

# ANNUAL REPORT FOR 2004



**Grimesland Sand Pit Phase I Site**  
**Pitt County**  
**Project No. 8.T221801**  
**TIP No. R-2510 WM**



Office of Natural Environment & Roadside Environmental Unit  
North Carolina Department of Transportation  
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## **SUMMARY**

The following report summarizes the monitoring activities that have occurred in the past year for Phase I of the Grimesland Sand Pit Mitigation Site. This site is being constructed to serve as a wetland mitigation site for road projects taking place in the Lower Tar River portion of the Tar-Pamlico River Basin in North Carolina. The site will be constructed in three phases. Phase I construction was completed in January of 2000 and planting was completed in March of 2000. In March 2002, the Phase I area was replanted.

The site is monitored for hydrology using five groundwater-monitoring gauges, two surface water gauges, and one rain gauge. The site is monitored for vegetation using four vegetation plots that are representative of the 7.8 acres planted in trees. The 2004-year represents the third year of hydrology and vegetation monitoring following construction. The site must demonstrate hydrologic and vegetation success for a minimum of five years or until the project is deemed successful.

Results for both hydrologic and vegetation monitoring indicate that the site is meeting success. The hydrologic data for 2004 shows that the Phase I site was saturated and met jurisdictional success with all five groundwater gauges meeting the 12.5% success criteria. Vegetation monitoring for the third year yielded 473 trees per acre, which is above the minimum requirement for the second year of monitoring.

Per the letter from the Ecosystem Enhancement Program (EEP) to NCDOT dated August 25, 2004, the EEP has accepted the transfer of all off-site mitigation projects. The EEP will be responsible for fulfilling the remaining monitoring requirements and future remediation for this project.

## 1.0 INTRODUCTION

### 1.1 PROJECT DESCRIPTION

The 550-acre Grimesland Sand Pit Mitigation Site (herein after referred to as “the site”) is located in Pitt County near the community of Grimesland. The site is currently owned and mined by NCDOT. It is bounded on the north and the east by Grindle Creek, on the west by croplands and pine plantation, and on the south by the floodplain of the Tar River and the Tar River itself (Figure 1). The site serves as a regional wetland mitigation site for NCDOT roadway projects that would impact similar sites located in the Lower Tar River Sub-Basin. The site includes the creation of 58 acres of forested riverine wetlands (cypress-gum swamp and coastal plain bottomland hardwoods), the creation of 2 acres of emergent wetlands on submerged benches, the preservation of 348 acres of riverine wetland ecosystem, the preservation of 29.59 acres of riparian buffer and the enhancement of aquatic habitat within 80 acres of flooded abandoned borrow pits.

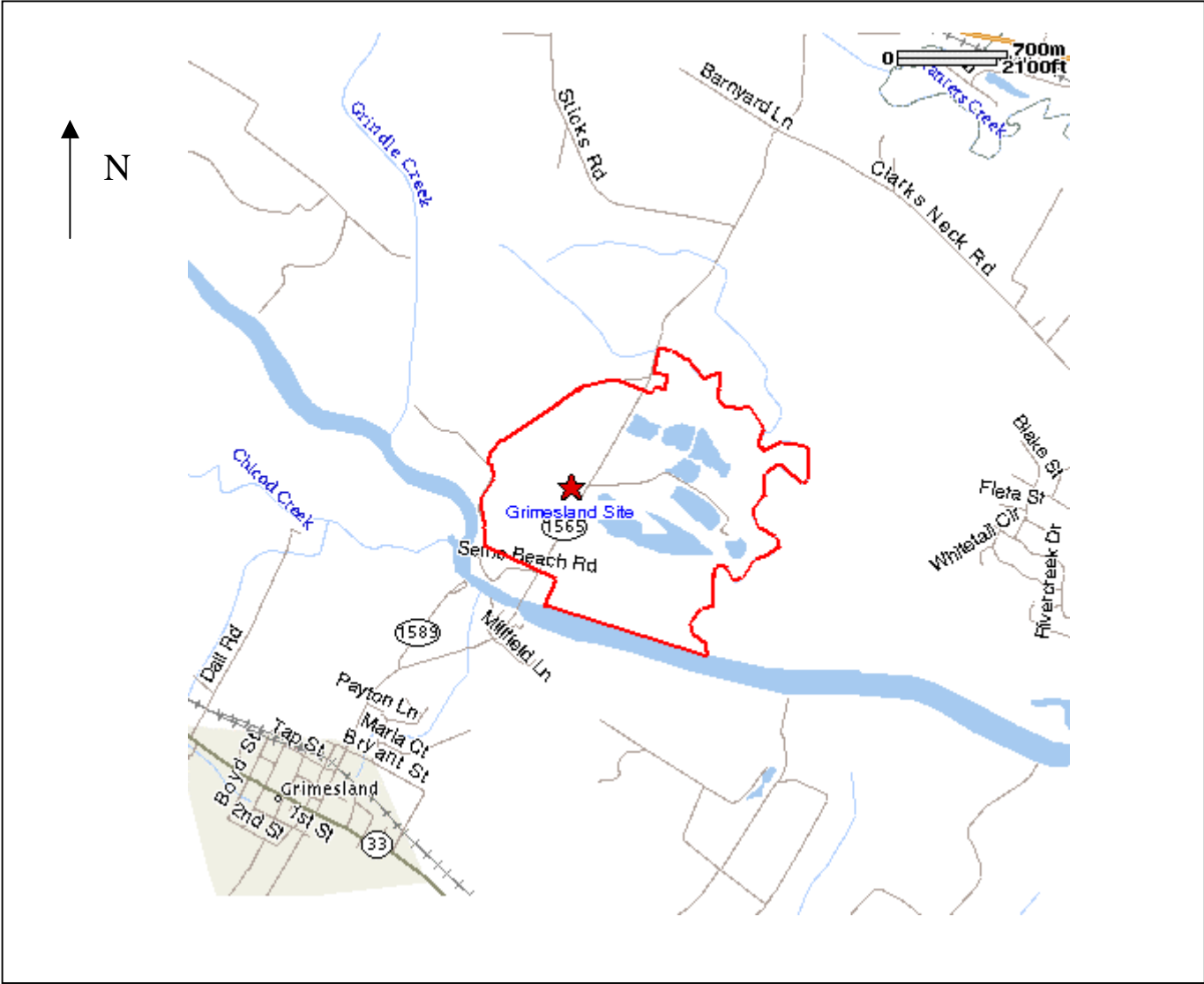
### 1.2 PURPOSE

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years or until success criteria are satisfied. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrologic conditions and vegetation survival. The following report details the results of hydrologic and vegetative monitoring during the 2004-growing season at the Grimesland Sand Pit Site.

### 1.3 PROJECT HISTORY

January 2000	Construction- Phase 1
March 2000	Phase I Planted
August 2001	Vegetation Monitoring (1 yr.)
March 2002	Phase I Replanted
March- November 2002	Hydrologic Monitoring (1 yr.)
June 2002	Vegetation Monitoring (1 yr. Restart)
March- November 2003	Hydrologic Monitoring (2 yr.)
June 2003	Vegetation Monitoring (2 yr.)
March- November 2004	Hydrologic Monitoring (3 yr.)
June 2004	Vegetation Monitoring (3 yr.)

