

# ANNUAL REPORT FOR 2006



**Grimesland Sand Pit Phase I Site**

**Pitt County**

**Project No. 8.T221801**

**EEP Project No. 155**

**TIP No. R-2510WM**

**Monitoring Year 5 of 5**



# TABLE OF CONTENTS



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SUMMARY . . . . .	1
1.0 INTRODUCTION . . . . .	2
1.1 Project Description. . . . .	2
1.2 Purpose . . . . .	2
1.3 Project History . . . . .	2
2.0 HYDROLOGY . . . . .	4
2.1 Success Criteria . . . . .	4
2.2 Hydrologic Description . . . . .	4
2.3 Results of Hydrologic Monitoring. . . . .	4
2.3.1 Site Data . . . . .	4
2.3.2 Climatic Data. . . . .	8
2.4 Conclusions . . . . .	8
3.0 VEGETATION . . . . .	10
3.1 Success Criteria . . . . .	10
3.2 Community Description . . . . .	10
3.3 Results of Vegetation Monitoring. . . . .	10
3.4 Conclusions . . . . .	11
4.0 CONCLUSIONS/ RECOMMENDATIONS . . . . .	11

TABLES

TABLE 1 – 2006 PHASE I HYDROLOGIC MONITORING RESULTS . . . 6  
TABLE 2 – 2006 PHASE I VEGETATION MONITORING RESULTS. . . 10

FIGURES

FIGURE 1 – SITE LOCATION MAP . . . . . 3  
FIGURE 2 – MONITORING GAUGE LOCATION MAP. . . . . 5  
FIGURE 3 – 2006 HYDROLOGIC MONITORING RESULTS . . . . . 7  
FIGURE 4 – 30-70 PERCENTILE GRAPH . . . . . 9

APPENDICES

APPENDIX A – DEPTH TO GROUNDWATER & SURFACE WATER CHARTS  
APPENDIX B – SITE PHOTOS AND PHOTO AND PLOT LOCATIONS MAP

## **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 was constructed to serve as a wetland mitigation site for roadway project impacts in the Lower Tar River portion of the Tar-Pamlico River Basin in North Carolina. The site consists of 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 2006-year represents the fifth 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 2006 shows that the Phase I site was saturated and met jurisdictional success with all five groundwater gauges. Vegetation monitoring for the fifth year yielded 441 trees per acre, which is above the minimum requirement of 260 trees per acre in year five (5).

# 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 2006-growing season at the Grimesland Sand Pit Site Phase I.

## 1.3 PROJECT HISTORY

Date	Task Accomplished
<b>2000</b>	
January	Construction- Phase 1
March	Phase I Planted
<b>2001</b>	
August	Vegetation Monitoring (1 yr.)
<b>2002</b>	
March	Phase I Replanted
March-November	Hydrologic Monitoring (1 yr.)
June	Vegetation Monitoring (1 yr. Restart)
<b>2003</b>	
March-November	Hydrologic Monitoring (2 yr.)
June	Vegetation Monitoring (2 yr.)
<b>2004</b>	
March-November	Hydrologic Monitoring (3 yr.)
June	Vegetation Monitoring (3 yr.)
<b>2005</b>	
March-November	Hydrologic Monitoring (4 yr.)
June	Vegetation Monitoring (4 yr.)

<b>Date</b>	<b>Task Accomplished</b>
<b>2006</b>	
March-November	Hydrologic Monitoring (5 yr.)
June	Vegetation Monitoring (5 yr.)

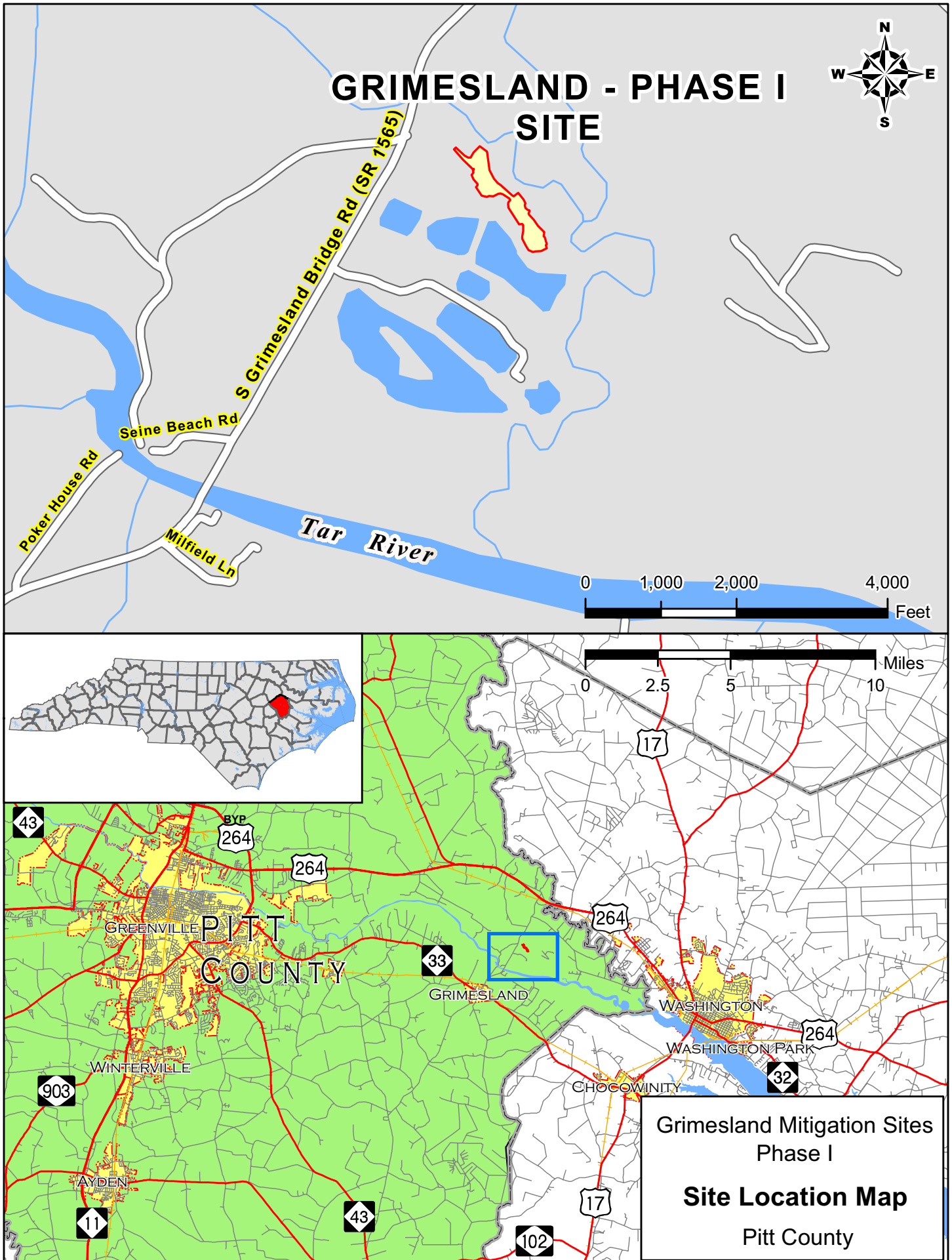


Figure 1

## **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 consecutive days lasting at least 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. 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 2006; Figure 3 is an aerial photograph with the gauges shown as a blue dot indicating 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%. All gauges met the 12.5% criterion.



