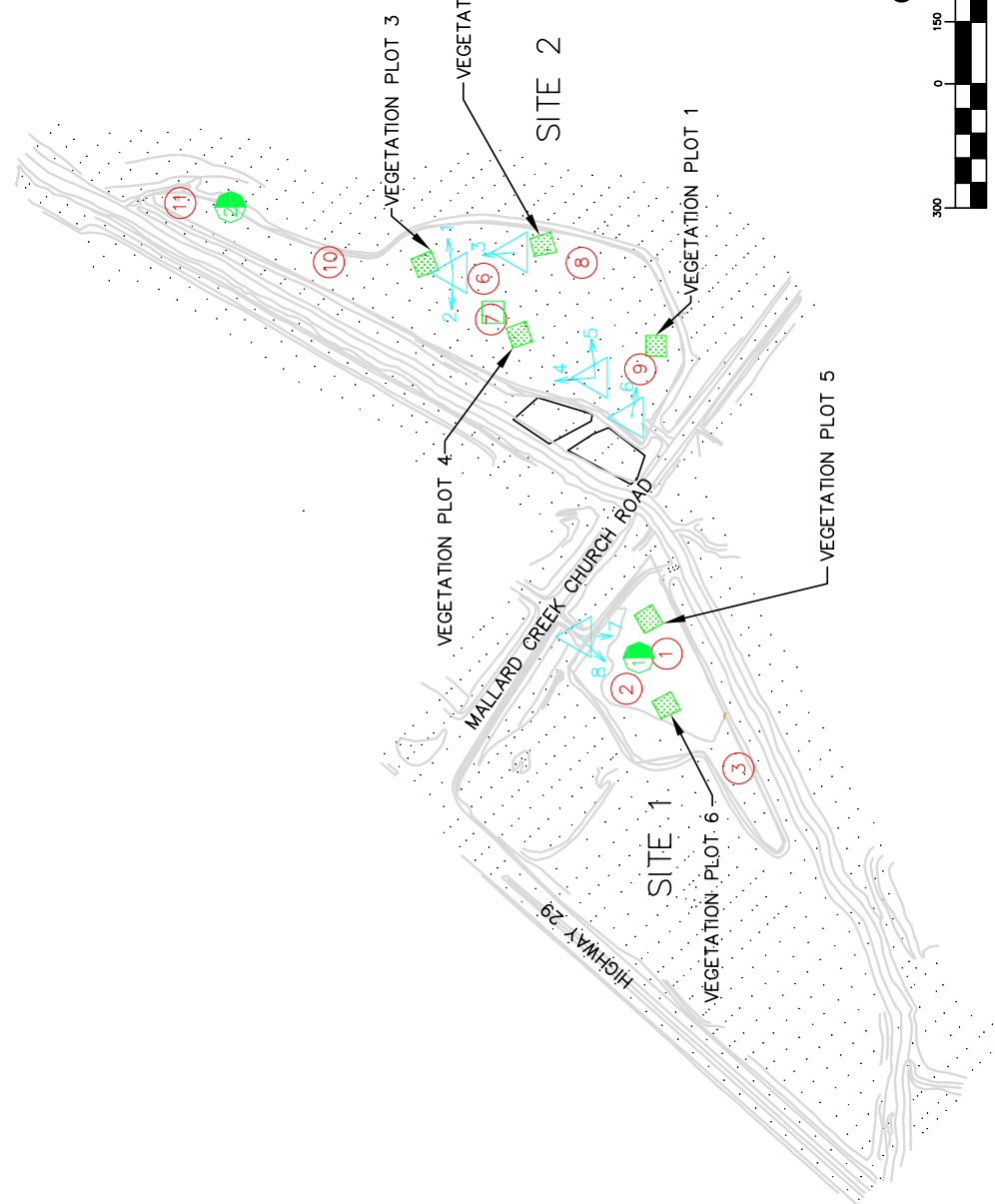
APPENDIX A3  
 PROBLEM AREAS PLAN VIEW

FIGURE KEY



**LEGEND**

- VEGETATION PLOT
- PHOTO POINT
- RAIN GAUGE
- WELL
- MANHOLE
- SURFACE GAUGE



**GRAPHIC SCALE**  
( IN FEET )



NOTES:  
1. GENERAL SITE DATA PROVIDED BY NCEEP.  
2. ALL LOCATIONS ARE APPROXIMATE.

PROJECT NO. 239  
MECKLENBURG COUNTY  
NORTH CAROLINA  
MONITORING  
YEAR 9 OF 9



NC ECOSYSTEM ENHANCEMENT PROGRAM  
MALLARD CREEK WETLAND RESTORATION  
APPENDIX A3  
PROBLEM AREAS PLAN VIEW

DATE : MARCH 2007  
SCALE : 1"=300'  
JOB NO.: 03060-001  
FIGURE 1 OF 1

## **APPENDIX B\***

- 1. Data Tables for Hydrological Data**
- 2. Precipitation – Water Level Plots for Wells\*\***

\*Raw data tables have been provided electronically.

\*\*Precipitation data used from the Back Creek site located approximately one mile south of Mallard Creek.