Figure 1. Grimesland Phase I Site Location Map



## **2.0 HYDROLOGY**

### **2.1 SUCCESS CRITERIA**

In accordance with federal guidelines for wetland mitigation, the success criteria for hydrology state that the area must be inundated or saturated (within 12" of the surface) by surface or groundwater for at least a consecutive 12.5% of the growing season. Areas inundated less than 5% of the growing season are always classified as non-wetlands. Areas inundated between 5% - 12.5% of the growing season can be classified as wetlands depending upon other factors, such as the presence of hydrophytic vegetation and hydric soils.

The growing season in Pitt County begins March 15 and ends November 16. These dates correspond to a 50% probability that temperatures will remain above 28° F or higher after March 15 and before November 16.<sup>1</sup> The growing season is 247 days; therefore, the optimum duration for wetland hydrology is 31 days. Also, local climate must represent average conditions for the area.

### **2.2 HYDROLOGIC DESCRIPTION**

Five groundwater and two surface water gauges were installed in the Phase I section in March of 2000 (Figure 2). The automatic monitoring gauges record daily readings of the groundwater depth, while the surface water gauges record water depth every three hours. A rain gauge installed onsite records daily rainfall totals; these rain events were incorporated into the monitoring results to examine how the site's groundwater level responded to rainfall.

### **2.3 RESULTS OF HYDROLOGIC MONITORING**

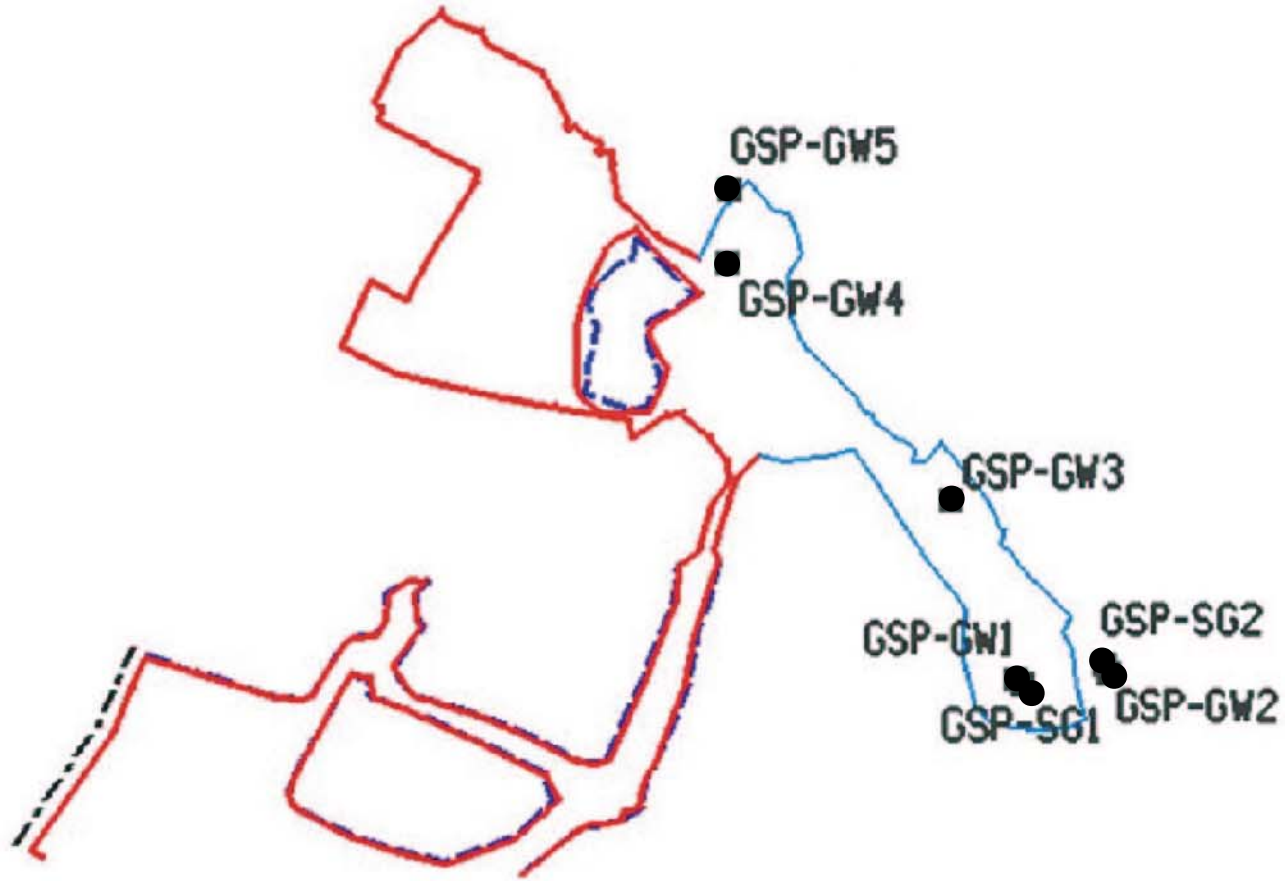
#### **2.3.1 Site Data**

The maximum number of consecutive days that the groundwater was within twelve inches of the surface was determined for each groundwater-monitoring gauge. This number was converted into a percentage of the 247-day growing season (March 15 – November 16).

Table 1 shows the hydrologic results for 2004; Figure 3 is a graphical representation of these results. In Figure 3, a blue dot indicates the gauge showed success for more than 12.5% of the growing season; a red dot, between 8 and 12.5%; a green dot, between 5 and 8%, and a black dot, less than 5%.

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<sup>1</sup> Soil Conservation Service, Soil Survey of Pitt County, North Carolina, p.71.



