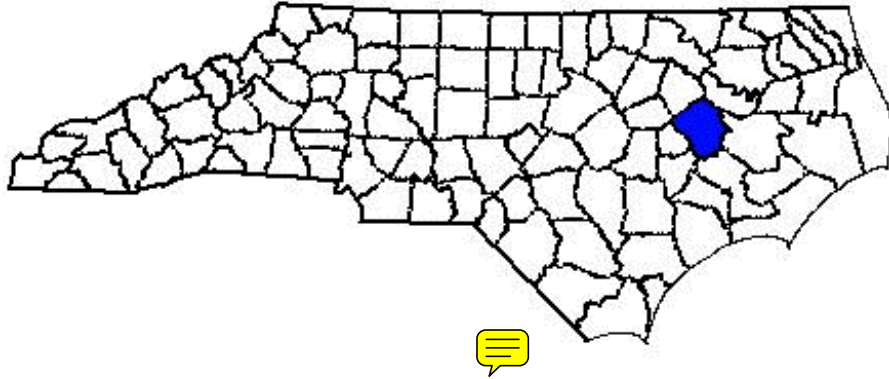


ANNUAL REPORT FOR 2002



Grimesland Sand Pit 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 bank for road projects taking place in the Lower Tar River portion of the Tar-Pamlico River Basin in North Carolina. The site is to be constructed in three phases, with Phase I construction activities having been completed in the January of 2000 and planting occurring in February of 2000. The site was replanted in March of 2002. The site is monitored using five groundwater monitoring gauges, two surface water gauges, one rain gauge, and four vegetation plots. The year 2002 reflects the first complete year that monitoring has taken place in the Phase I area following replanting.

During the 2002 monitoring season, all five groundwater monitoring gauges showed saturation for more than 12.5% of the growing season. The surface water gauges indicate that surface water is present on the site throughout the growing season. The 2002 vegetation monitoring of the site revealed an average tree density of 646 trees per acre. This average is well above the minimum success criteria of 320 trees per acre.

The NCDOT recommends that all monitoring activities be continued at the Grimesland Sand Pit site.

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. The site 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). Phase 1 grading and planting were completed in 2000; the site had to be replanted in March 2002. The site serves as a regional wetland mitigation bank for NCDOT roadway projects that would impact similar sites located in the Lower Tar Sub-Basin. The site includes the creation of 58 acres of forested riverine wetlands (cypress-gum swamp and coastal plain bottom land hardwoods, the creation of 2 acres of emergent wetlands on submerged benches, preservation of 348 acres of riverine wetland ecosystem, 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 2002 growing season at the Grimesland Sand Pit Site.

Activities in 2002 reflect the first year of monitoring following construction and the replanting of the Phase I site. Included in this report are analyses of both hydrologic and vegetative monitoring results as well as local climate conditions throughout the 2002 growing season.

1.3 Project History

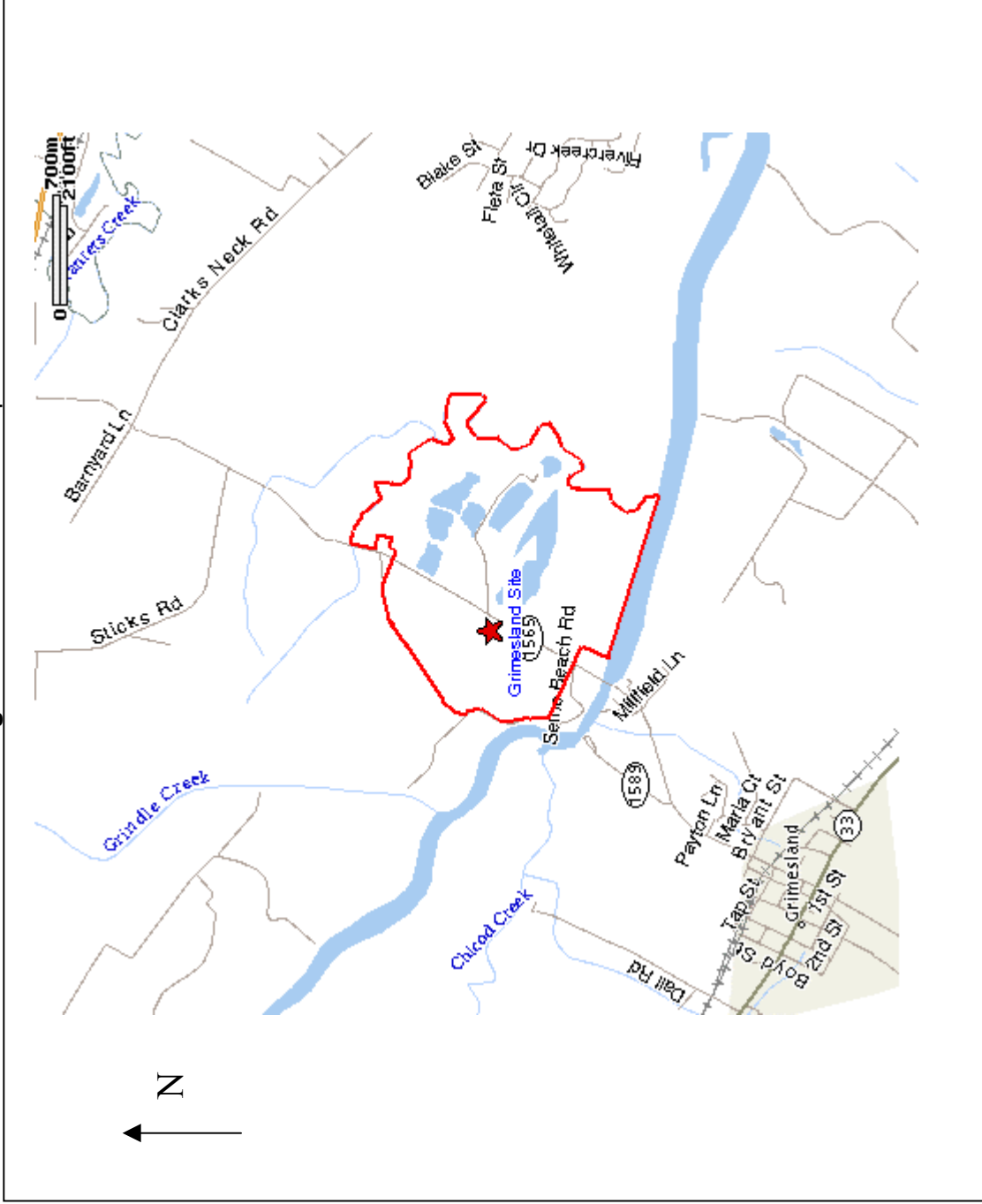
January 2000	Construction- Phase 1
February 2000	Site Planted
August 2001	Vegetation Monitoring (1 yr.)
March 2002	Site Replanted
March- November 2002	Hydrologic Monitoring (1 yr.)
June 2002	Vegetation Monitoring (1 yr. Restart)

Phase I consisted of filling one existing borrow pit and grading adjacent areas to meet existing wetland elevations and 7.8 acres of tree planting.