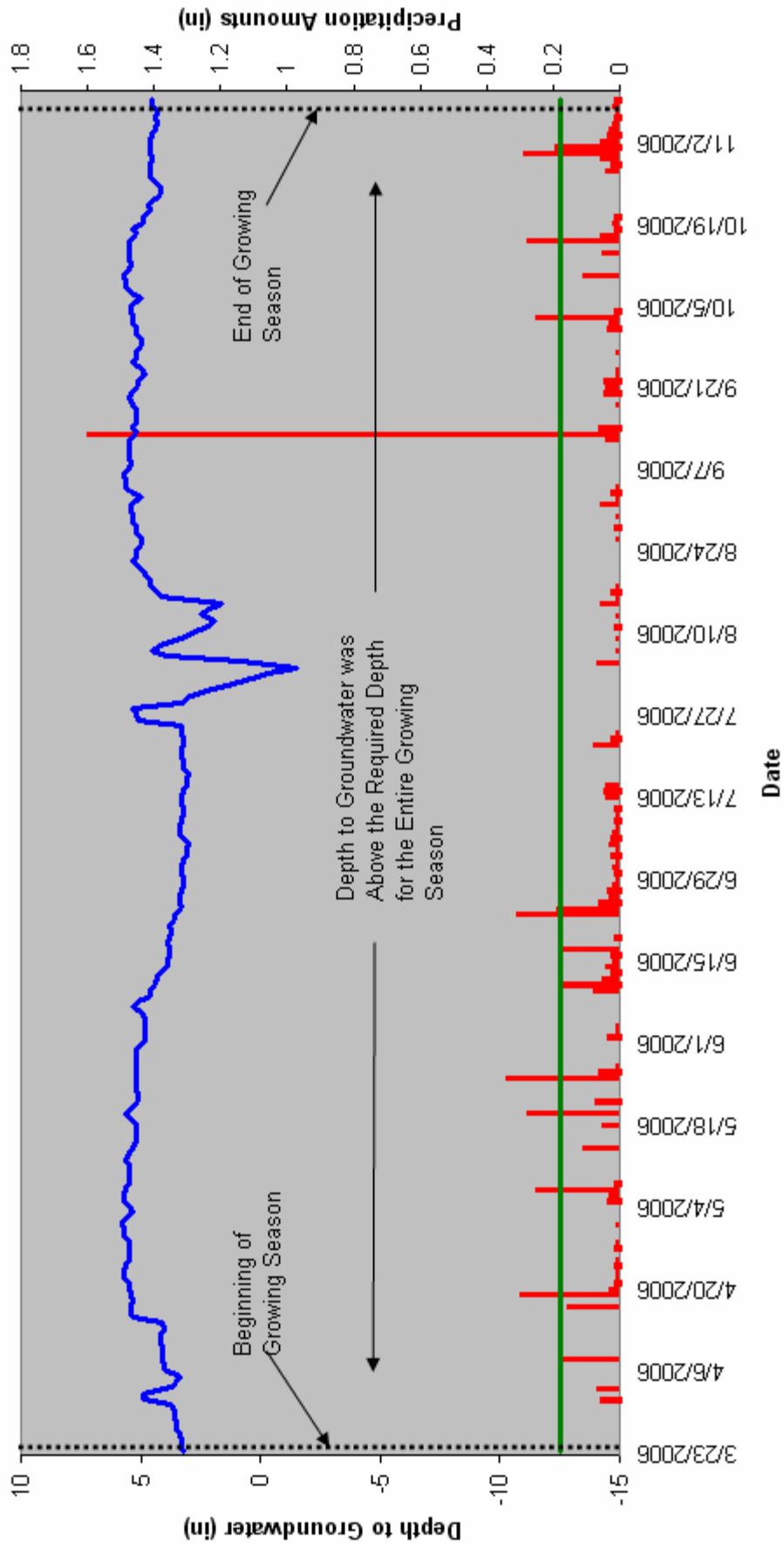








**Mallard Creek Hydrology Monitoring  
Mecklenburg County, North Carolina  
Groundwater Gauge 1**



■ Rainfall Amount    — MC-WLG1 EBDD5C6    — Required Depth

Prepared For:



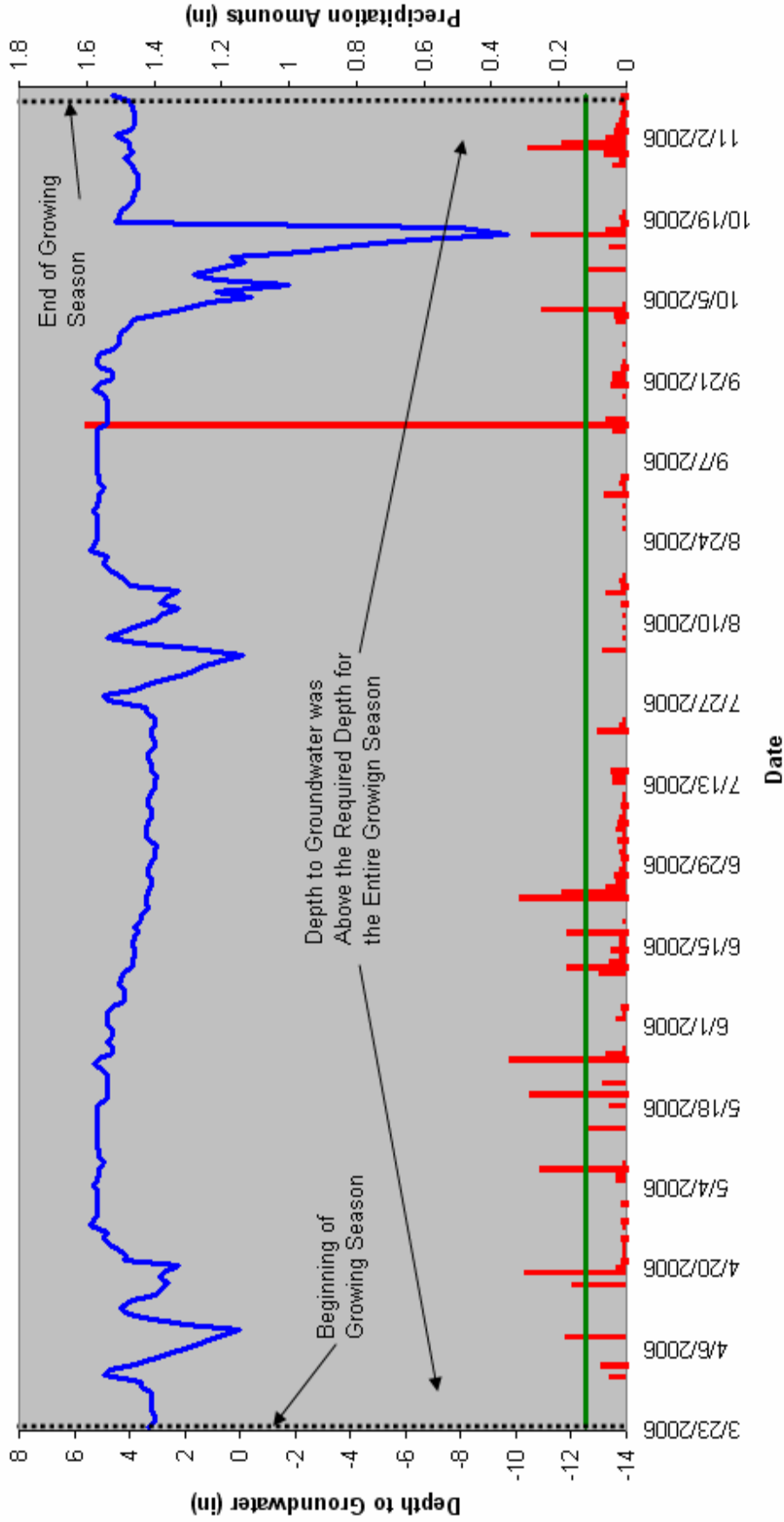
Mallard Creek Wetland Restoration  
Year 9 of 9