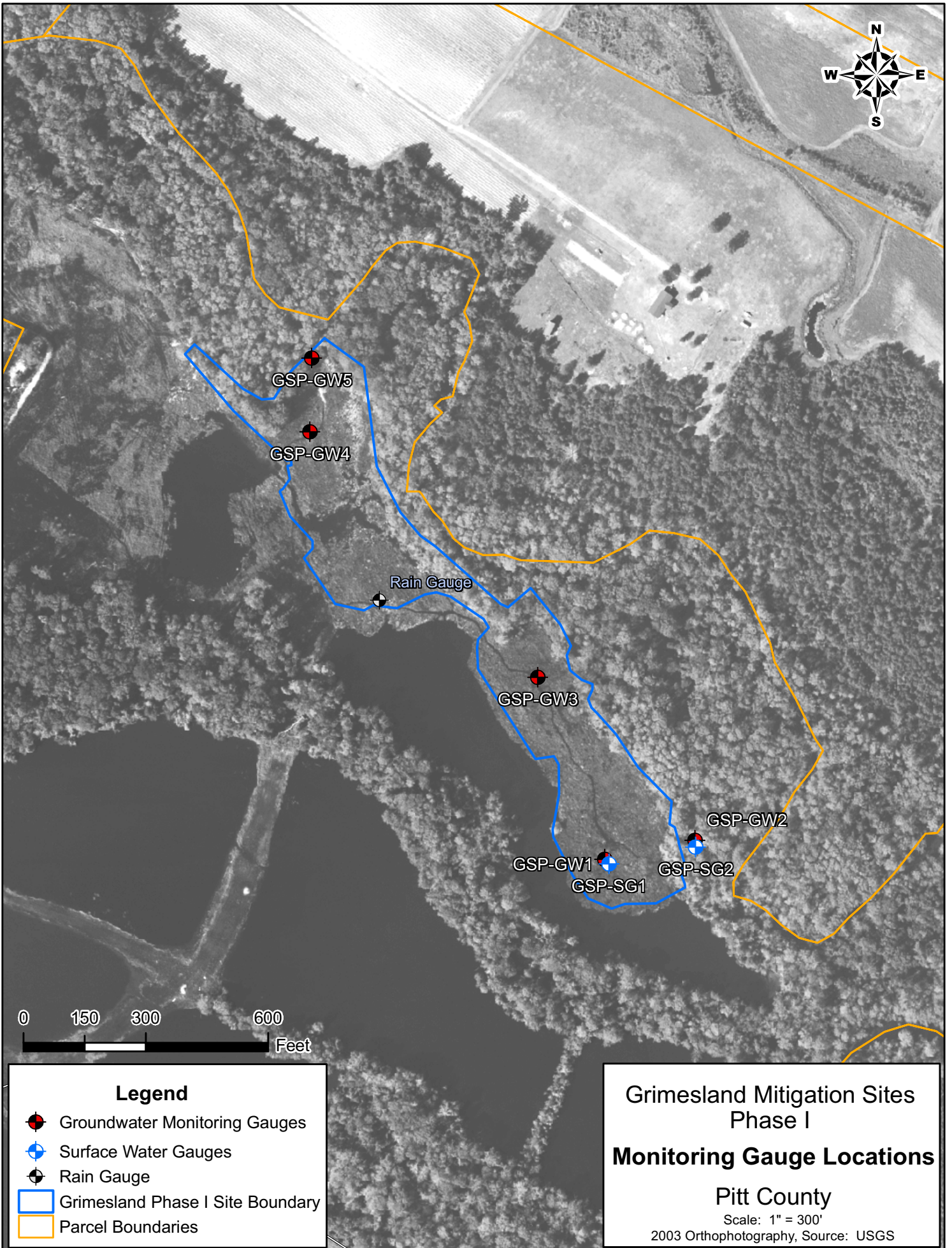


Figure 2

**Table 1. 2006 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				<b>x</b>	97.6	March 21-November 16
GSP-GW2				<b>x</b>	100	March 15-November 16
GSP-GW3				<b>x</b>	100	March 15-November 16
GSP-GW4				<b>x</b>	100	March 15-November 16
GSP-GW5				<b>x</b>	100	March 15-November 16

Appendix A contains plots of the groundwater depth at each monitoring gauge location during 2006. 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.