1.4 Debit Ledger

There have been no debits to this site to compensate for impacts to projects.

Figure 1. Site Location Map



2.0 HYDROLOGY

2.1 Success Criteria

In accordance with federal guidelines for wetland mitigation, the success criteria for hydrology states that the area must be inundated or saturated (within 12" of the surface) by surface or ground water 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 16.¹ 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 on site 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. The 2002 data represents the first full growing season during which the water table was monitored. A rain gauge installed onsite records daily rainfall totals; these rain events are incorporated into the monitoring results to examine how the site's groundwater level responds 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 2002; 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%. All five groundwater gauges met or exceeded the 12.5% time duration during the growing season. The two surface water gauges showed the consistent presence of surface water throughout the growing season.

¹ Soil Conservation Service, Soil Survey of Pitt County, North Carolina, p.71.

Figure 2. Grimesland Sand Pit Gauge Location Map

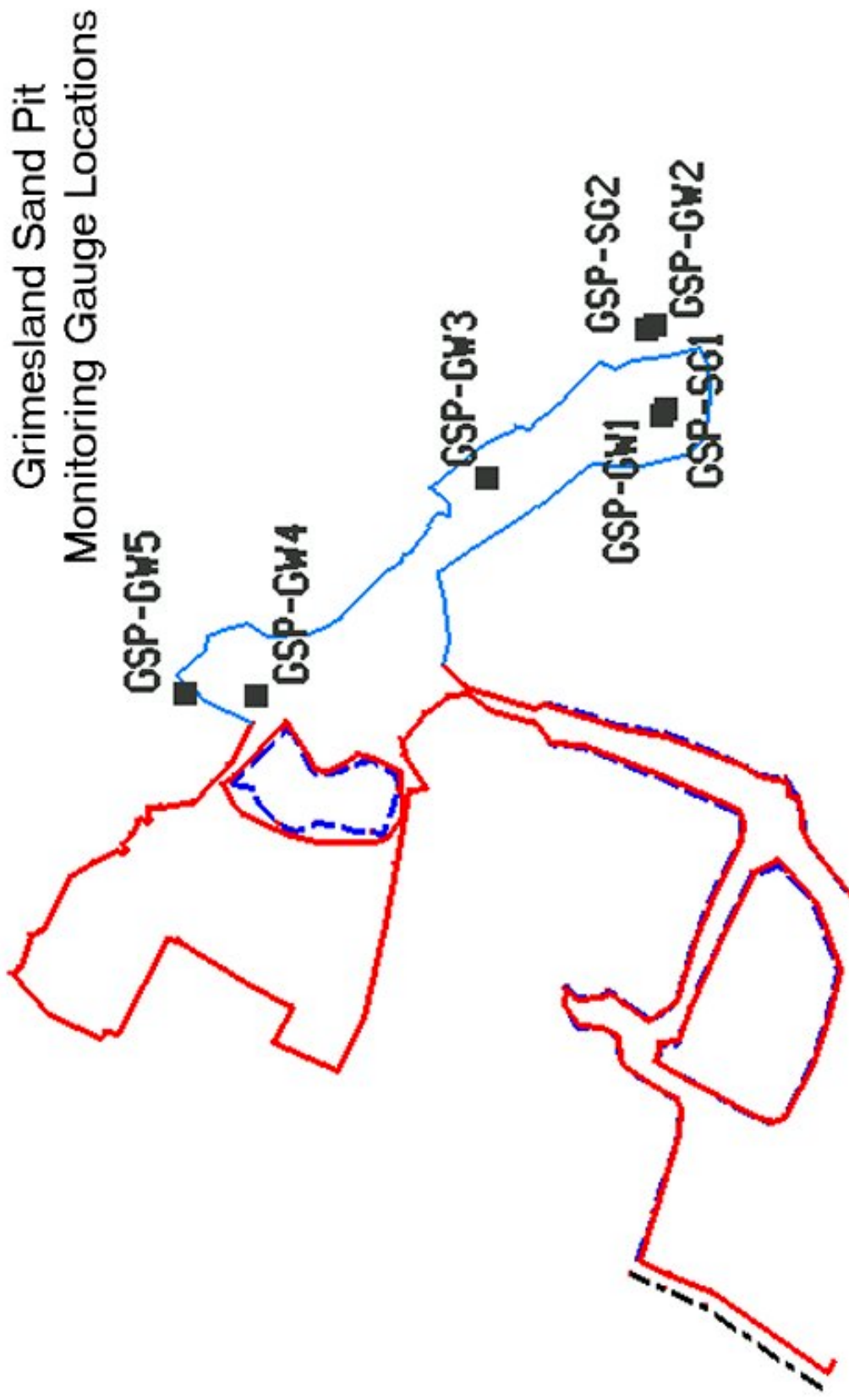


Table 1. 2002 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 8%	8 – 12%	> 12.5%	Actual %	Success Dates
GSP-GW1				✓	58.7	June 25- Nov. 16
GSP-GW2				✓	100.0	March 15- Nov. 16
GSP-GW3				✓	100.0	March 15- Nov. 16
GSP-GW4				✓	58.7	June 25- Nov. 16
GSP-GW5				✓	100.0	March 15- Nov. 16

Specific Gauge Problems:

GW1: Data was unable to be downloaded in June; thus there is no data available between May 14 and June 24.

GW 5: The gauge malfunctioned on March 30, and was not able to be downloaded until June 24.

SG1: This gauge stopped reading between June 16 and June 24, when it was repaired. The gauge also did not record between October 3 and October 8.

SG2: Gauge stopped recording between October 3 and October 7.

Appendix A contains plots of the groundwater depth at each monitoring gauge location during 2002. 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.

2.3.2 Climatic Data

Figure 4 is a graph of monthly rainfall for the period of November 2001 through August 2002 compared to historical precipitation data (collected between 1931 and 2001) for Washington, North Carolina. The NC State Climate Office provided the rainfall data. The comparison of 2002 rainfall versus historical values gives an indication of how 2002 compares to historical climate conditions.

Monthly rainfall for the site fluctuated around the average rainfall for 2002. November and December (2001), February, April, May, and July experienced below average rainfall. The month of June recorded average rainfall for the site. January and March experienced above average rainfall. Overall, the site experienced below average rainfall for 2002. All five gauges met the success criteria during months of normal or below normal rainfall.

2.4 Conclusions

Five groundwater and two surface water gauges were installed onsite in 2001. 2002 represents the first full year of hydrologic monitoring for the Grimesland site. All five groundwater monitoring gauges indicated jurisdictional success for the year, as each showed saturation within 12 inches of the surface for more than 12.5% of the growing season. The two gauges that did not show success for the entire growing season experienced malfunctions. The two surface gauges showed the consistent presence of surface water throughout the growing season. A comparison of 2002 rainfall versus historical precipitation shows that 2002 experienced below average rainfall conditions.