Date: March 2007  
Project No.: 239



**Appendix B2. Precipitation – Water Level Plots for Wells**

**Mallard Creek Hydrology Monitoring  
Mecklenburg County, North Carolina  
Groundwater Gauge 2**



■ Rainfall Amount — MC-WLG2 A288289 — Required Depth



Prepared For:

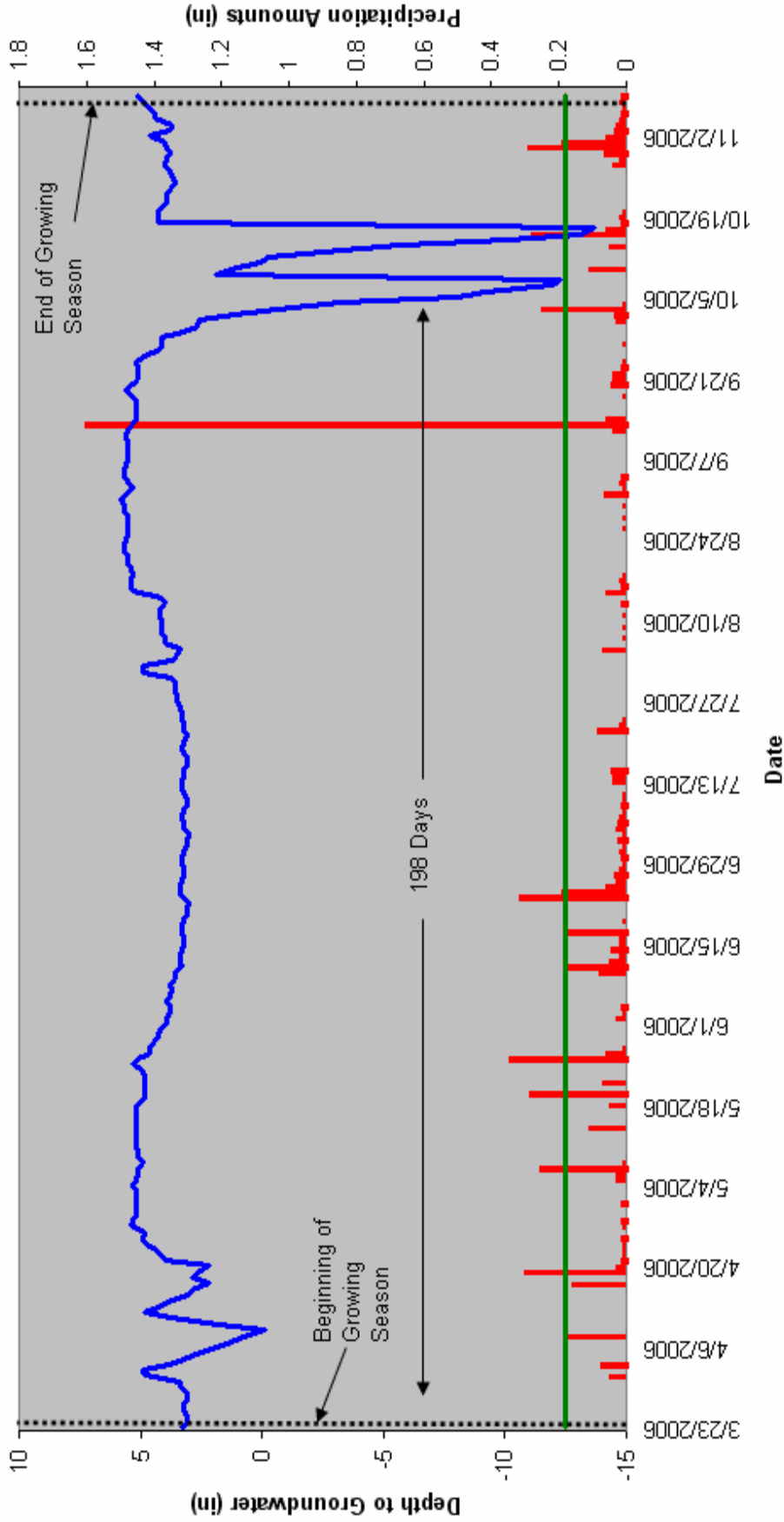
Mallard Creek Wetland Restoration  
Year 9 of 9

Date: March 2007  
Project No.: 239



**Appendix B2. Precipitation – Water Level Plots for Wells**

Mallard Creek Hydrology Monitoring  
 Mecklenburg County, North Carolina  
 Groundwater Gauge 3



■ Rainfall Amount   
 — MC-WLG3 EBDD74D   
 — Required Depth



Prepared For:

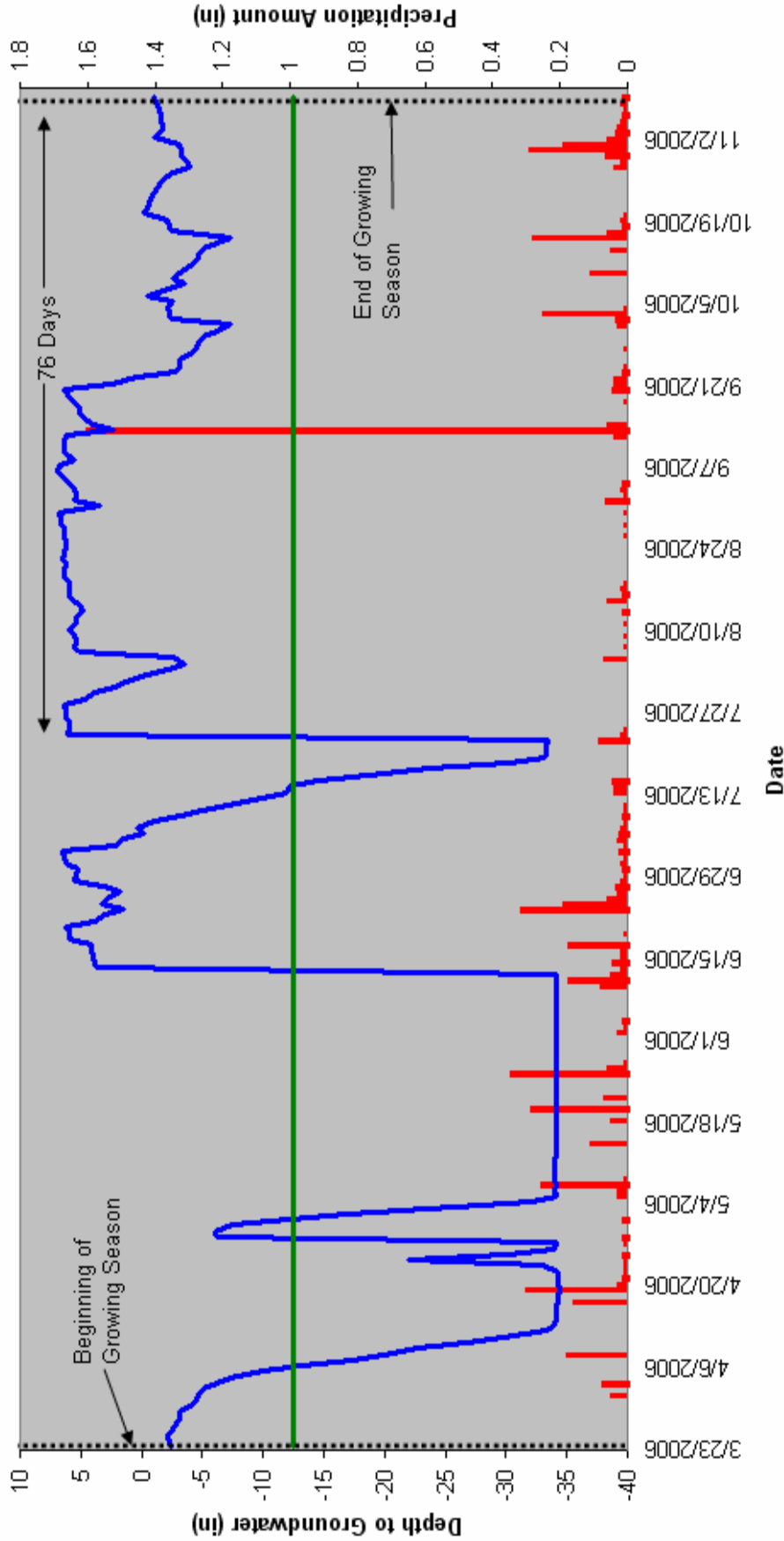
Mallard Creek Wetland Restoration  
 Year 9 of 9

Date: March 2007  
 Project No.: 239



Appendix B2. Precipitation – Water Level Plots for Wells

Mallard Creek Hydrology Monitoring  
 Mecklenburg County, North Carolina  
 Groundwater Gauge 4



■ Rainfall Amount — MC-WLG4 A286880 — Required Depth

Prepared For:

Mallard Creek Wetland Restoration  
 Year 9 of 9

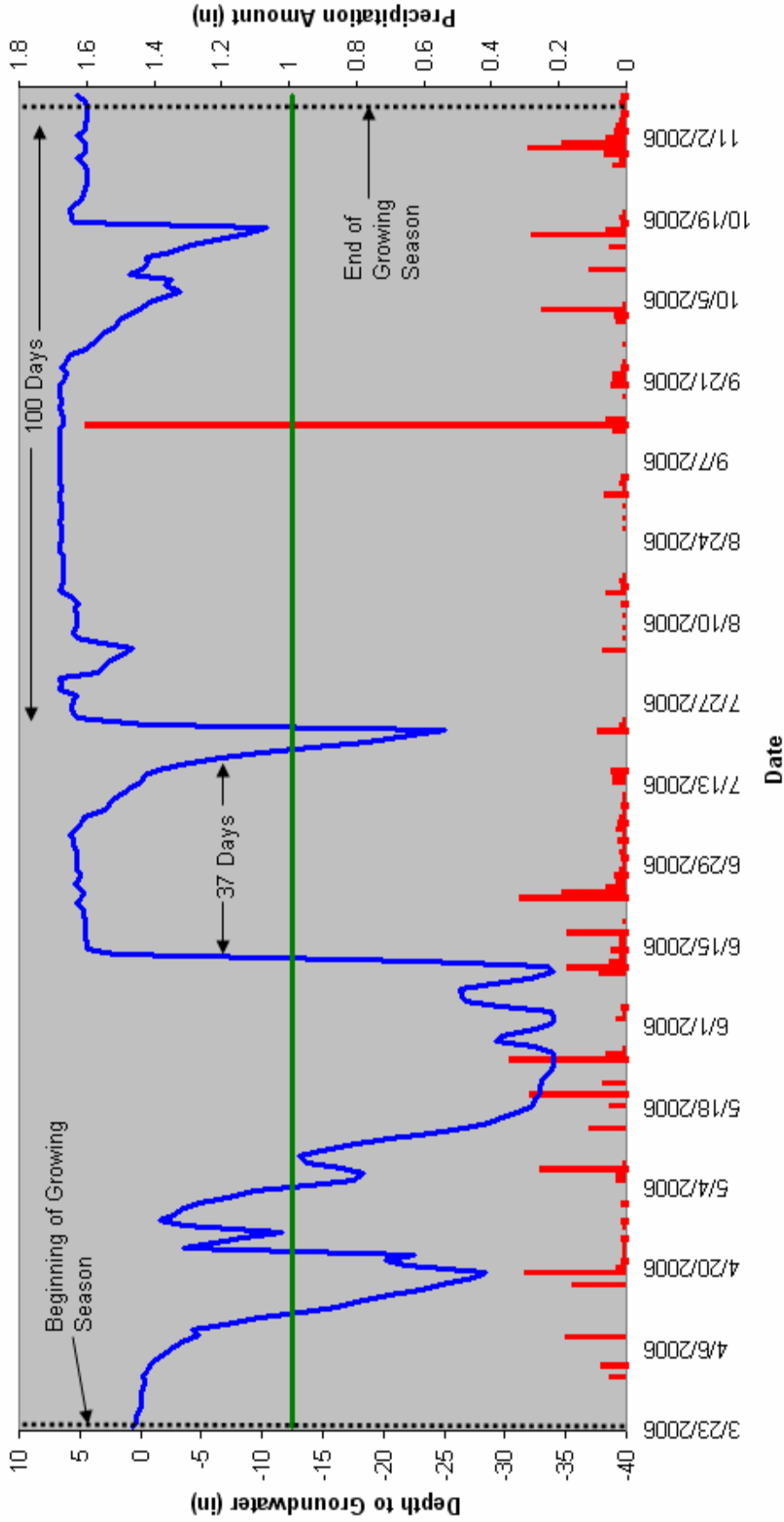
Date: March 2007  
 Project No.: 239



Appendix B2. Precipitation – Water Level Plots for Wells



**Mallard Creek Hydrology Monitoring  
Mecklenburg County, North Carolina  
Groundwater Gauge 5**



Prepared For:



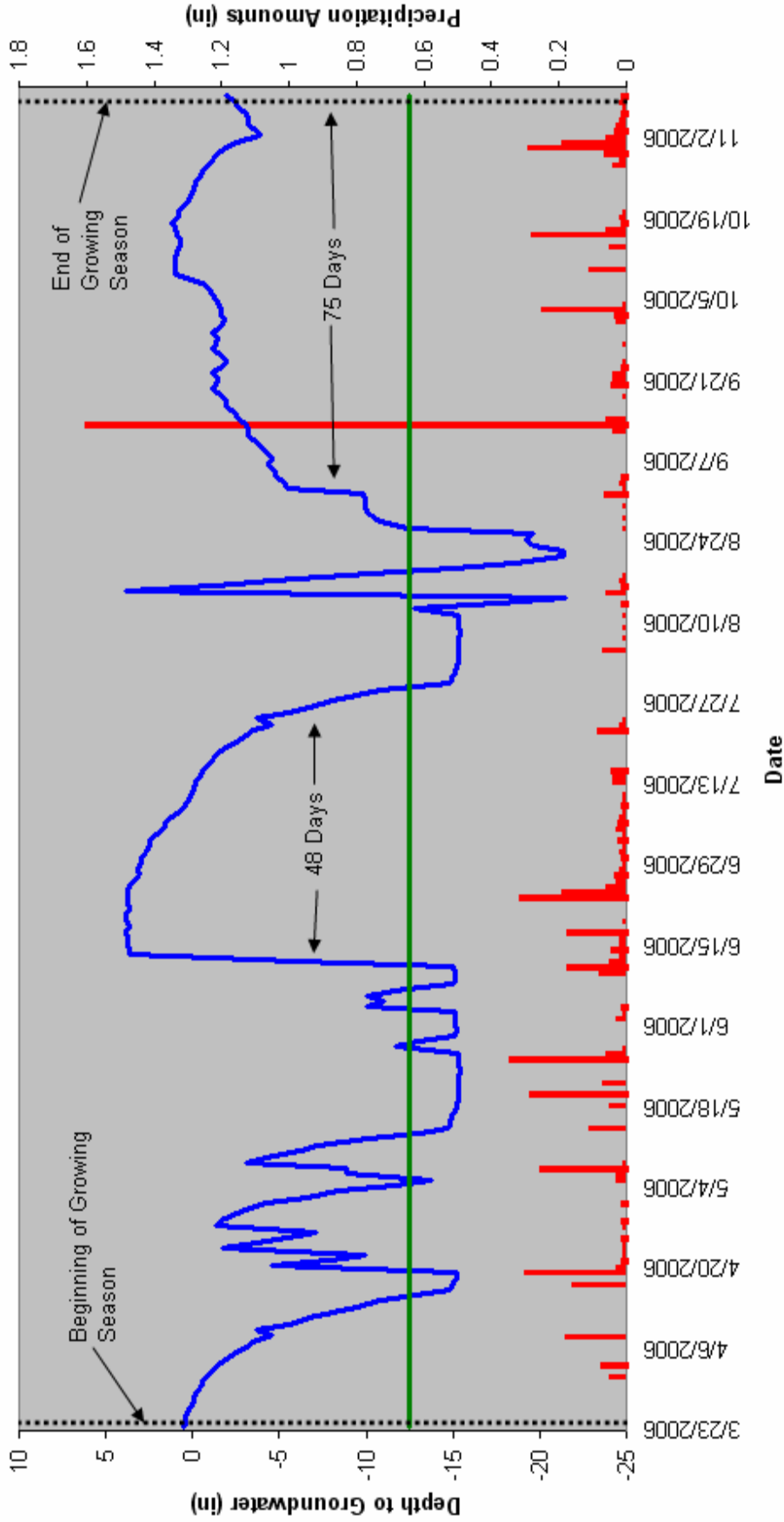
Mallard Creek Wetland Restoration  
Year 9 of 9