Phase I

Figure 2. Gauge Location Map



Not to Scale



**Table 1. 2004 Phase I Hydrologic Monitoring Results**

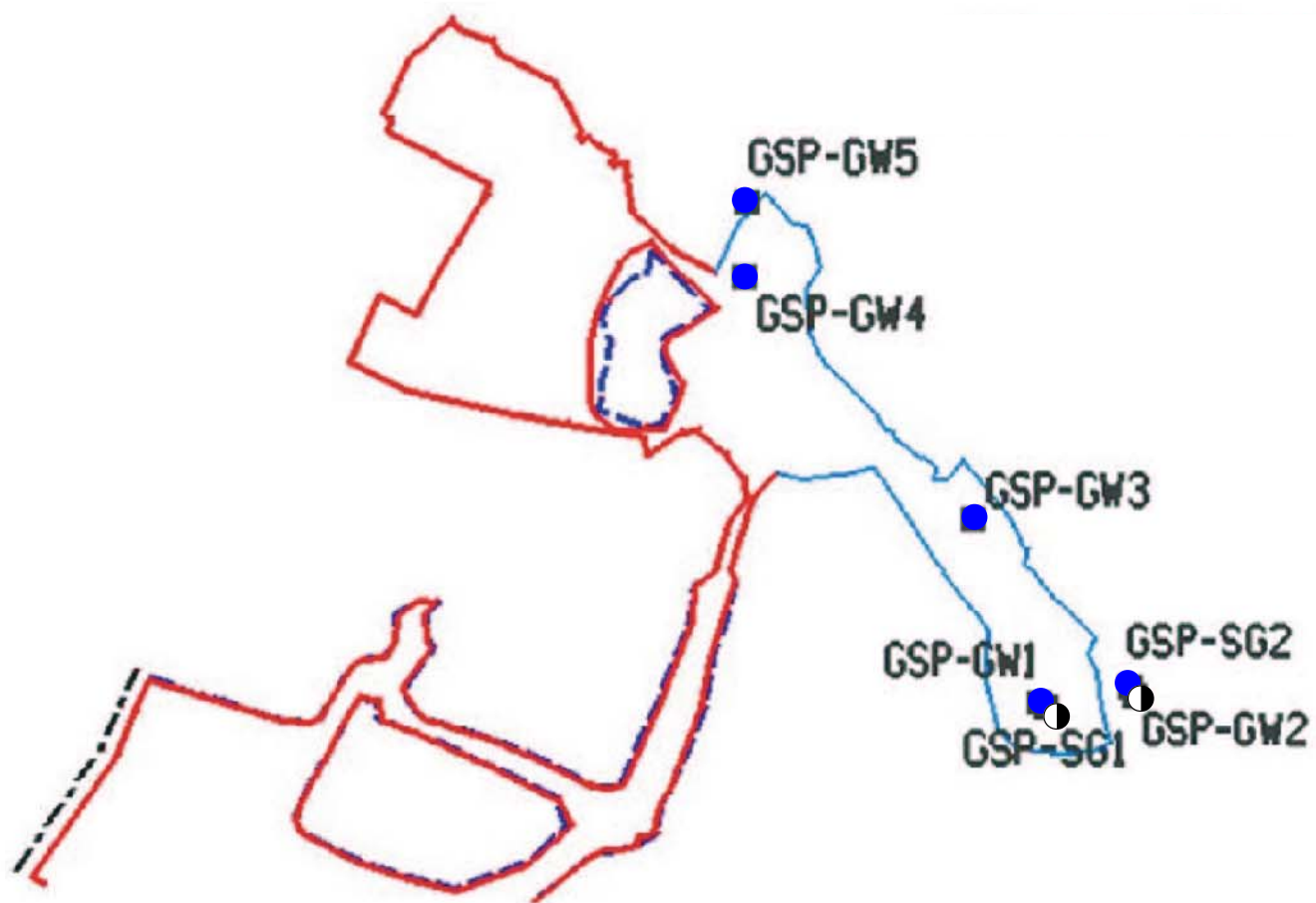
<b>Monitoring Gauge</b>	<b>&lt; 5%</b>	<b>5 – 8%</b>	<b>8 – 12%</b>	<b>&gt; 12.5%</b>	<b>Actual %</b>	<b>Success Dates</b>
GSP-GW1+				×	48.2	March 15-April 24 May 23-July 14 July 21-Nov 16
GSP-GW2+				×	71.3	March 15-Sept 6
GSP-GW3+				×	100	March 15-Nov 16
GSP-GW4+				×	79.8	March 15-Aug 31 Sept 29-Nov 16
GSP-GW5+				×	38.9	May 21-Aug 24 Sept 29-Nov 16

+ Gauge met the success criterion during an average rainfall month (February, April, May, August, September, October, and November).

*Specific Gauge Problems:*

- GW5 was not set to record every 24 hours. This resulted in the gauge recording data every other day.

Appendix A contains plots of the groundwater depth at each monitoring gauge location during 2004. In addition to documenting the groundwater level relative to the ground surface (within 12”), these monitoring gauge graphs are designed to show the reaction of the groundwater level to specific rainfall events. The maximum number of consecutive days that the gauge indicates successful hydrology is noted on each graph. Precipitation events recorded by the onsite rain gauge are included on each graph. Plots of the data recorded at each of the two surface water gauges are also included in Appendix A.



Phase I

**Figure 3. 2004 Hydrologic Monitoring Gauge Results**



Hydrology Results

- < 5%
- 5 - 8%
- 8 - 12.5%
- > 12.5%

- ⊕ Rain Gauge
- Surface Gauge



### **2.3.2 Climatic Data**

Figure 4 is a graph of monthly rainfall for the period of November 2003 through November 2004 compared to historical precipitation data (collected between 1973 and 2004) for Washington, North Carolina. The NC State Climate Office provided the rainfall data. The comparison of 2004 rainfall versus historical values gives an indication of how 2004 compares to historical climate conditions.

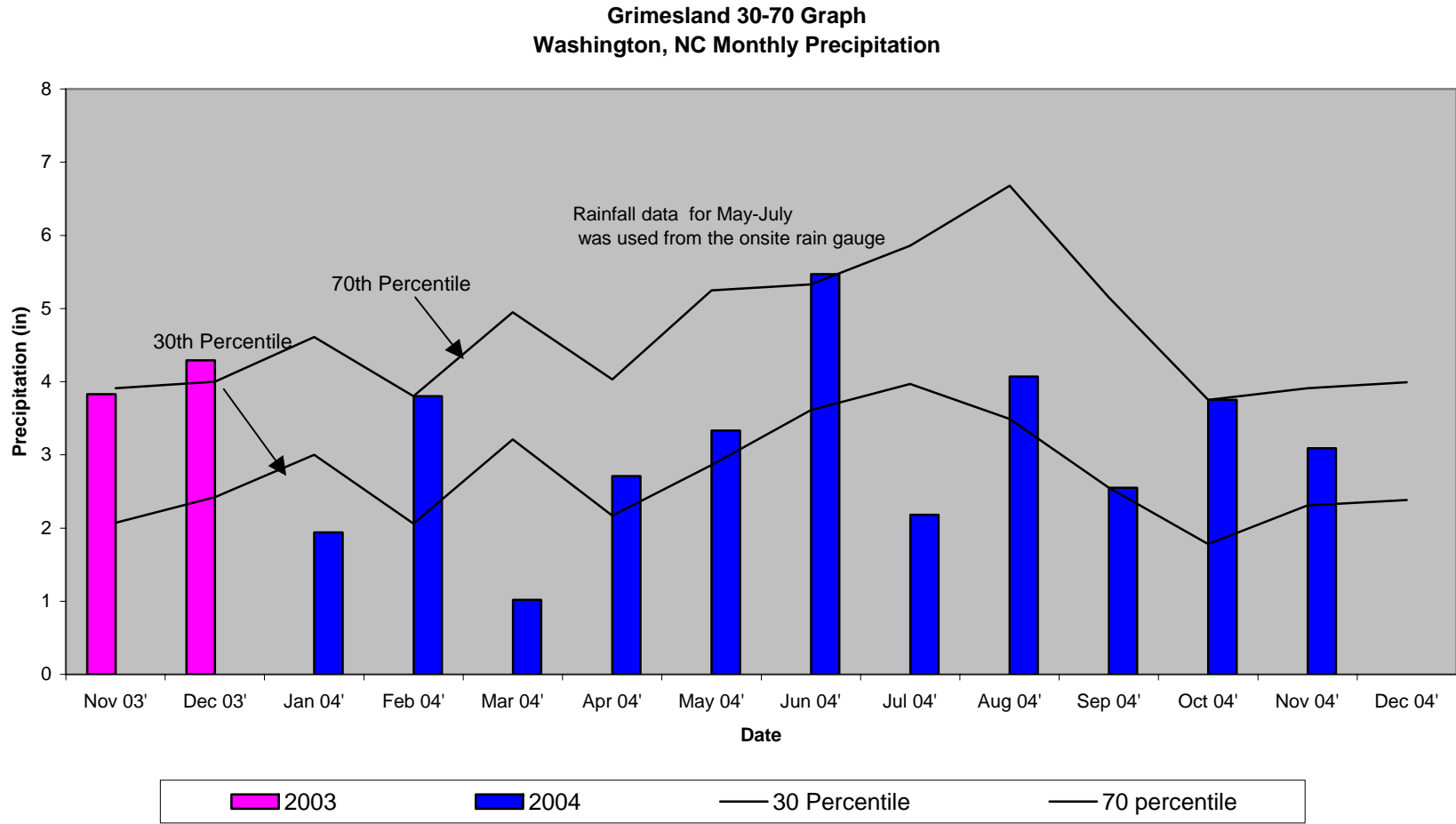
For the 2004 monitoring year, December (03') and June experienced above average rainfall. The months of January, March, and June recorded below average rainfall for the site. November (03'), February, April, May, August, September, October, and November experienced average rainfall. Overall, 2004 experienced an average rainfall year.