Figure 3. Grimesland Sand Pit 2002 Hydrologic Monitoring Results

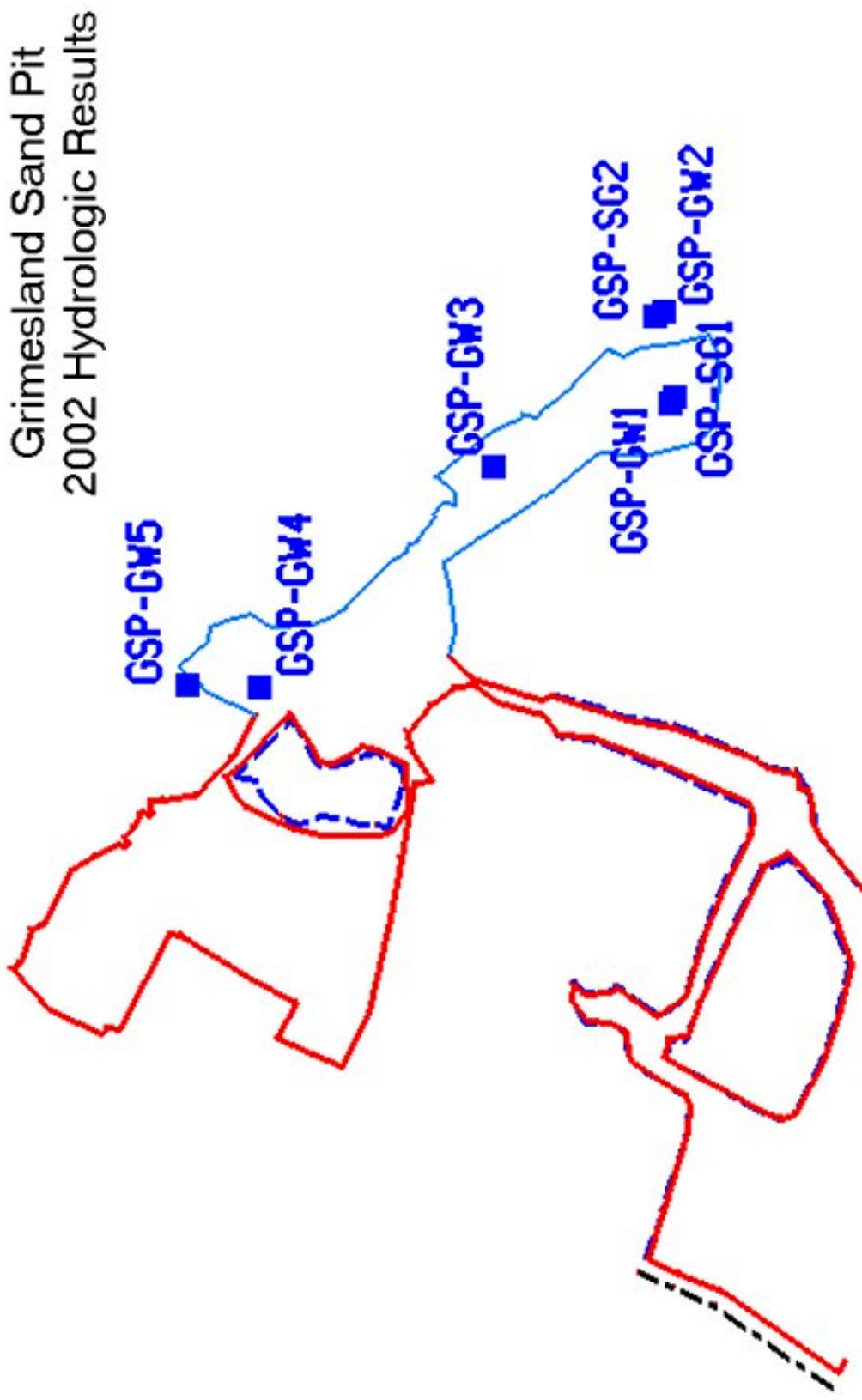
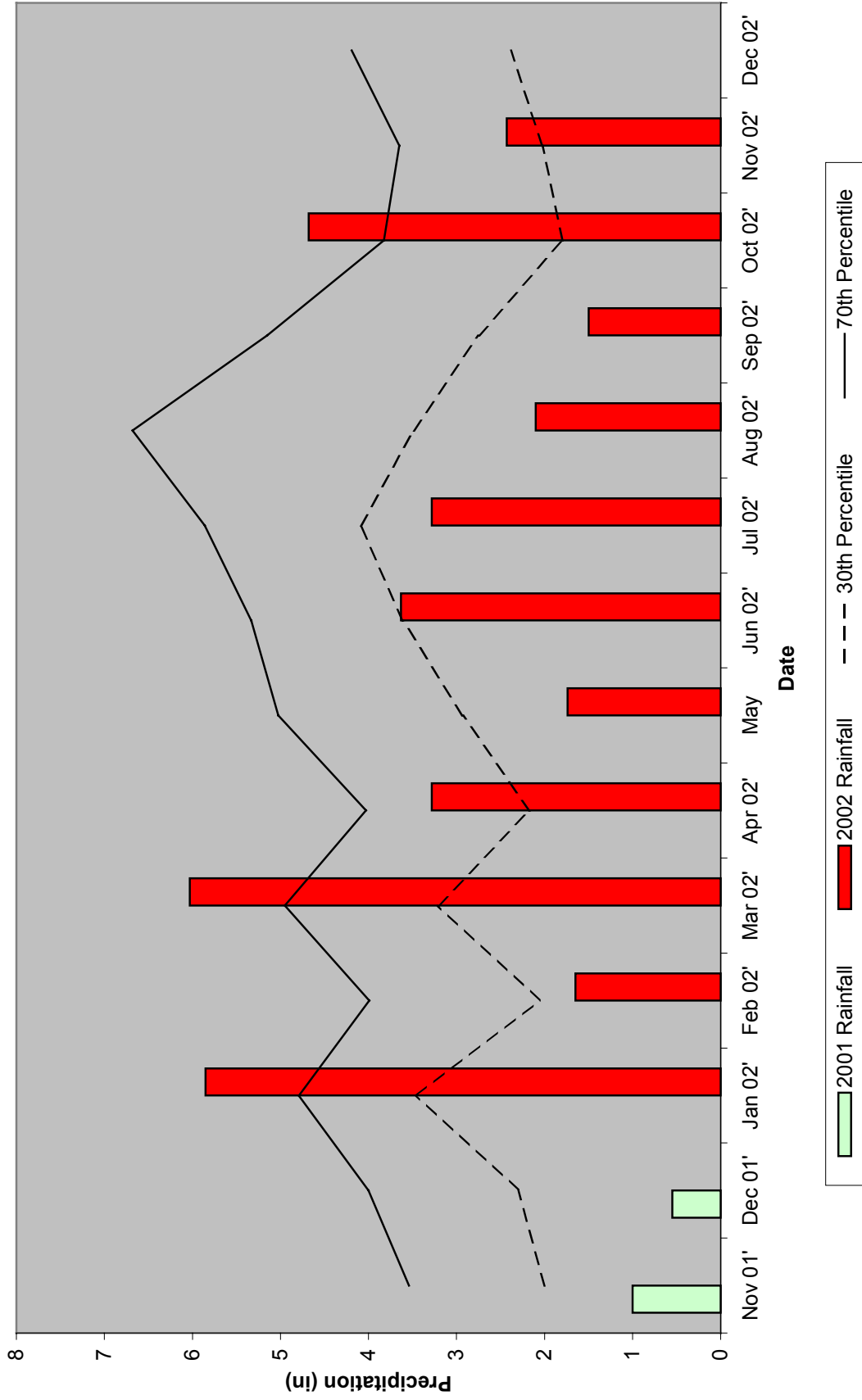