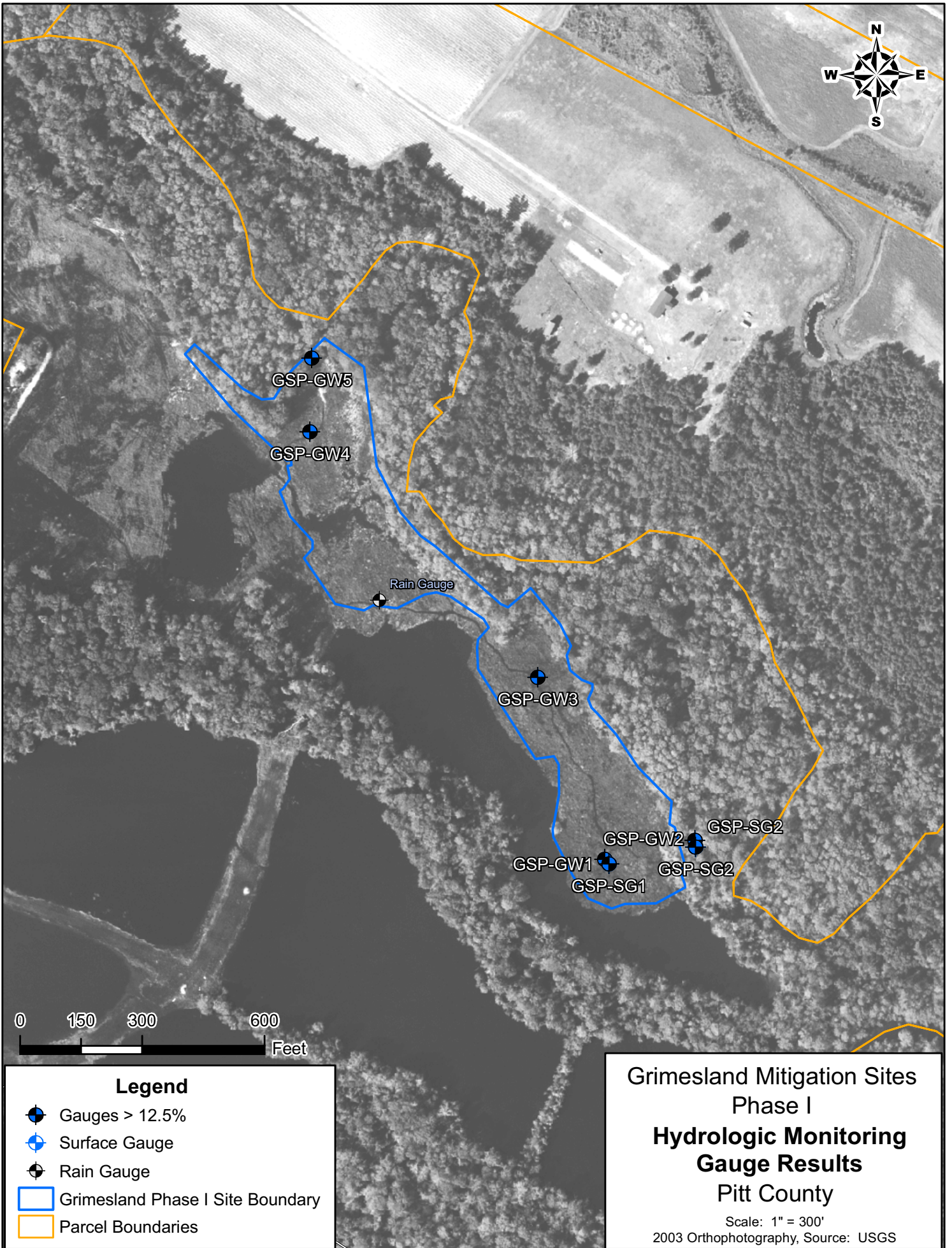


Figure 3

### **2.3.2 Climatic Data**

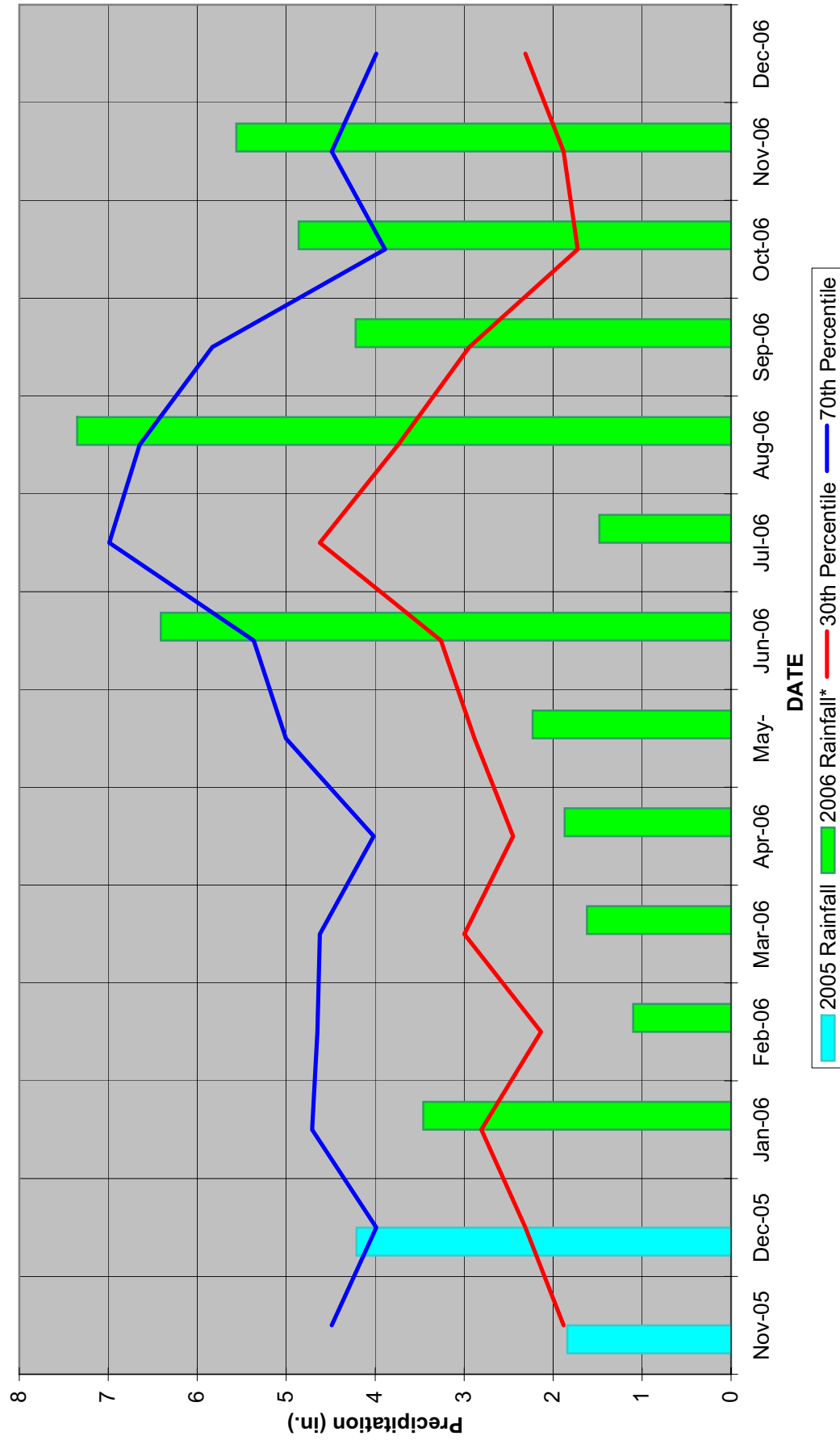
Figure 4 is a graph of monthly rainfall for the period of November 2005 through November 2006 compared to historical precipitation data (collected between 1973 and 2004) for Washington, North Carolina. The onsite rain gauge provided rainfall data and the NC State Climate Office provided the historical rainfall data. The comparison of 2006 rainfall versus historical values gives an indication of how 2006 compares to historical climate conditions.

For the 2006 monitoring year, January and September experienced average rainfall. The months of February, March, April, May, and July recorded below average rainfall while June, August, and November recorded above average rainfall.