## **2.4 CONCLUSIONS**

In 2004, all five groundwater-monitoring gauges indicated success for at least 12.5% of the growing season. The two surface gauges provided data showing the consistent presence of surface water throughout the growing season.

EEP will begin monitoring the hydrology at the Grimesland Phase I Mitigation Site for the 2005 monitoring year.

**Figure 4.** Grimesland Phase I 30-70 Percentile Graph, Washington, NC



### 3.0 VEGETATION: GRIMESLAND PIT MITIGATION SITE PHASE I (YEAR 3 MONITORING)

#### 3.1 SUCCESS CRITERIA

The success criteria state that there must be a minimum mean density of 320 trees per acre within three years of initial planting and a minimum count of 260 trees per acre must be achieved within five years of initial planting.

#### 3.2 DESCRIPTION OF SPECIES

The following species were planted in the Wetland Restoration Area:

Phase I:

*Nyssa sylvatica* var. *biflora*, Swamp Blackgum

*Fraxinus pennsylvanica*, Green Ash

*Nyssa aquatica*, Water Tupelo

*Quercus phellos*, Willow Oak

*Quercus nigra*, Water Oak

*Taxodium distichum*, Baldcypress

*Carpinus caroliniana*, American Hornbeam

#### 3.3 RESULTS OF VEGETATION MONITORING

Table 2. Vegetation Monitoring Statistics

Plot #	Baldcypress	Green Ash	Swamp Blackgum	Water Tupelo	Water Oak	Willow Oak	Hornbeam	Total (Year 3)	Total (at planting)	Density (Trees/Acre)
1	5	4	6	7				22	40	374
2	27		7	8	2	3	2	49	49	680
3	4	13	10	5		1	2	35	47	506
4	1	5	11				4	21	43	332
<b>AVERAGE TREE (BLH) DENSITY</b>									<b>473</b>	

**Site Notes:** Other species noted: black willow, *Juncus* sp., woolgrass, cattail, *Cyperus* sp., *Scirpus* sp., smartweed, sycamore, volunteer swamp blackgum, and various grasses.

### **3.4 CONCLUSIONS**

Phase I consisted of approximately 7.8 acres of tree planting. There were four vegetation-monitoring plots established throughout the Phase I planting areas. The site is well vegetated with a variety of wetland grasses. The 2004 vegetation monitoring of the site revealed an average tree density of 473 trees per acre within Phase I. This average is above the minimum success criteria of 320 trees per acre.

EEP will begin monitoring the vegetation at the Grimesland Phase I Mitigation Site for the 2005 monitoring year.

### **4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS**

The Grimesland Sand Pit Phase I Mitigation Site was monitored for the third year in 2004. All five groundwater-monitoring gauges indicated jurisdictional success (at least 12.5%) for the 2004-monitoring year. The two site surface water gauges indicated the presence of surface water throughout the growing season. An analysis of rainfall in nearby Washington, NC shows that the region experienced average rainfall for the year. Therefore, the site met the jurisdictional success criteria under average climatic conditions.

Approximately 7.8 acres of the site were planted; four vegetation plots within this area are used for vegetation monitoring. The established success criteria stated that the minimum survival rate in the first three years following planting was 320 trees per acre. Monitoring results showed an average survival rate of 473 trees per acre in the third year. Therefore, the vegetation exceeds the minimum success criteria.

Per the letter from the Ecosystem Enhancement Program (EEP) to NCDOT dated August 25, 2004, the EEP has accepted the transfer of all off-site mitigation projects. The EEP will be responsible for fulfilling the remaining monitoring requirements and future remediation for this project.