Figure 4. 30-70 Percentile Graph, Washington, NC

2002 30-70 Graph



3.0 VEGETATION

3.1 Success Criteria

Success Criteria states 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:

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Fraxinus pennsylvanica, Green Ash

Nyssa aquatica, Water Tupelo

Quercus phellos, Willow Oak

Quercus nigra, Water Oak

Taxodium distichum, Bald cypress

Carpinus caroliniana, American Hornbeam

3.3 Results of Vegetation Monitoring

Table 2. Vegetation Monitoring Statistics, by zone and plot

Plot #	Baldcypress	Green Ash	Swamp Blackgum	Water Tupelo	Water Oak	Willow Oak	Hornbeam	Total (1 year)	Total (at planting)	Density (Trees/Acre)
1	7	11	8	8		4	1	39	40	663
2	18	2	7	6	7	3	2	45	45	680
3	5	14	7	5		10	1	42	47	608
4		20	17				3	40	43	633
AVERAGE TREE (BLH) DENSITY										646

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

3.4 Conclusions

Of the 550 acres on this site, approximately 7.8 acres involved tree planting. There were 4 vegetation monitoring plots established throughout the planting areas. The site is extremely well vegetated in a variety of wetland grasses. The 2002 vegetation monitoring of the site revealed an average tree density of 646 trees per acre. This average is well above the minimum success criteria of 320 trees per acre.

NCDOT will continue vegetation monitoring at the Grimesland Pit Mitigation Site.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

The Grimesland Sand Pit Mitigation Site was monitored for the first year in 2002. Hydrologic monitoring indicated that the site exceeds jurisdictional standards; each gauge showed saturation within 12 inches of the surface for more than 12.5% of the growing season. The only two gauges that did not show saturation for the entire growing season experienced malfunctions that prevented them from collecting readings for the entire season. The two site surface water gauges indicated the consistent presence of surface water throughout the entire growing season. An analysis of rainfall in nearby Washington, NC shows that the region experienced below average rainfall for the year. Thus the site met jurisdictional success criteria in below average climate conditions.

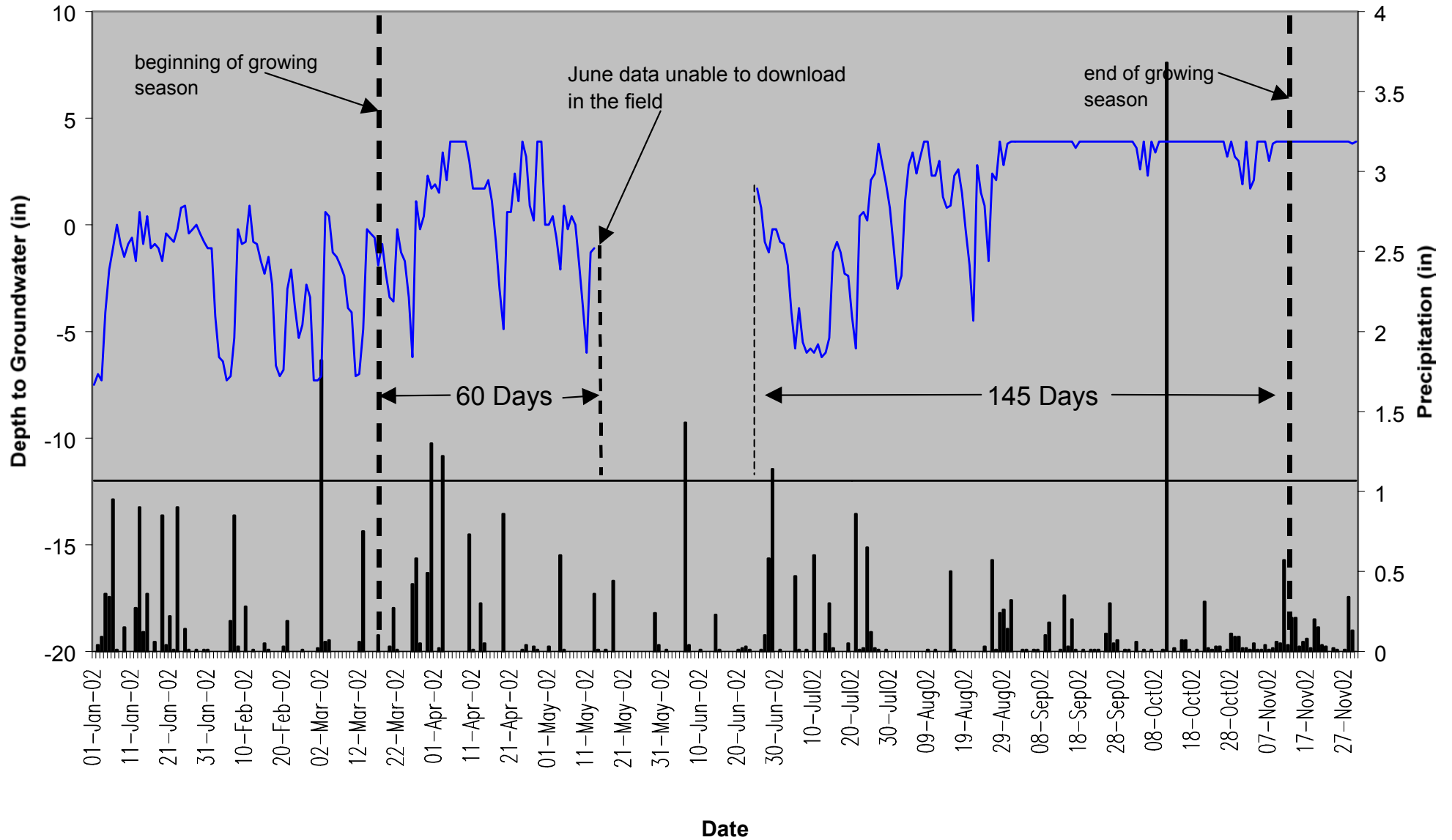
Approximately 7.8 acres of the site were planted; four vegetation plots within this area are used for vegetation monitoring. The established success criteria stated that the minimum survival rate in the first three years following planting was 320 trees per acre. Monitoring results showed an average survival rate of 646 trees per acre in the first year, with a minimum individual plot density of 608 trees per acre. Thus the vegetation exceeds minimum required success criteria.

Based on the results from the first year of monitoring, NCDOT recommends that both hydrologic and vegetation monitoring continue in 2003.