Date: March 2007  
Project No.: 239



**Appendix B2. Precipitation – Water Level Plots for Wells**

**Mallard Creek Hydrology Monitoring  
Mecklenburg County, North Carolina  
Groundwater Gauge 6**



■ Rainfall Amount   
 — MC-WLG6 A286489   
 — Required Depth



Prepared For:

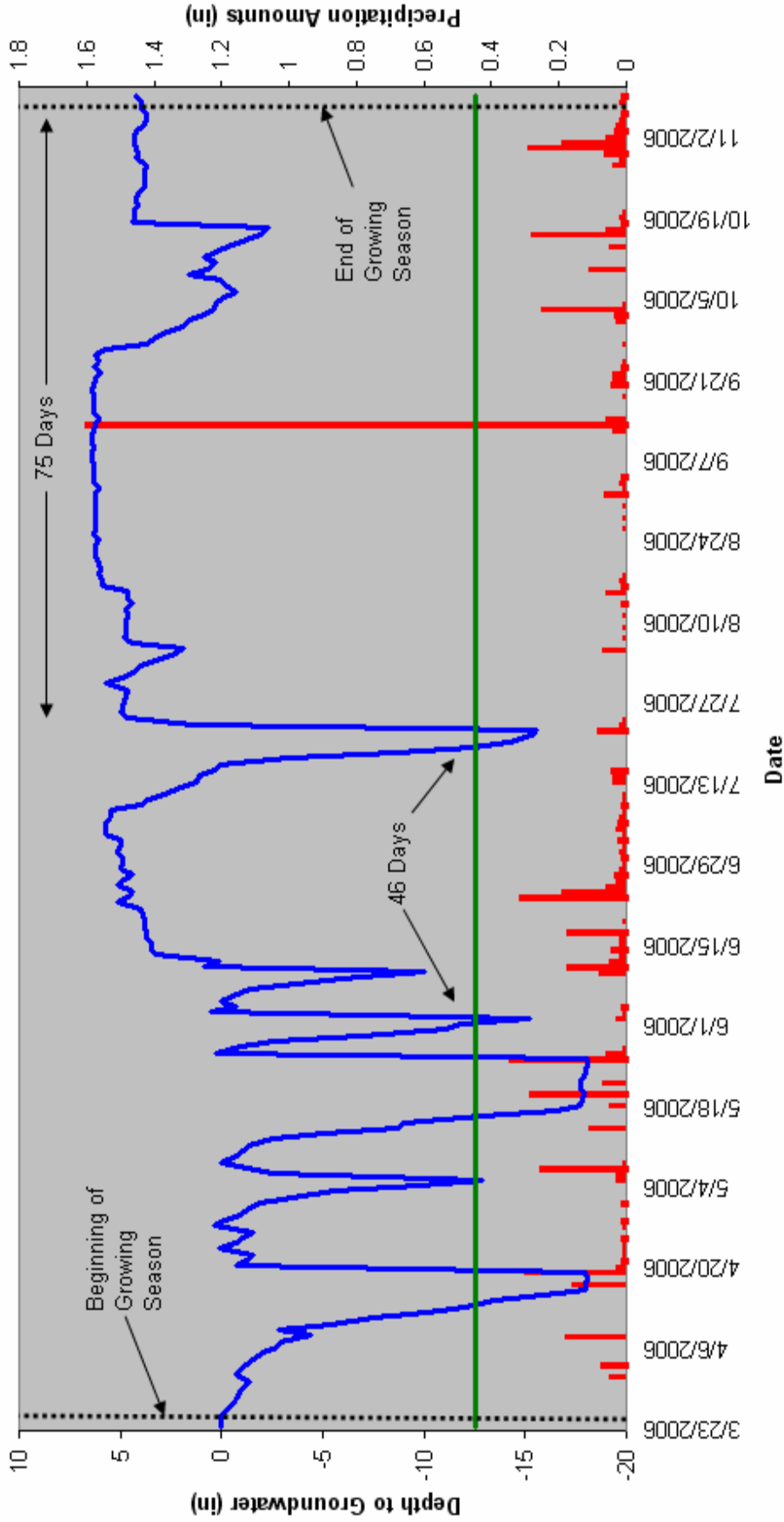
Mallard Creek Wetland Restoration  
Year 9 of 9

Date: March 2007  
Project No.: 239



**Appendix B2. Precipitation – Water Level Plots for Wells**

Mallard Creek Hydrology Monitoring  
 Mecklenburg County, North Carolina  
 Groundwater Gauge 7



■ Rainfall Amount   
 — MC-WLG7 A2897AE   
 — Required Depth

Prepared For:



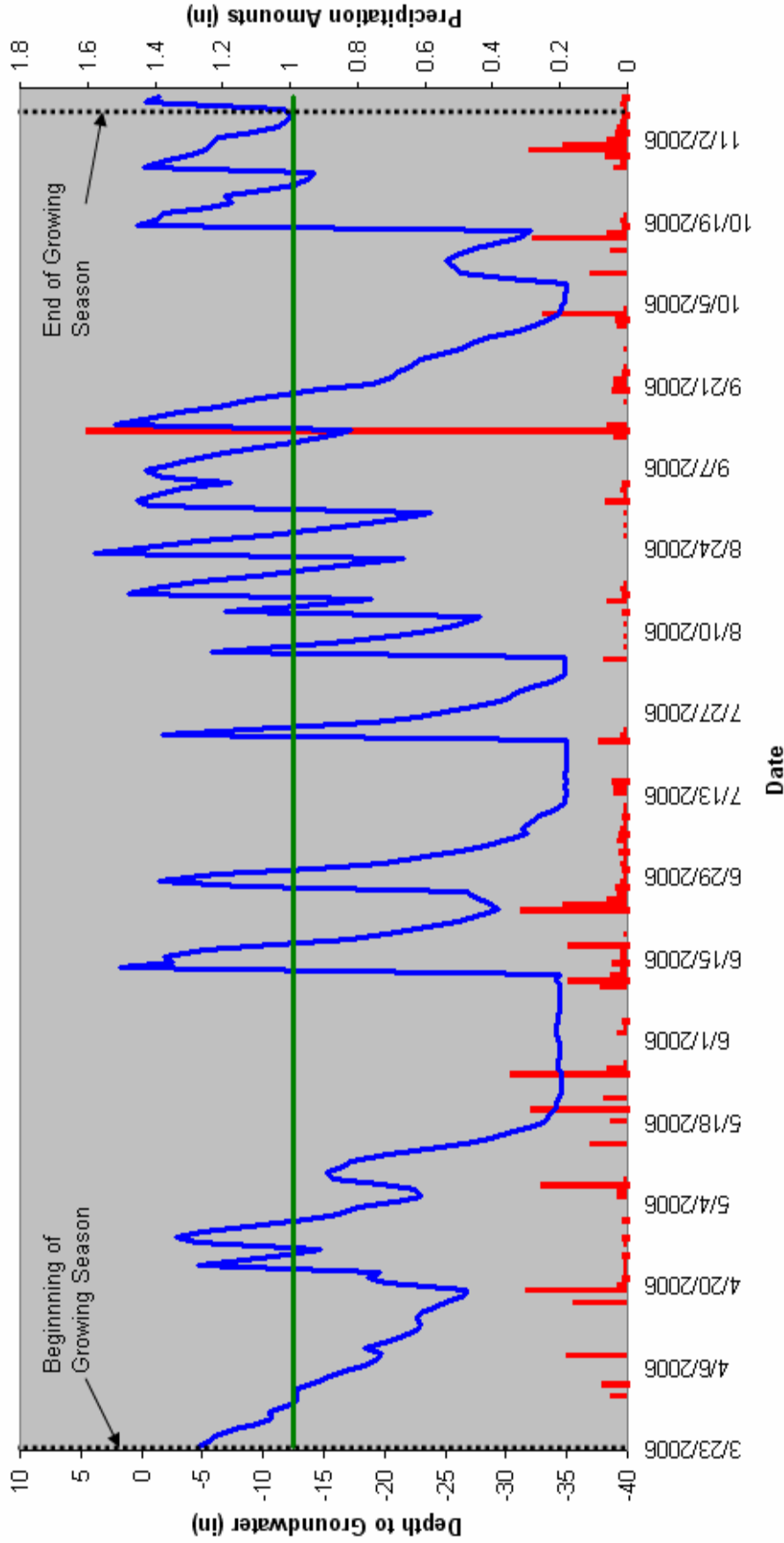
Mallard Creek Wetland Restoration  
 Year 9 of 9

Date: March 2007  
 Project No.: 239



Appendix B2. Precipitation – Water Level Plots for Wells

**Mallard Creek Hydrology Monitoring  
Mecklenburg County, North Carolina  
Groundwater Gauge 8**



■ Rainfall Amount   
 — MC-WLG8 A27 A635   
 — Required Depth



Prepared For:

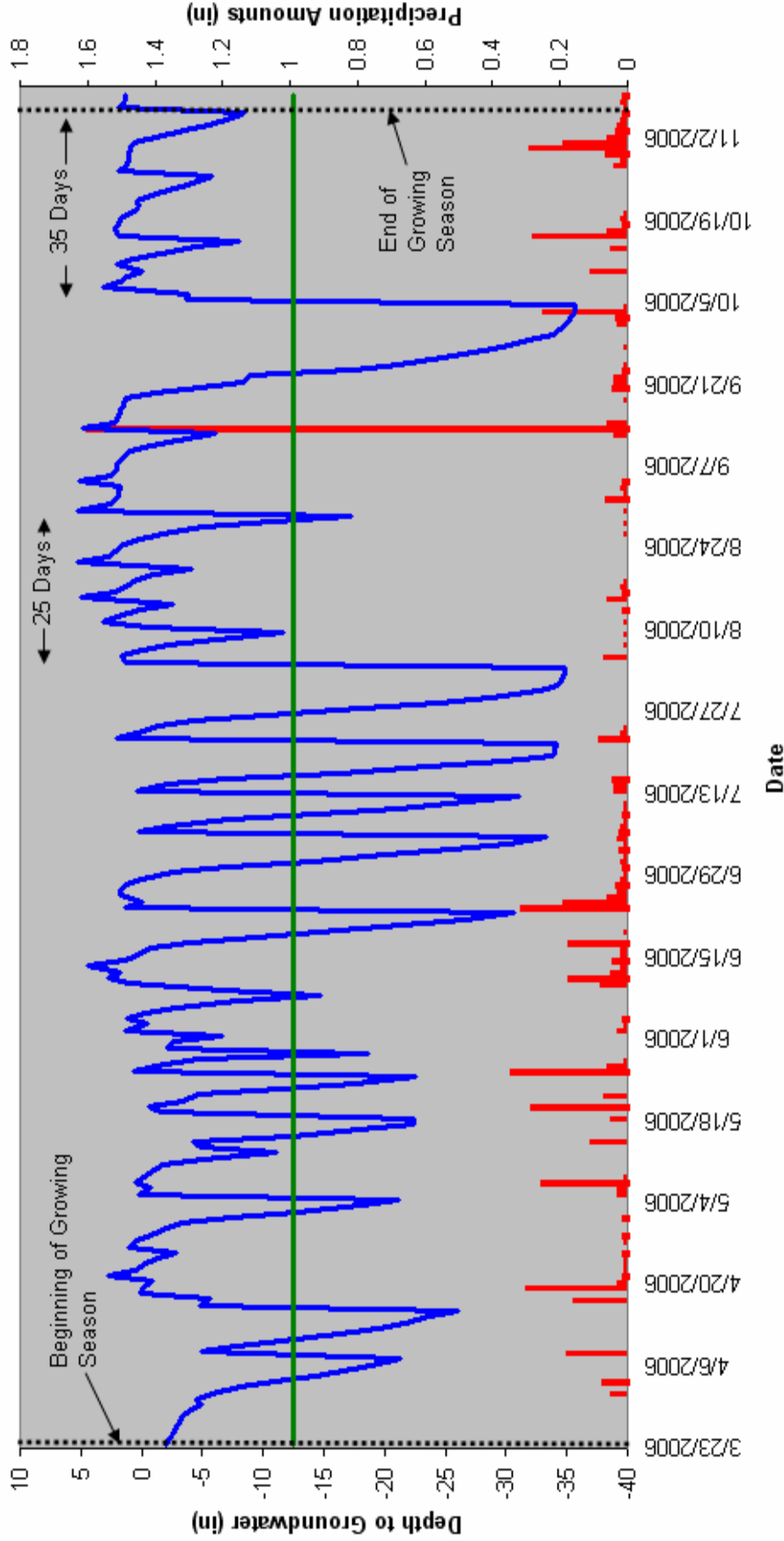
Mallard Creek Wetland Restoration  
Year 9 of 9