### **2.4 CONCLUSIONS**

In 2006, all five groundwater-monitoring gauges indicated success for at least 12.5% of the growing season. The two surface gauges showed the presence of surface water throughout the growing season. The 2006 growing season represents the fifth and final year of monitoring for the Grimesland Phase I site.

### Grimesland I 30-70 Percentile Graph Washington, NC



**Figure 4** \*Due to onsite rain gauge malfunction, rain fall data from KPGV - Pitt / Greenville Airport for the months of June, July, and August 2006.

### 3.0 VEGETATION (YEAR 5 MONITORING)

#### 3.1 SUCCESS CRITERIA

The success criteria state that there must be a minimum density of 320 trees per acre after three years of initial planting. A minimum of 290 trees per acre must be living at the end of year 4 and a minimum count of 260 trees per acre must be surviving at five years after 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.** 2006 Vegetation Monitoring Results

Plot #	Baldcypress	Green Ash	Swamp Blackgum	Water Tupelo	Sycamore	Hornbeam	Total (Year 5)	Total (at planting)	Density (Trees/Acre)
1	6	2	8	5			21	40	357
2	22		12	3	1	2	40	49	555
3	3	12	16	2		3	36	47	521
4	1	5	10		4	5	21	43	332
<b>AVERAGE TREE DENSITY</b>									<b>441</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 2006 vegetation monitoring of the site revealed an average tree density of 441 trees per acre within Phase I. This average is above the minimum success criteria of 260 trees per acre at the end of year five (5).

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

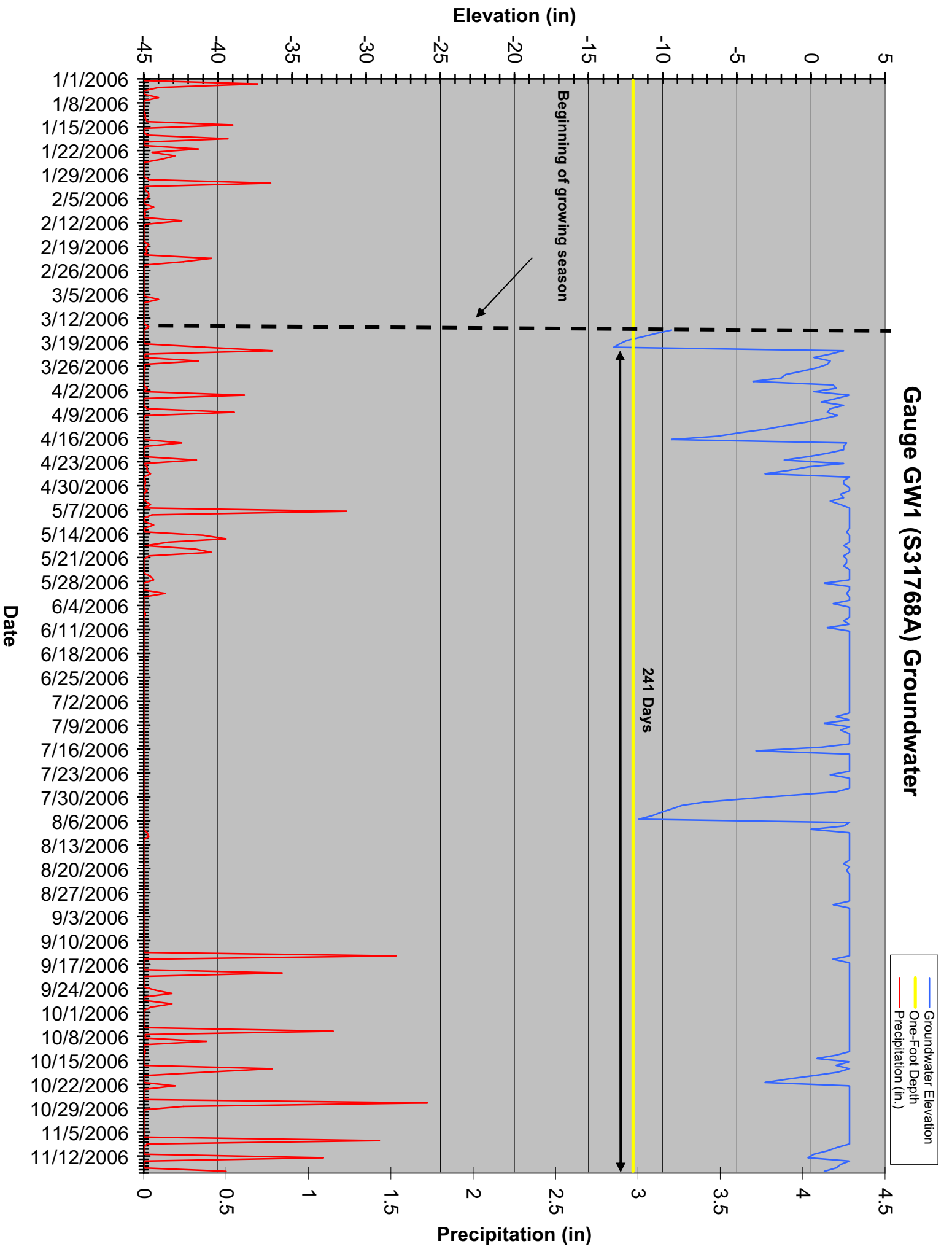
The Grimesland Sand Pit Phase I Mitigation Site was monitored for the fifth year in 2006. All five groundwater-monitoring gauges indicated jurisdictional success (at least 12.5%) for the 2006-monitoring year. The two site surface water gauges indicated the presence of surface water throughout the growing 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.