APPENDIX A

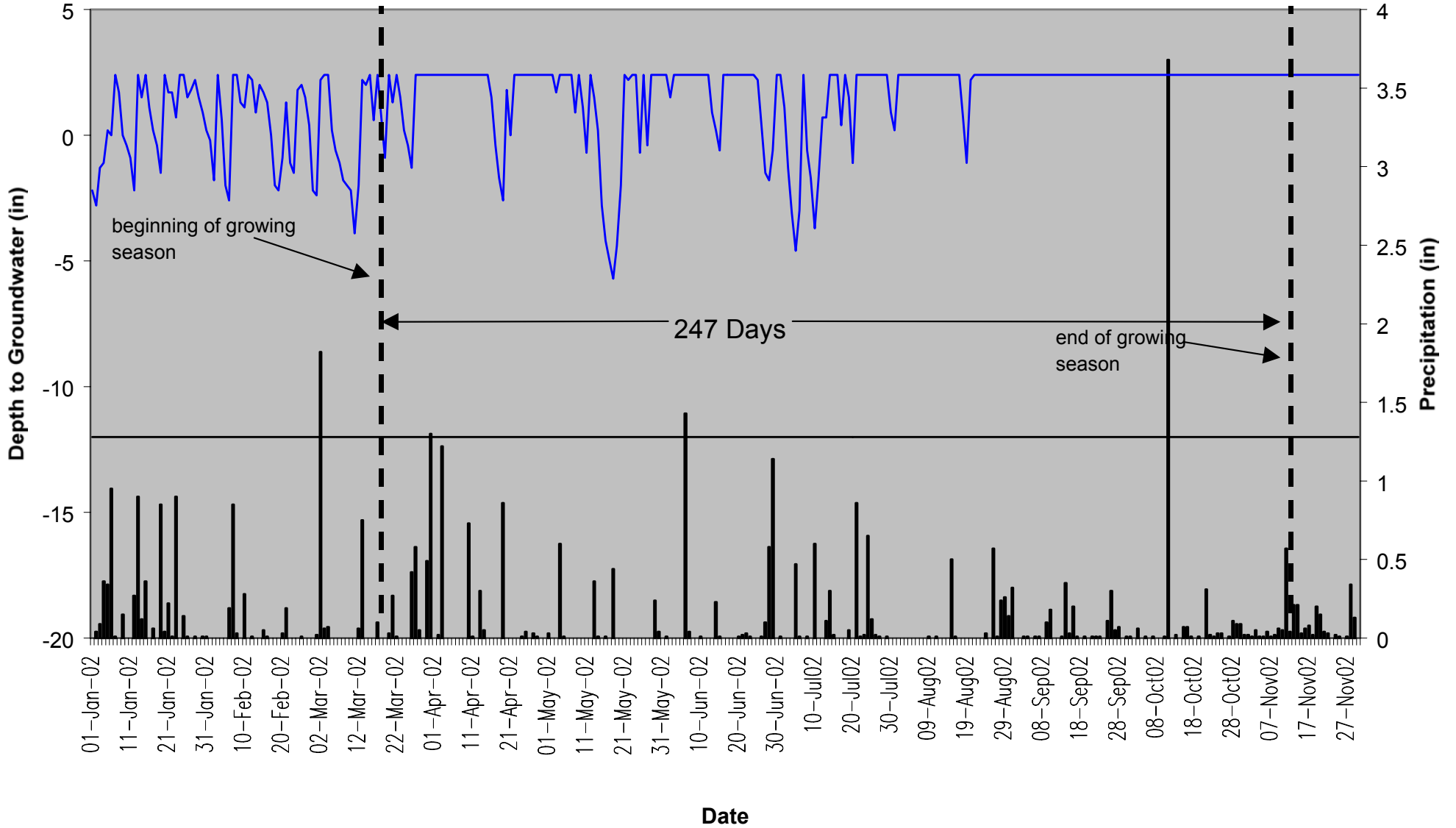
DEPTH TO GROUNDWATER CHARTS

Grimesland - Groundwater Gauge 1



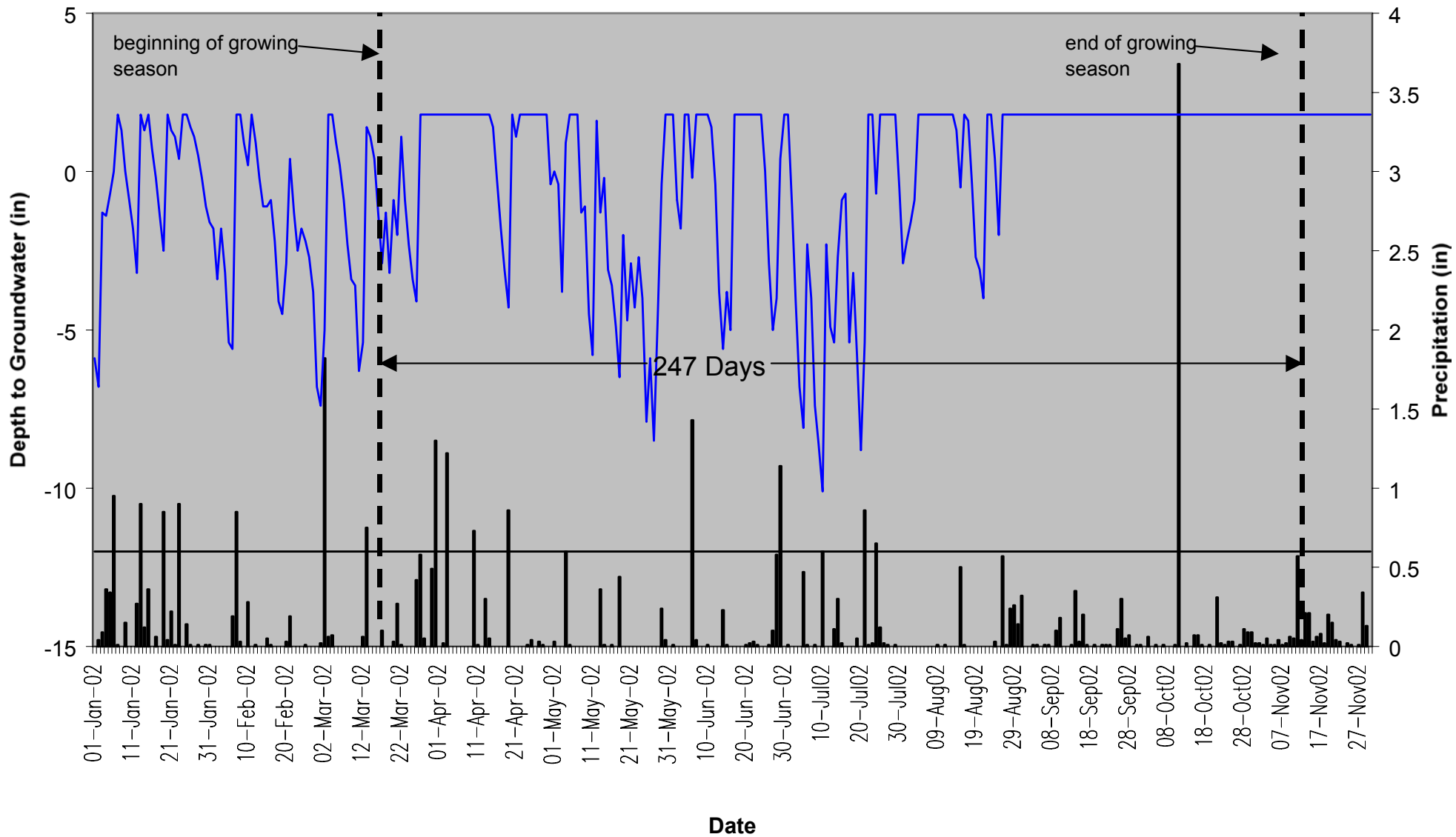
N38B817B
 — S316700 GSP-GW1
 — Required Depth