**APPENDIX A**

**DEPTH TO GROUNDWATER**

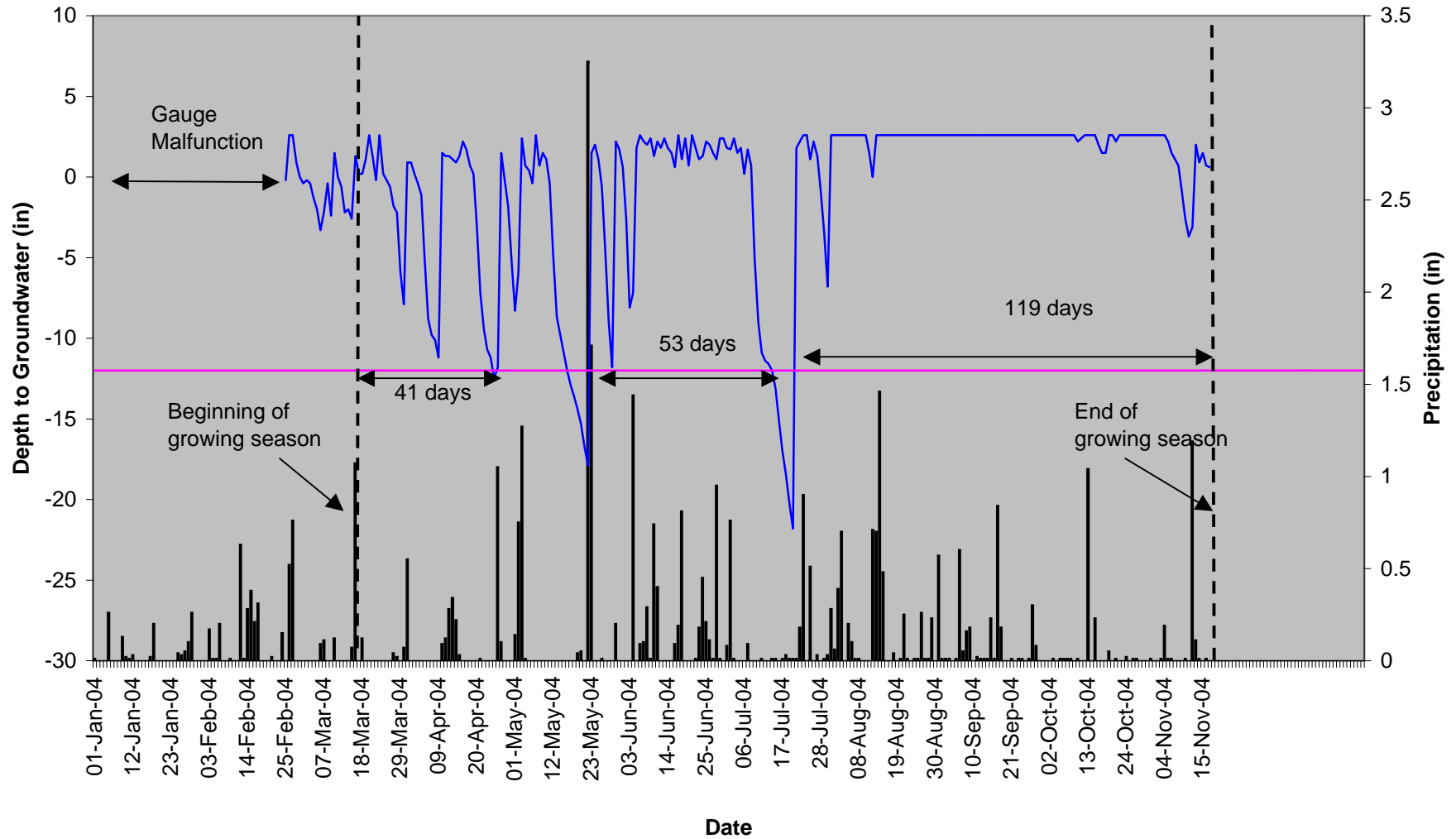
**&**

**SURFACE WATER CHARTS**

## **GROUNDWATER GAUGES**

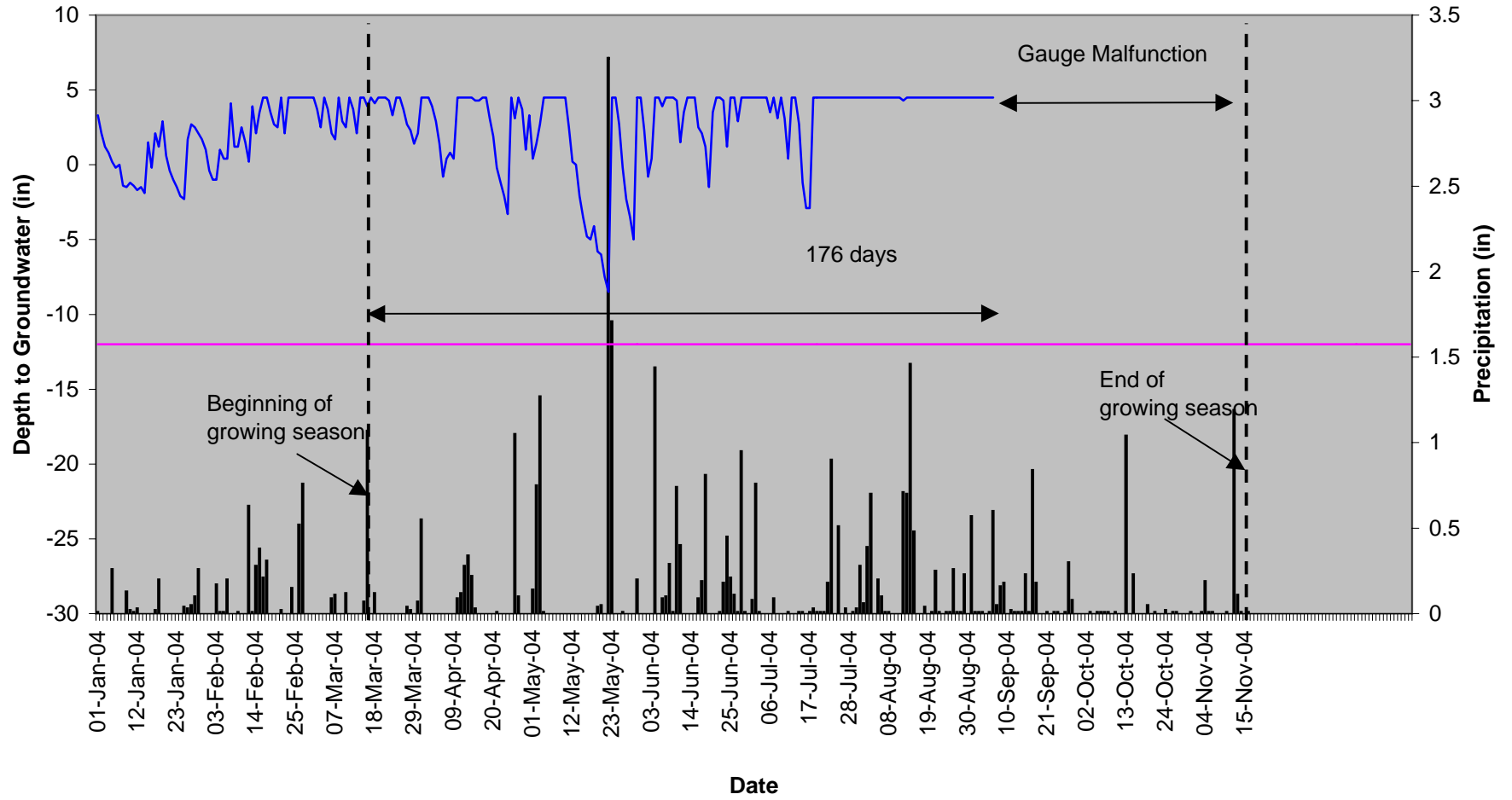


**Grimesland GSP-GW1  
Phase I  
40" Groundwater**



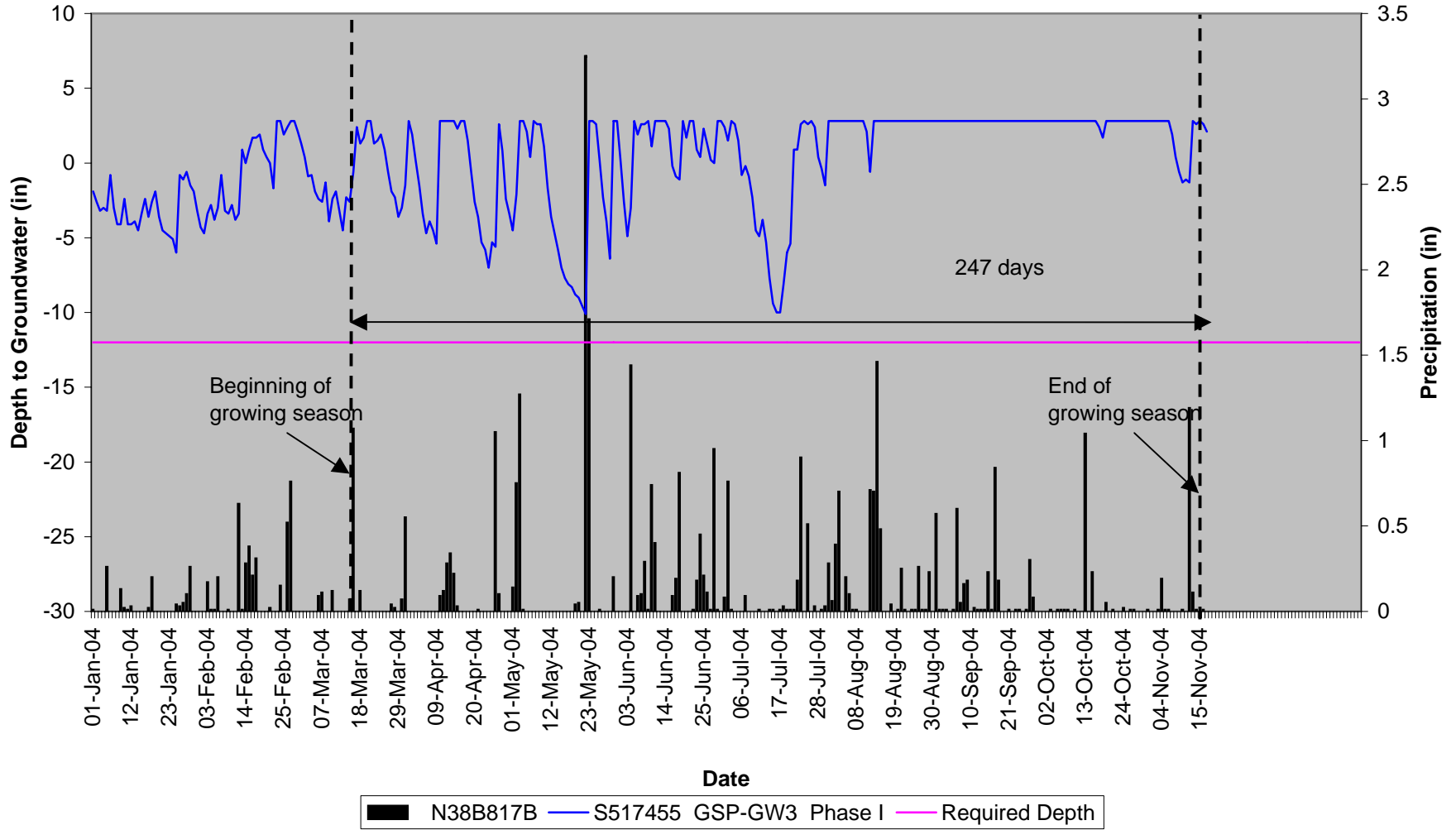
N38B817B
  S31768A GSP-GW1 Phase I
  Required Depth