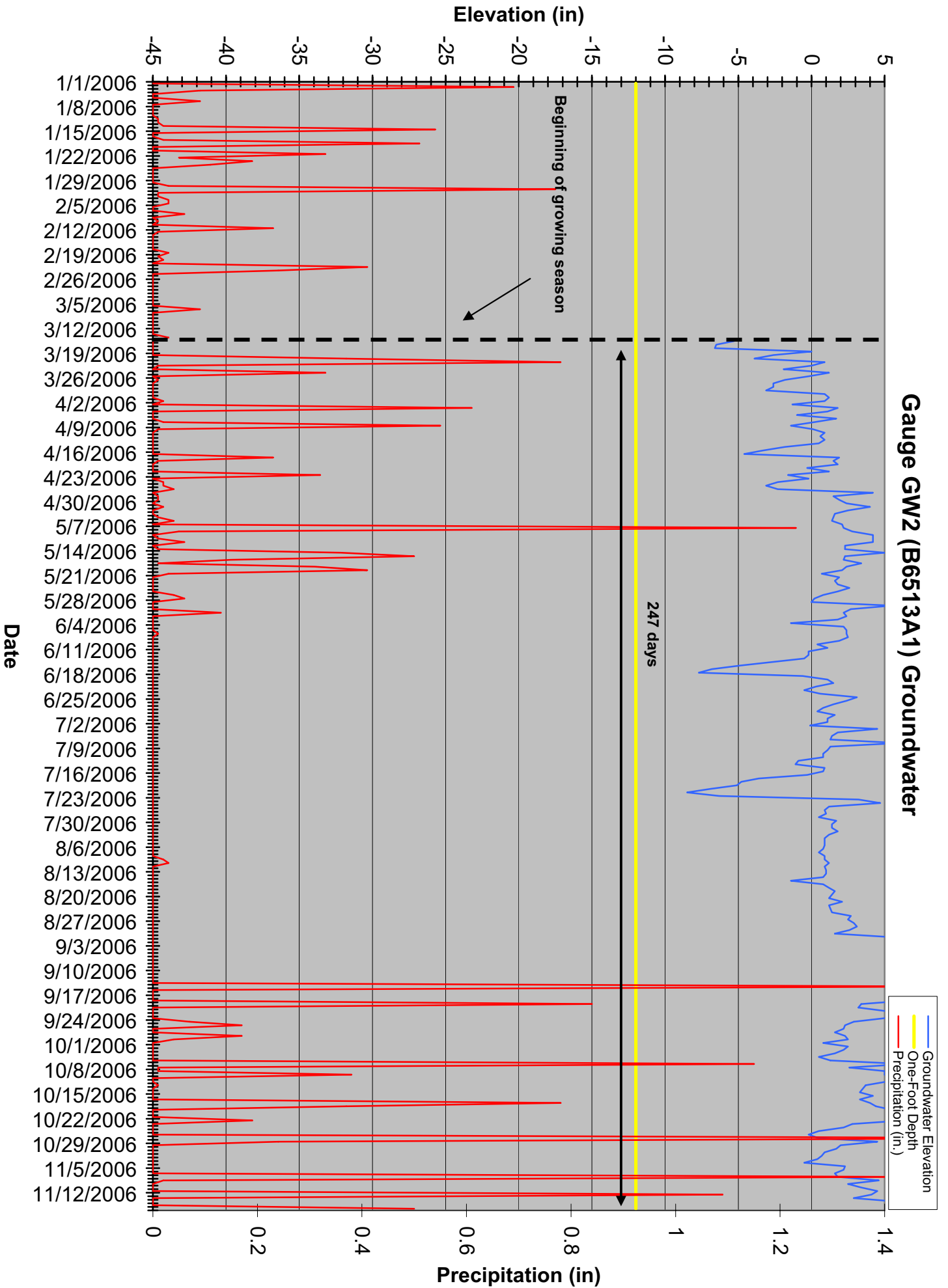
Approximately 7.8 acres of the site were planted; four vegetation plots within this area are used for vegetation monitoring. The established success criteria stated that a minimum of 260 trees per acre must be living at year 5. Monitoring results showed an average survival rate of 441 trees per acre in the sixth year. Therefore, the vegetation exceeds the minimum success criteria.

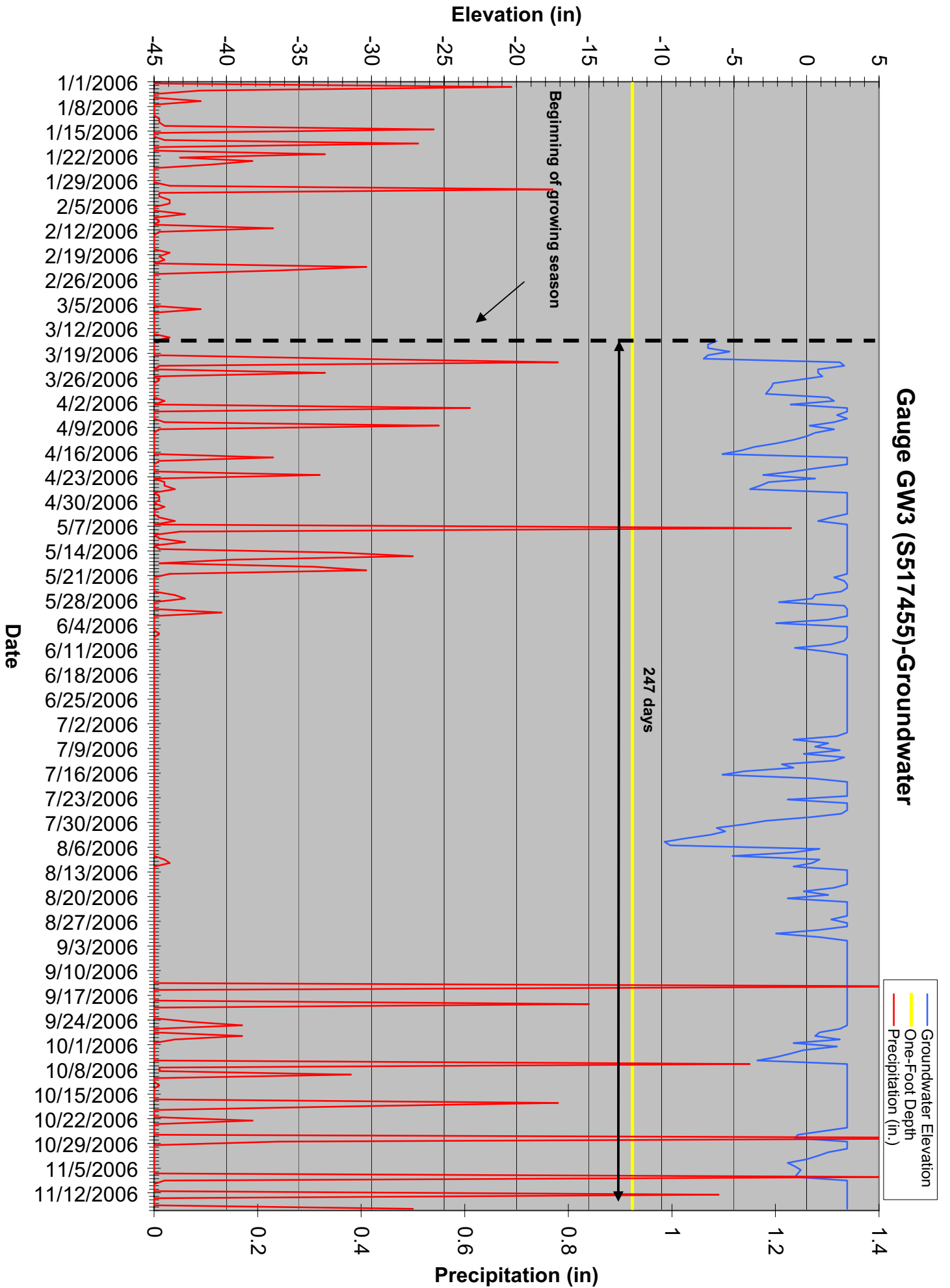
It is recommended that the Grimesland Sand Pit Phase 1 Mitigation Site be closed out and the appropriate close out documentation be prepared in 2007.