Date: March 2007  
Project No.: 239



**Appendix B2. Precipitation – Water Level Plots for Wells**

Mallard Creek Hydrology Monitoring  
 Mecklenburg County, North Carolina  
 Groundwater Gauge 9



■ Rainfall Amount   
 — MC-WLG9 A2871A8   
 — Required Depth



Prepared For:

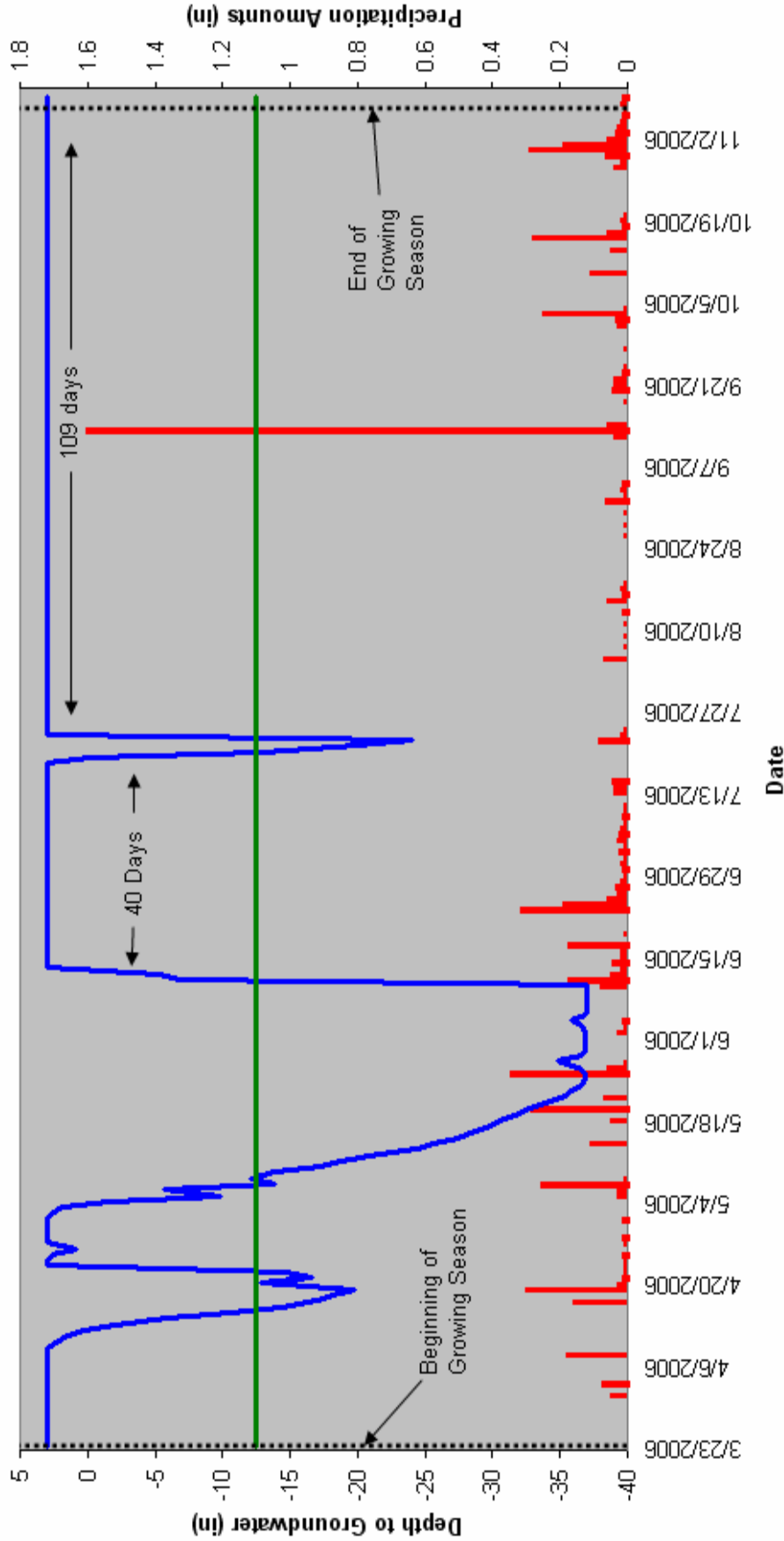
Mallard Creek Wetland Restoration  
 Year 9 of 9

Date: March 2007  
 Project No.: 239



Appendix B2. Precipitation – Water Level Plots for Wells

Mallard Creek Hydrology Monitoring  
 Mecklenburg County, North Carolina  
 Groundwater Gauge 10



■ Rainfall Amount — MC-WLG10 0494166 — Required Depth



Prepared For:

Mallard Creek Wetland Restoration  
 Year 9 of 9

Date: March 2007  
 Project No.: 239



Appendix B2. Precipitation – Water Level Plots for Wells