Grimesland - Groundwater Gauge 2



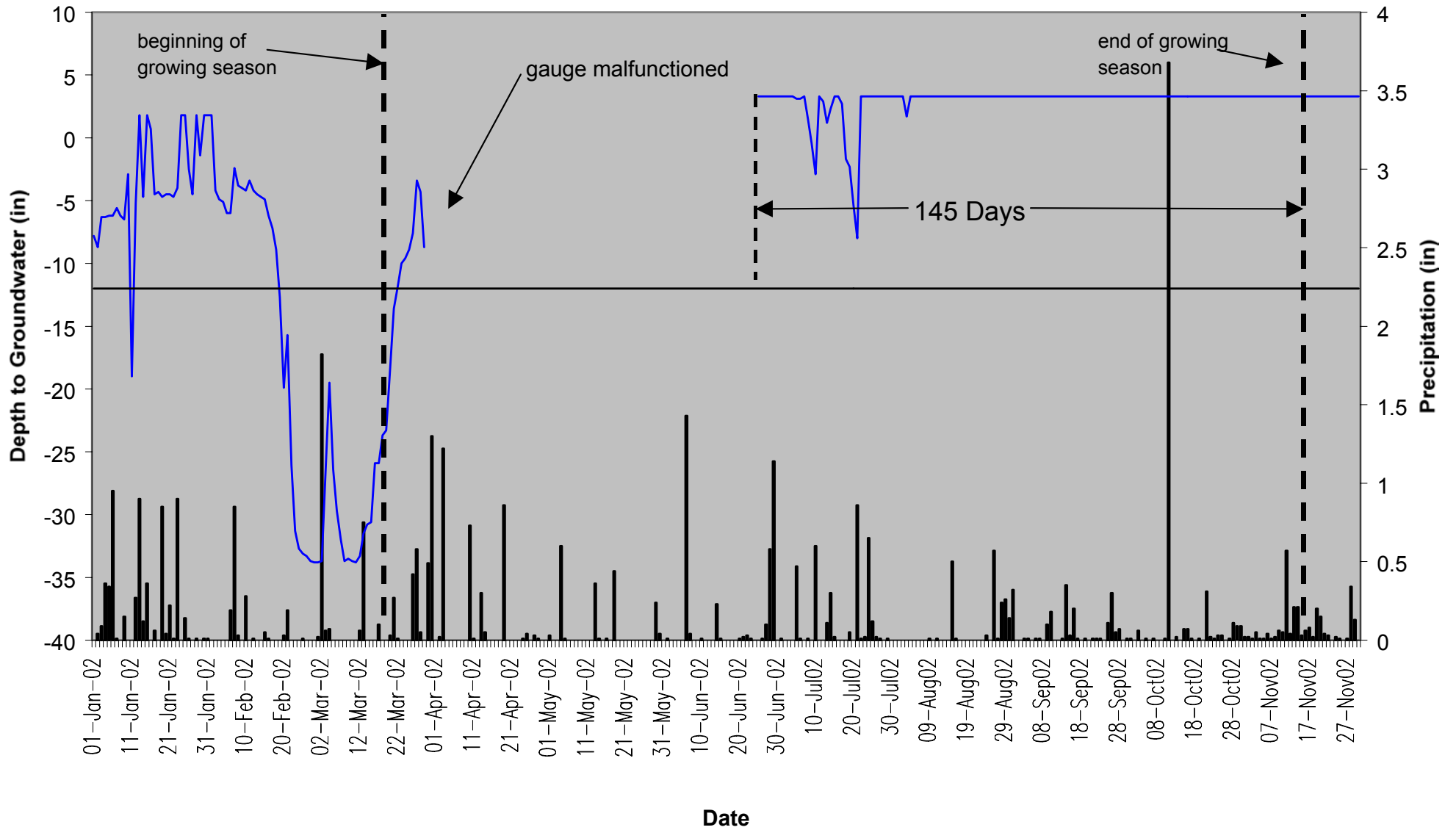
Legend: N38B817B (yellow box), S2B07F9 GSP-GW2 (blue line), Required Depth (black line)

Grimesland - Groundwater Gauge 3



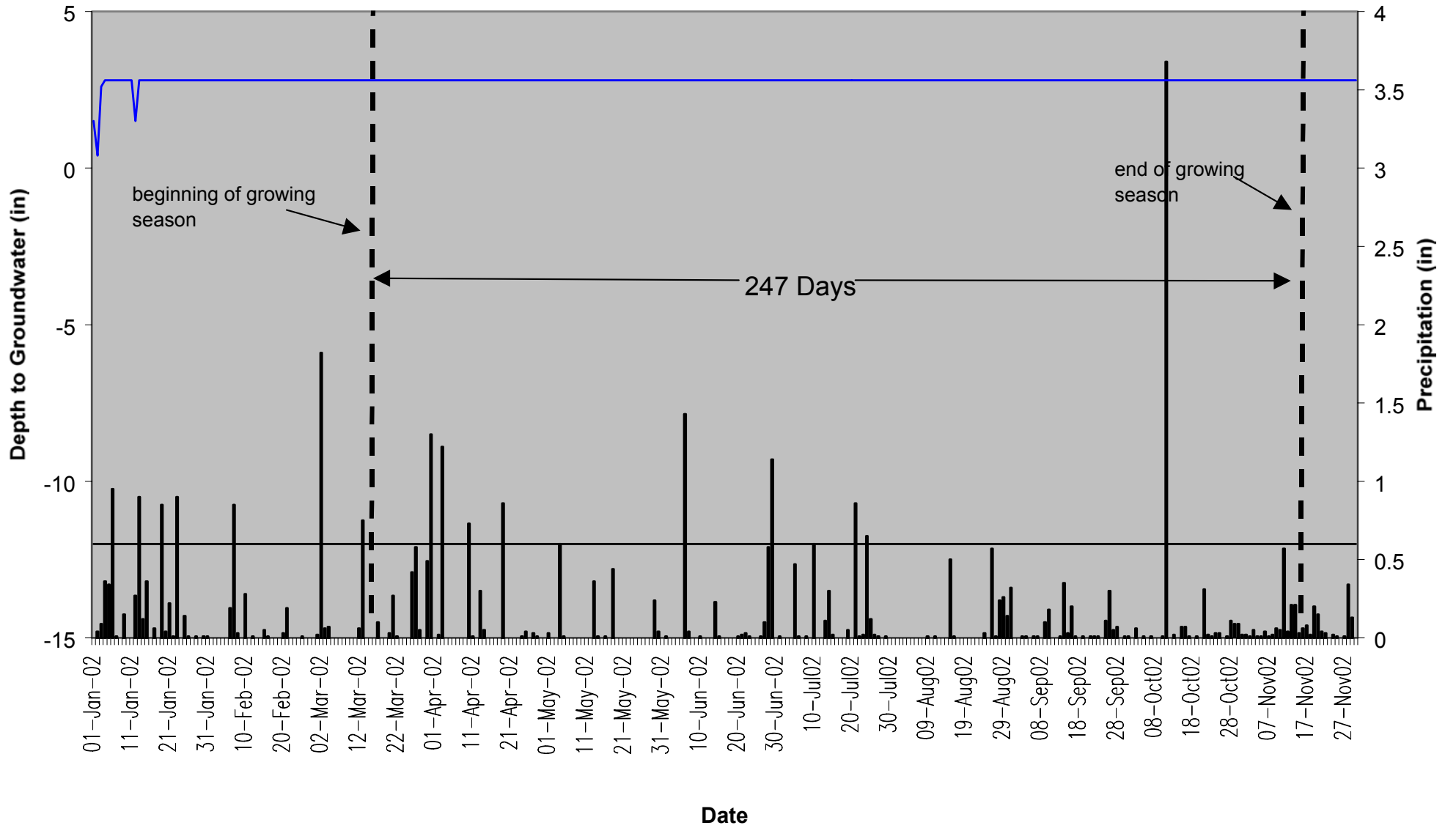
N38B817B
 S31FA48 GSP-GW3
 Required Depth