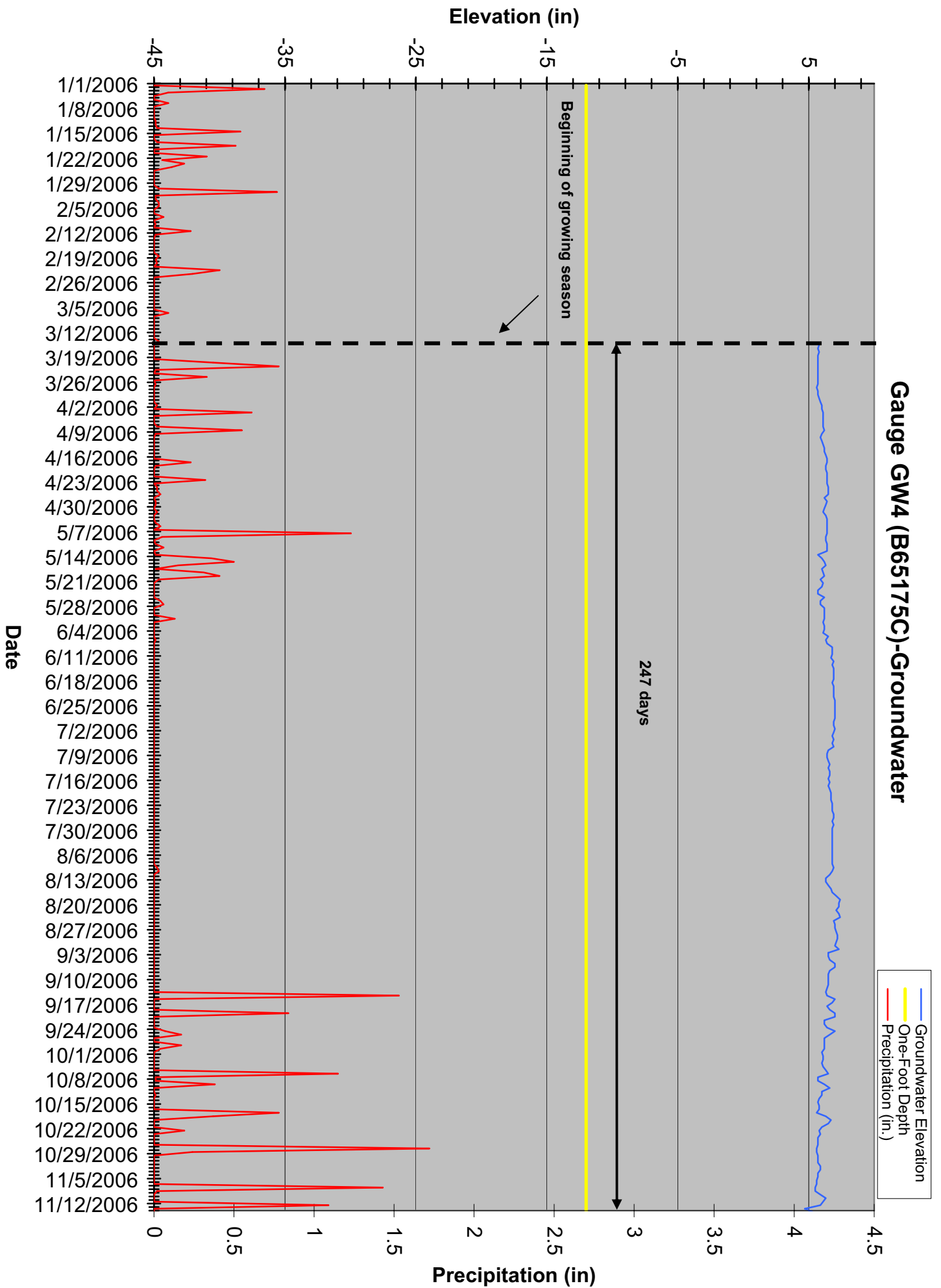
**APPENDIX A  
DEPTH TO GROUNDWATER  
&  
SURFACE WATER CHARTS**

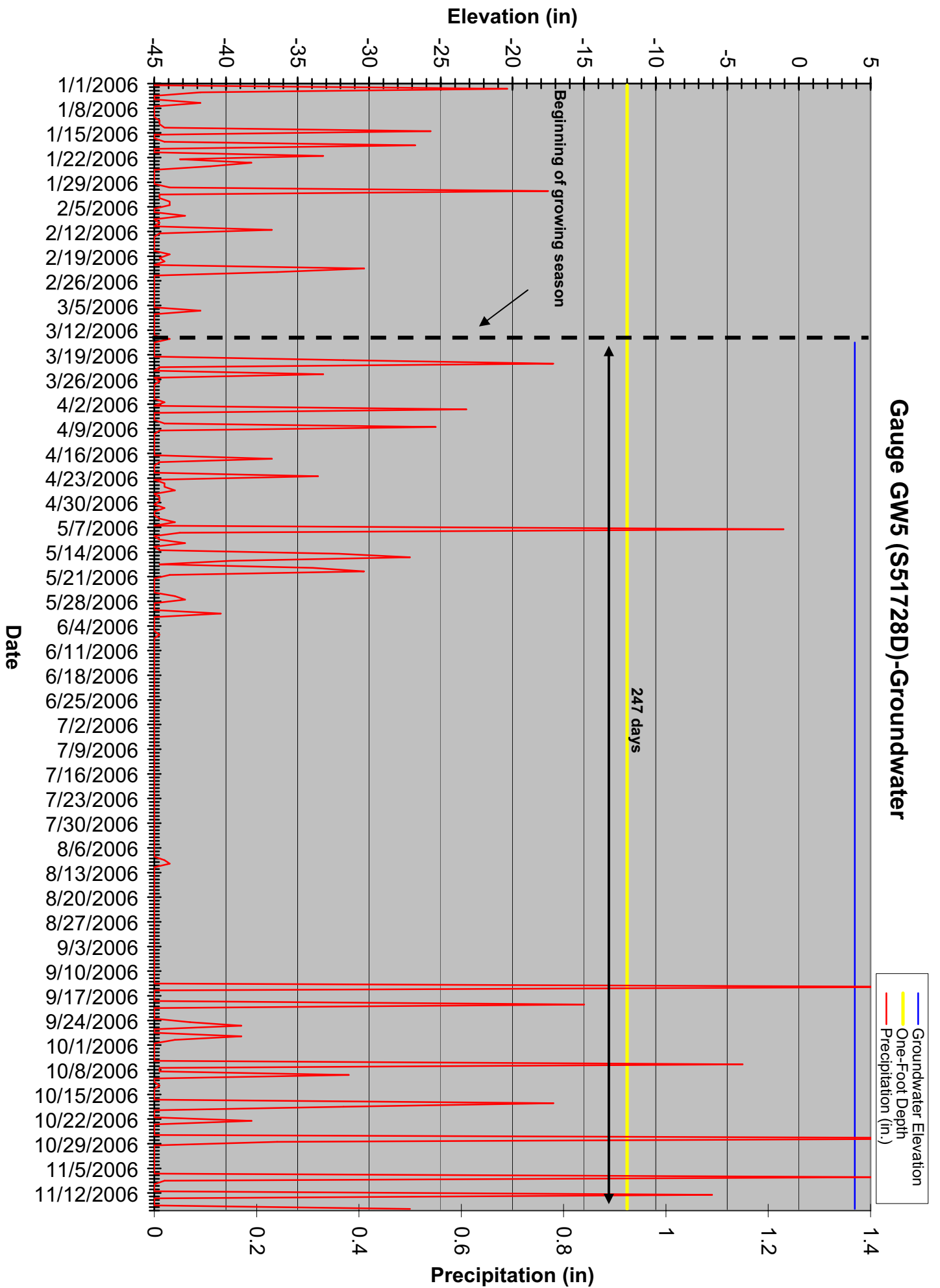






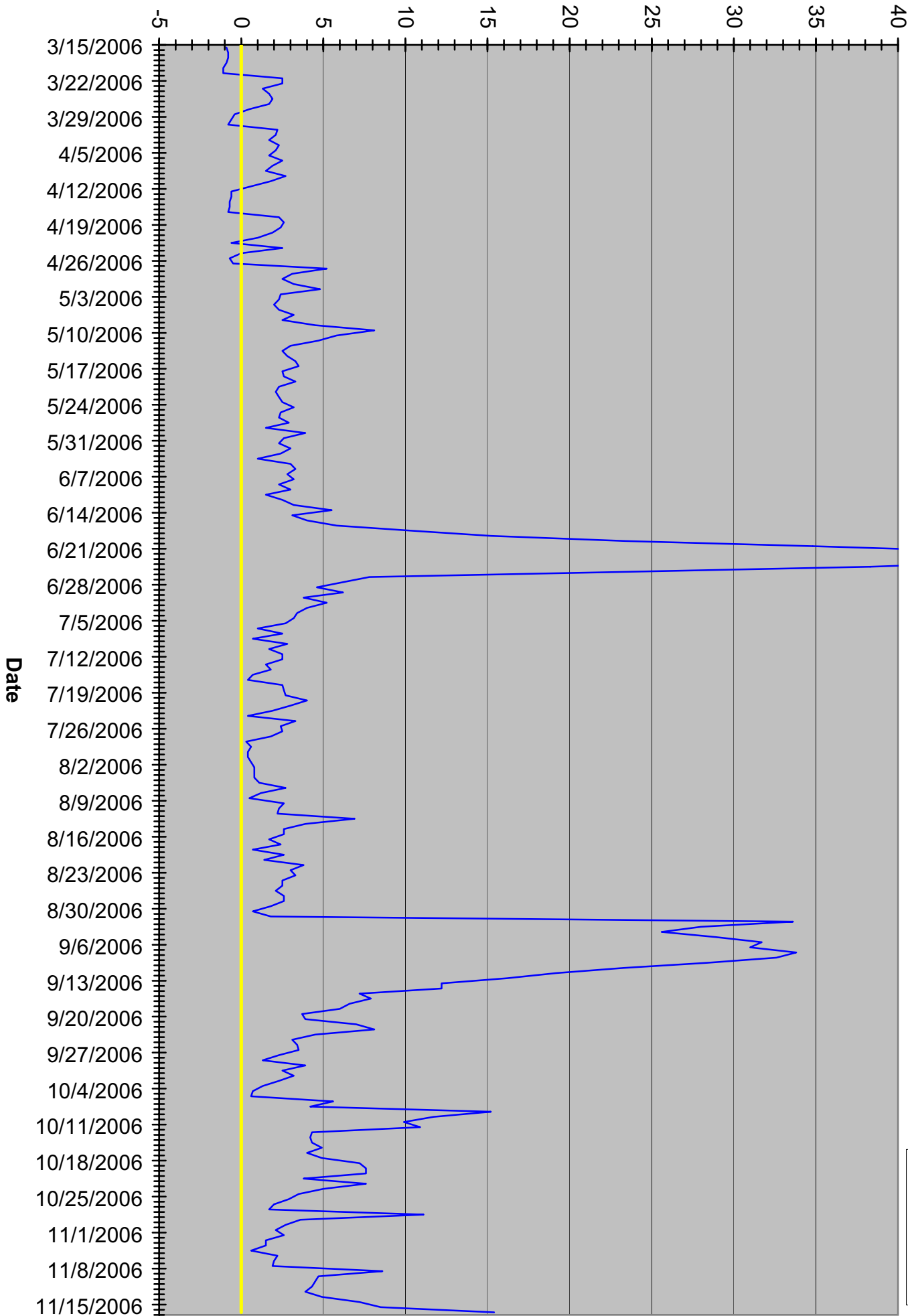