**Grimesland GSP-GW2  
Phase I  
40" Groundwater**

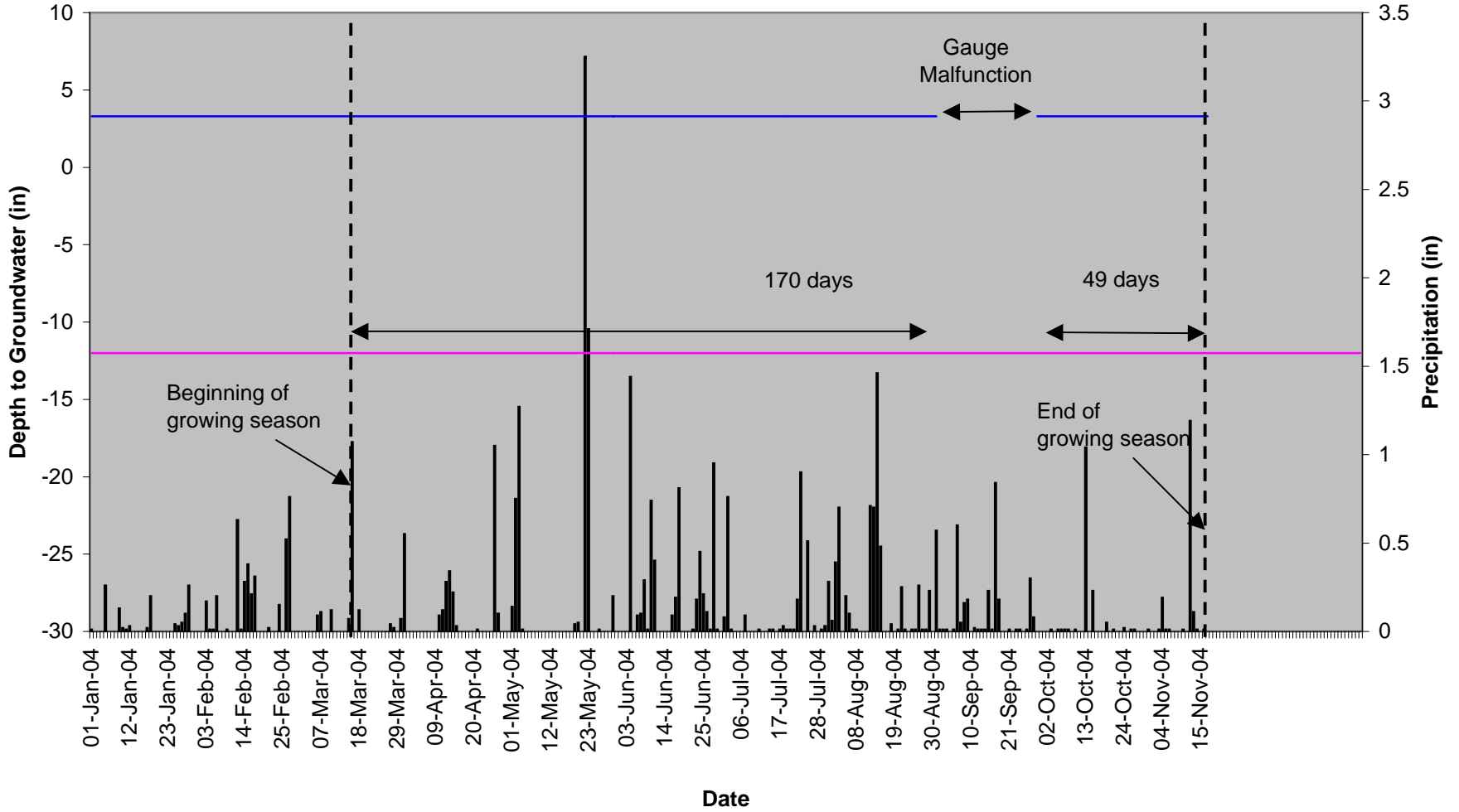


■ N38B817B — S5176B3 GSP-GW2 Phase I — Required Depth

**Grimesland GSP-GW3  
Phase I  
40" Groundwater**