Grimesland - Groundwater Gauge 4



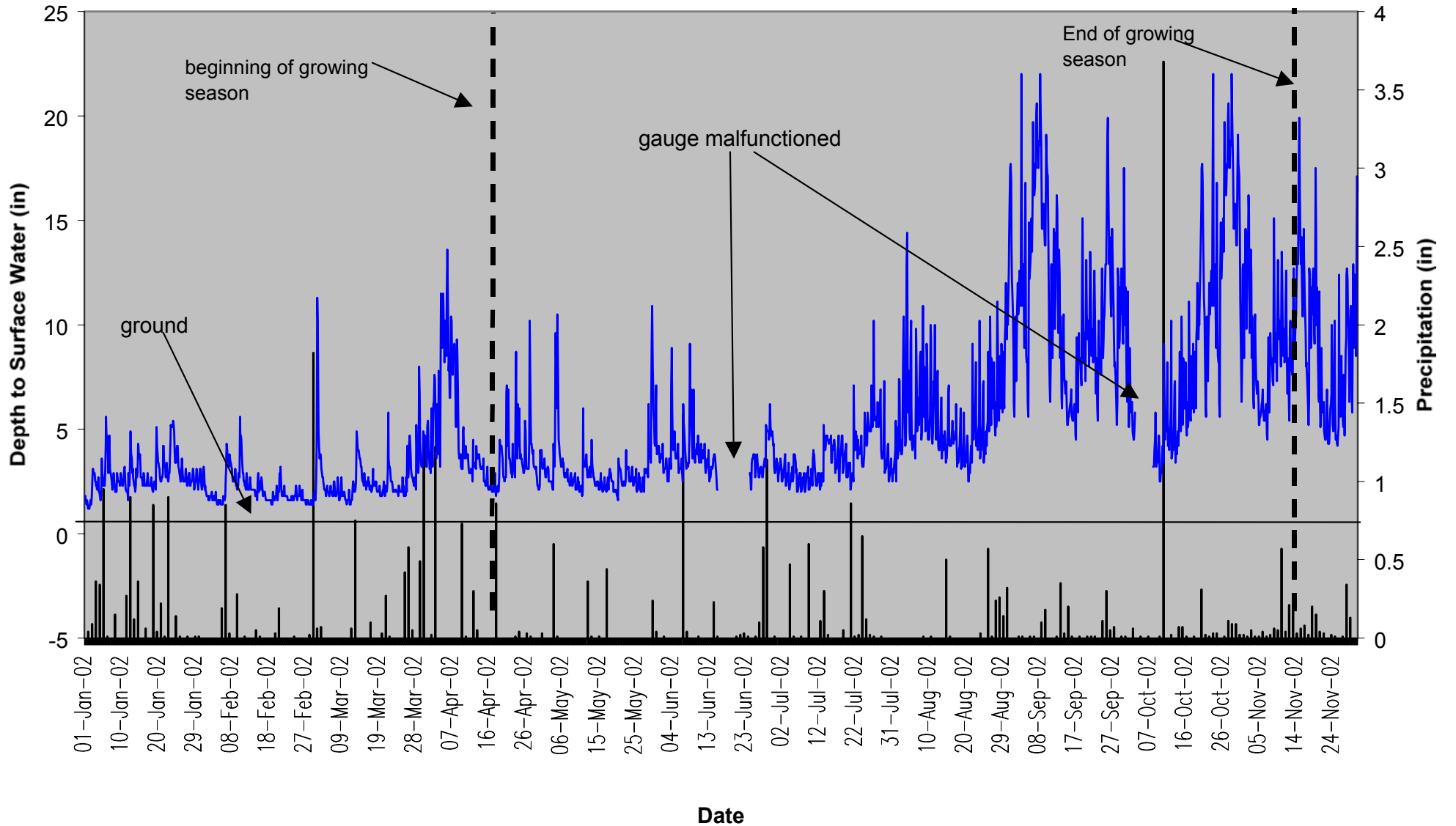
N38B817B S51705B GSP-GW4 Required Depth

Grimesland - Groundwater Gauge 5



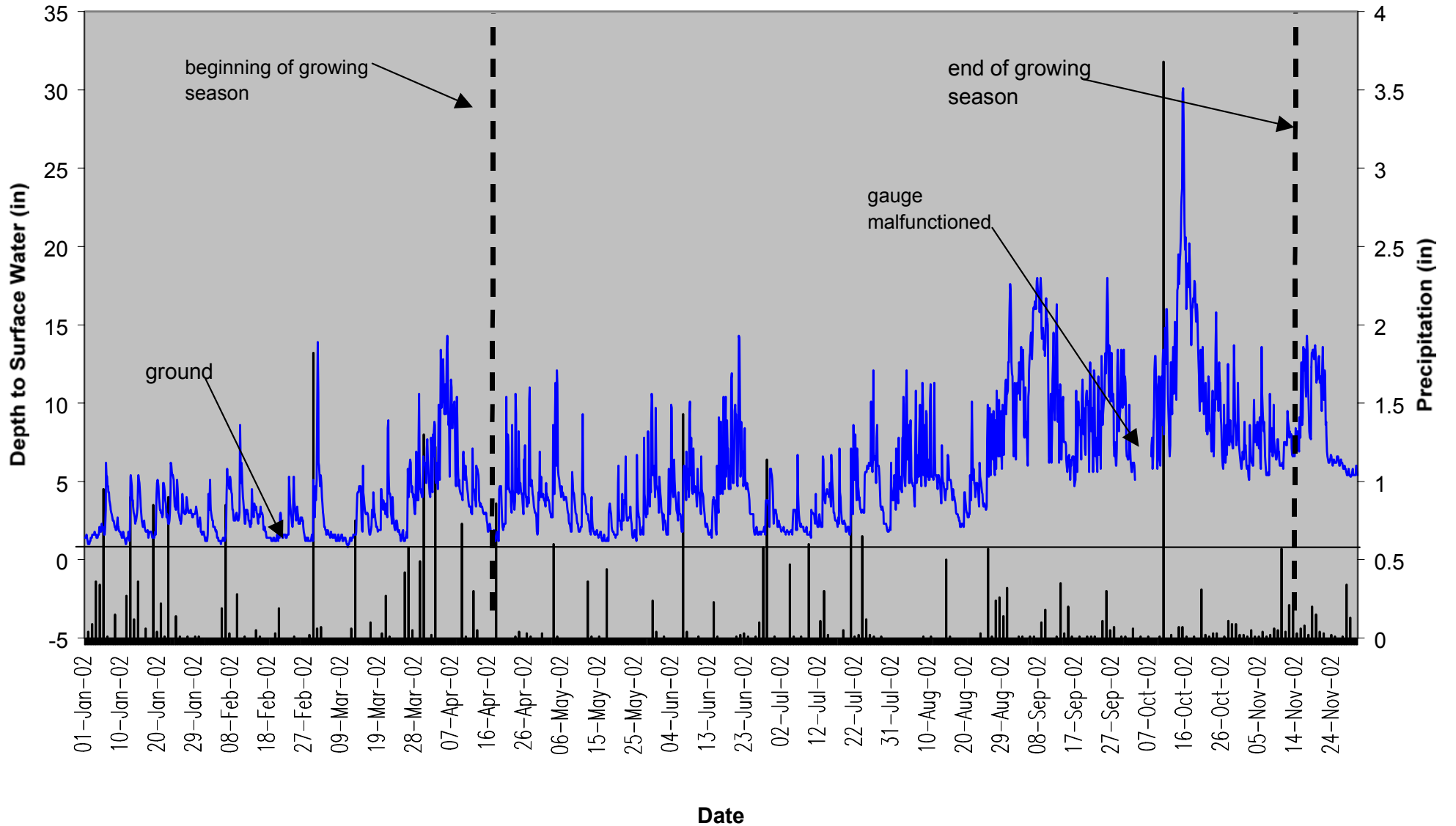
N38B817B S2B23EA GSP-GW5 Required Depth

Grimesland - Surface Gauge 1



■ N38B817B — S31FAAA (adjusted)

Grimesland - Surface Gauge 2