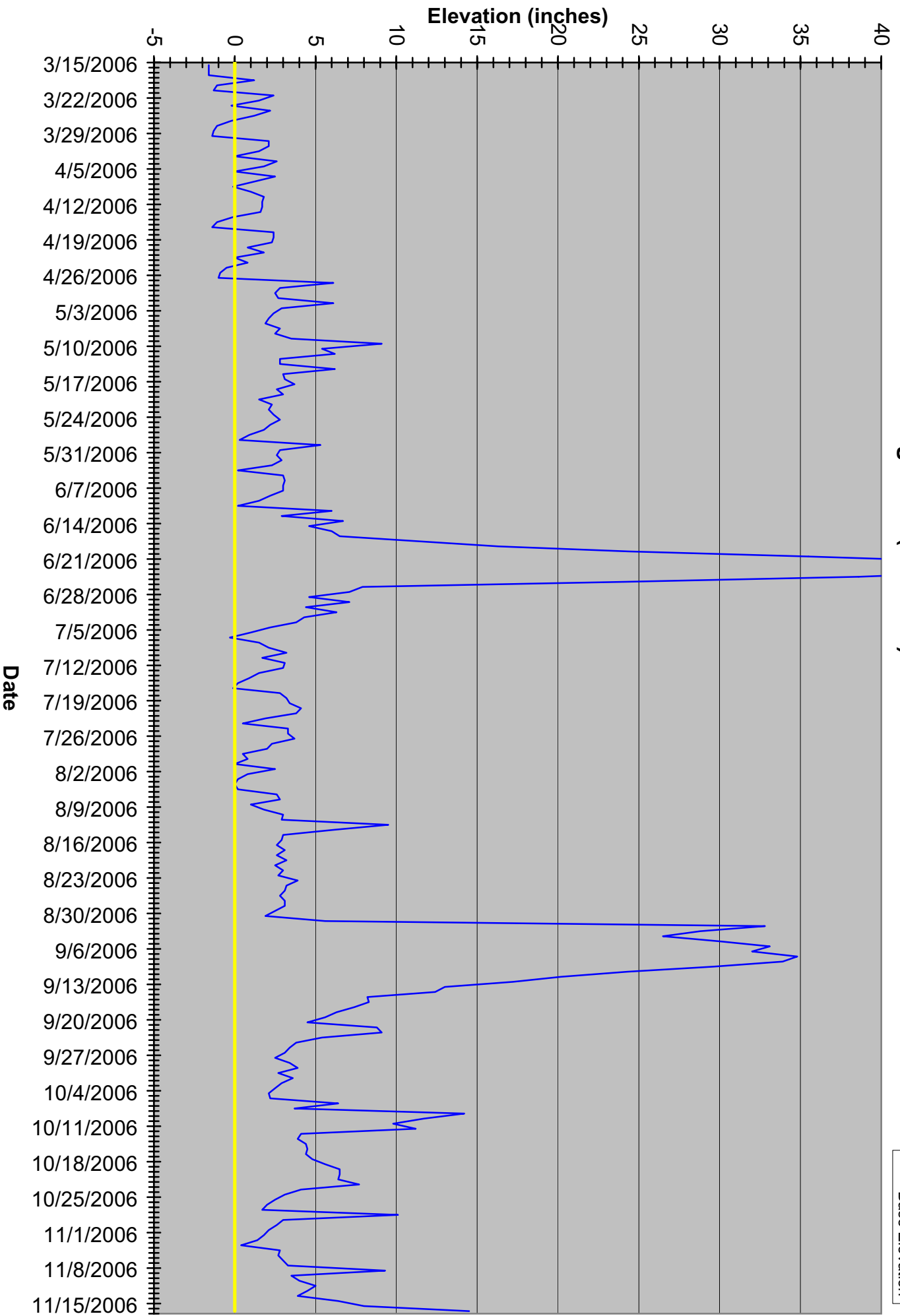
Elevation (inches)

Gauge SG1 (B6514BF)-Surface Water



Surface Water  
Base Elevation

Gauge SG2 (B652225)-Surface Water