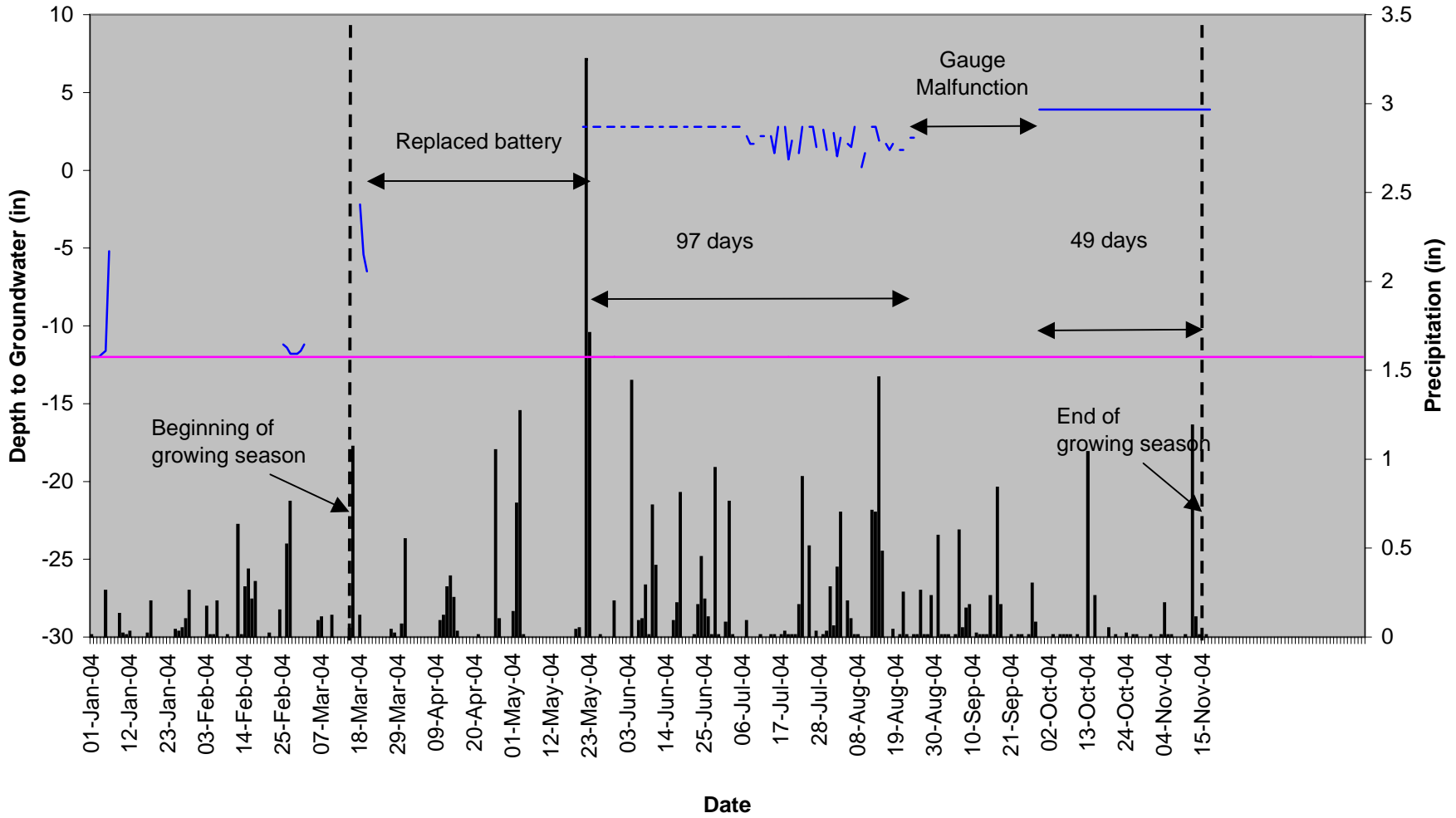


**Grimesland GSP-GW4  
Phase I  
40" Groundwater**



N38B817B
  S51705B
  Required Depth

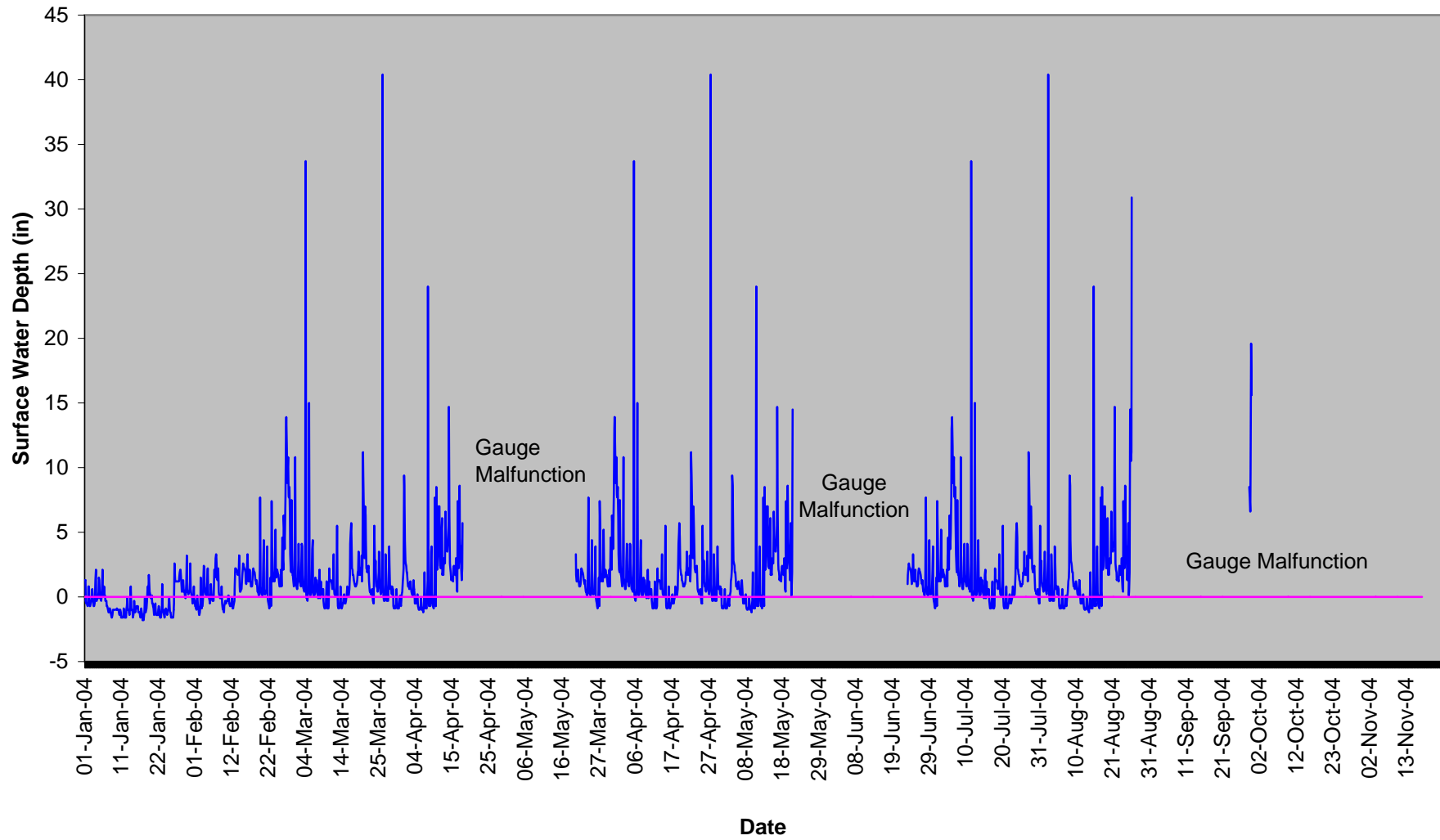
**Grimesland GSP-GW5  
Phase I  
40" Groundwater**