■ N38B817B — S2B23D5 (adjusted)

APPENDIX B

SITE PHOTOS AND PHOTO AND PLOT LOCATIONS MAP

GRIMESLAND SAND PIT



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

GRIMESLAND SAND PIT

GRIMESLAND SAND PIT

Grimesland Pit Mitigation Site
Photo and Plot Locations

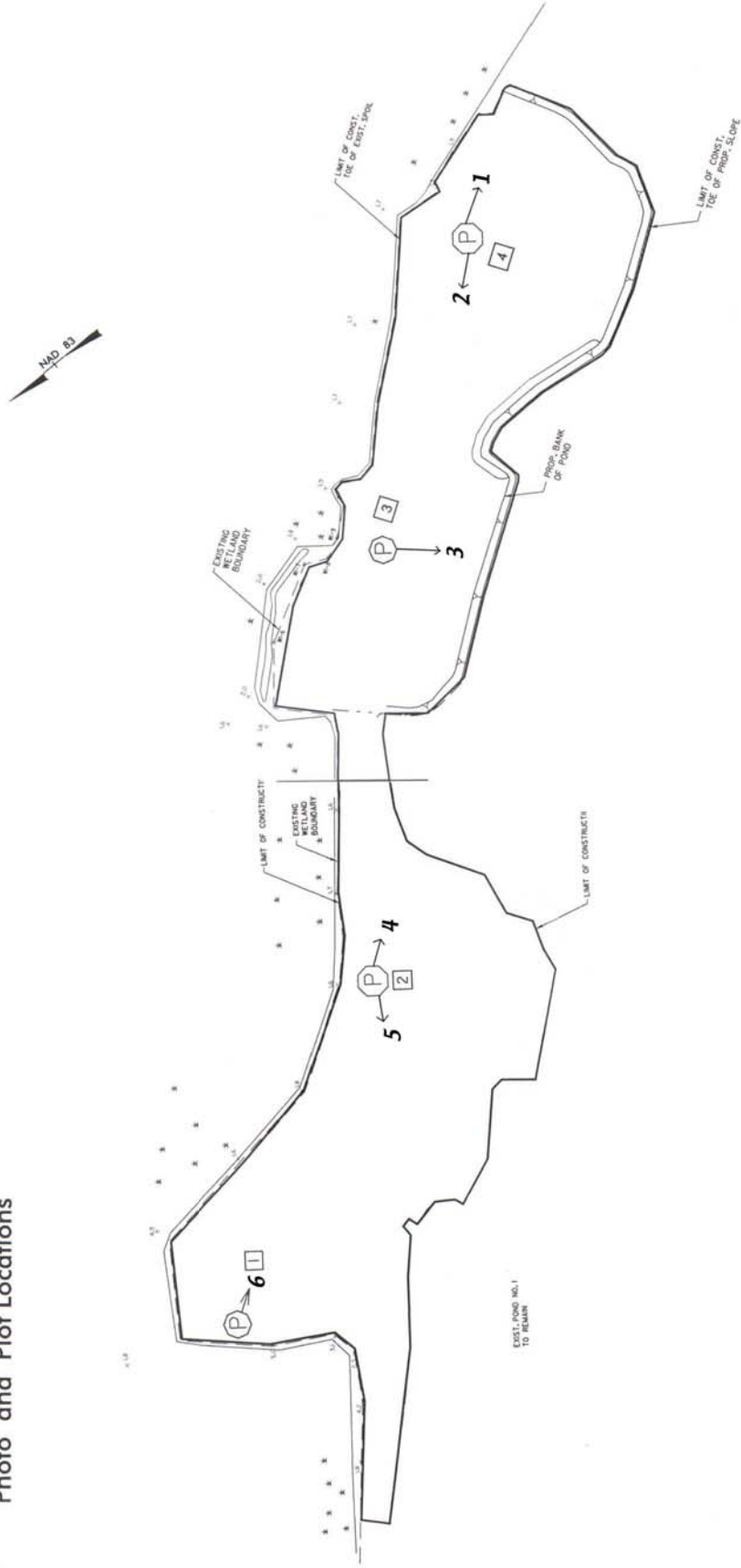


	PHOTO LOCATIONS
	MONITORING PLOTS

GRIMESLAND SAND PIT