**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**

Grimesland Pit Mitigation Site  
 Photo and Plot Locations  
 Phase 1

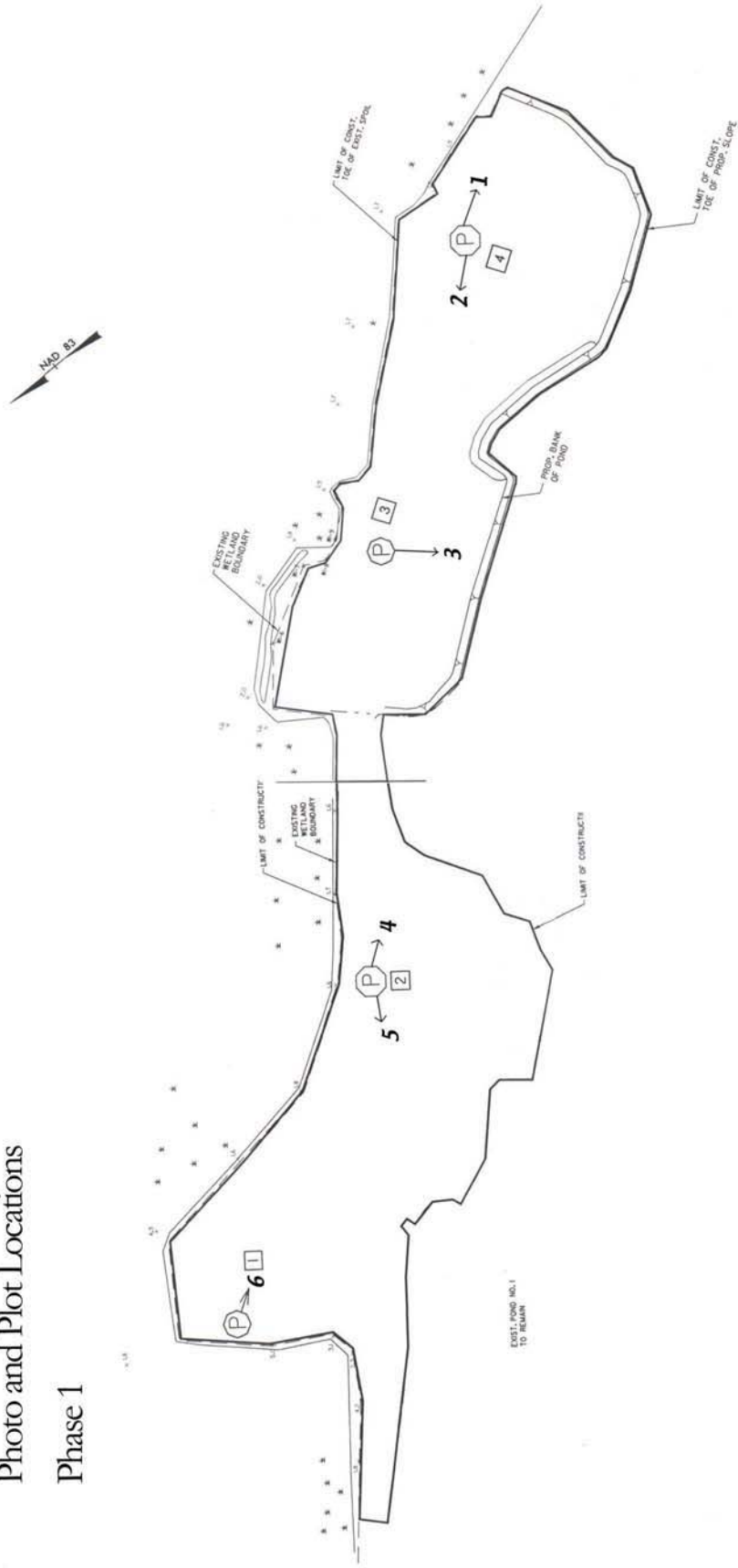


	PHOTO LOCATIONS
	MONITORING PLOTS