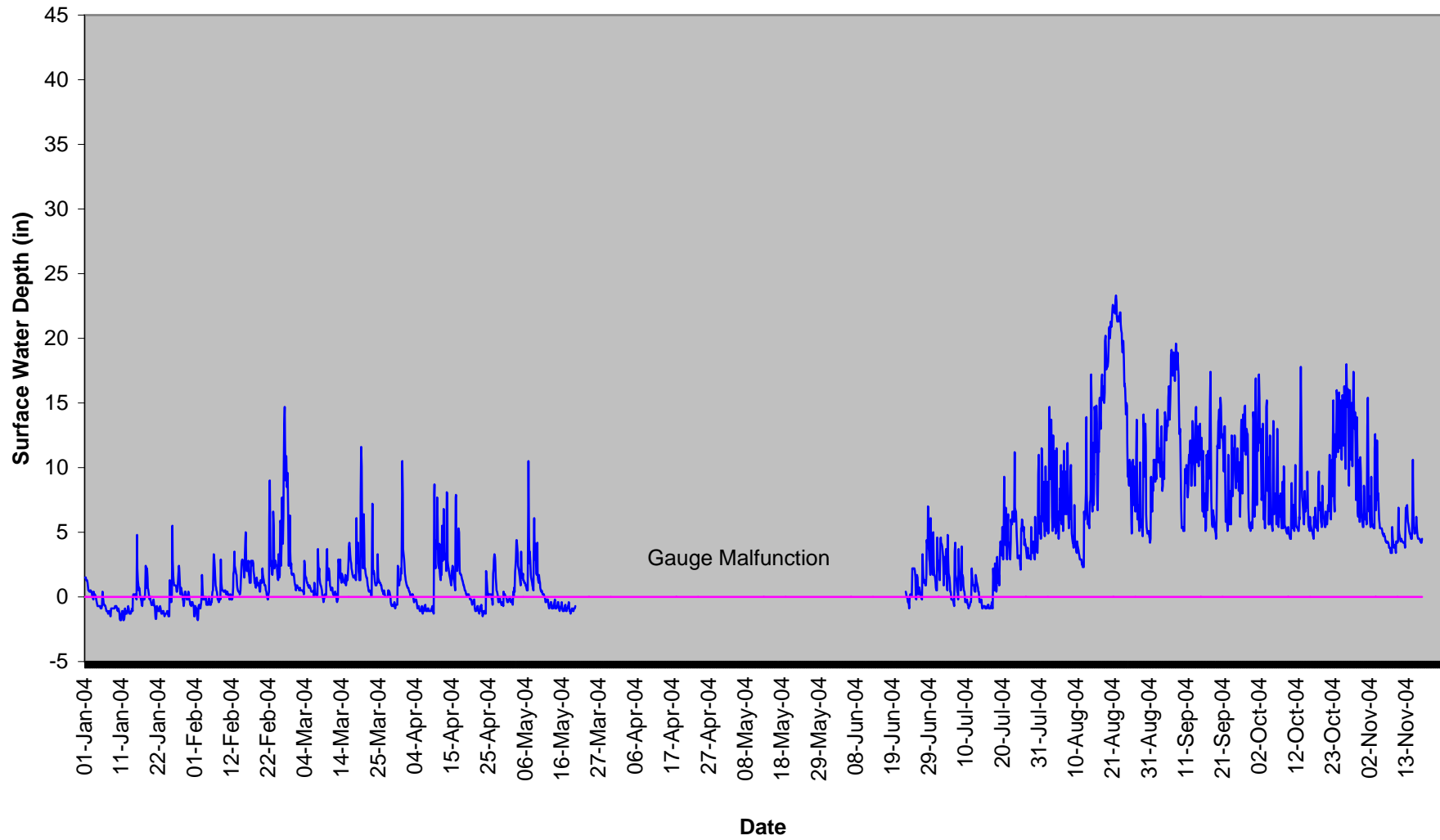
N38B817B
  S51728D
  GSP-GW5 Phase I
  Required Depth

## **SURFACE WATER GAUGES**

# Grimesland GSP-SG1 40" Surface Gauge



**Grimesland GSP-SG2  
40" Surface Gauge**





## **APPENDIX B**

### **SITE PHOTOS AND PHOTO AND PLOT LOCATIONS MAP**

# Grimesland Pit – Phase I



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

2004

# Grimesland Pit Mitigation Site

## Photo and Plot Locations

### Phase 1

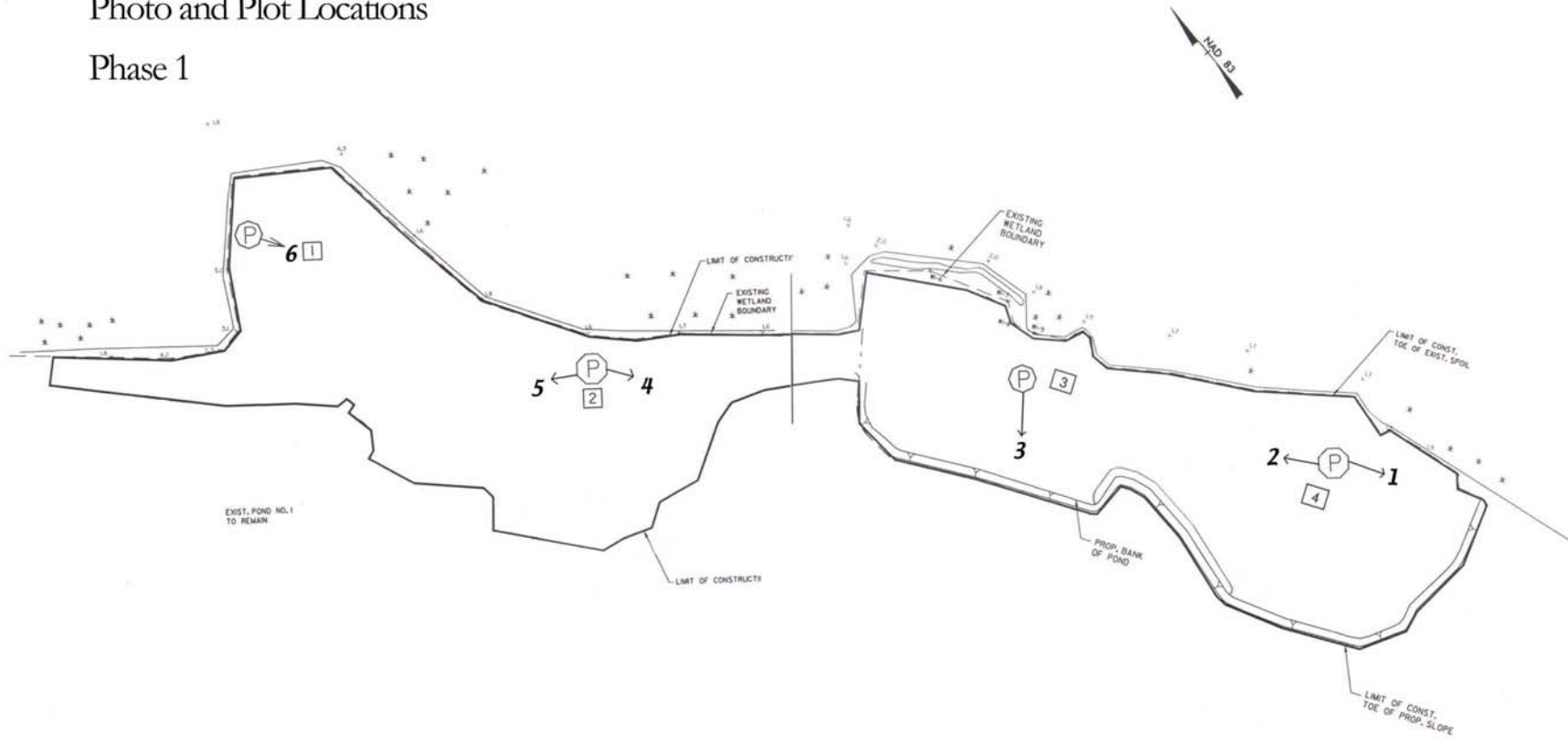


	PHOTO LOCATIONS
	MONITORING PLOTS