

ANNUAL REPORT FOR 2004



Grimesland Sand Pit Phase II 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 II of the Grimesland Sand Pit Mitigation Site. This site was 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 II construction was completed in 2003 and planting occurred in February of 2003.

The site is monitored for hydrology using twenty groundwater-monitoring gauges and one rain gauge. The site is monitored for vegetation using seven vegetation plots, which are representative of the 48.8 acres planted in trees on the Grimesland Sand Pit Site Phase II.

The 2004-year represents the second 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 demonstrates that the Phase II site met jurisdictional success with all twenty groundwater gauges exceeding the 12.5% minimum success criterion, with fifteen gauges meeting 100% during the growing season. Vegetation monitoring yielded 412 trees per acre, which is above the minimum success criteria 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. 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). 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.

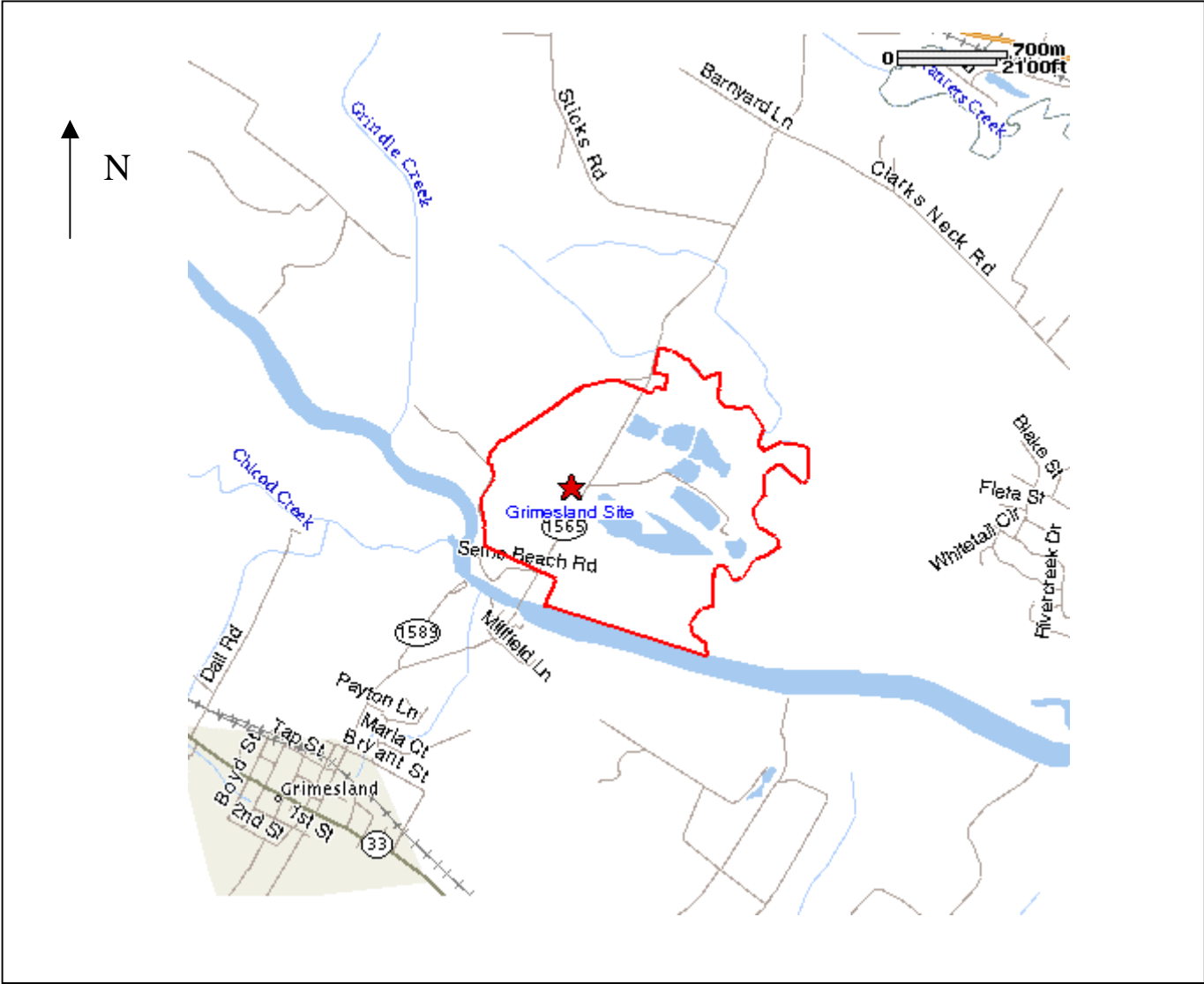
1.2 PURPOSE

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

2003	Construction-Phase II
February 2003	Phase II Planted
March- November 2003	Hydrologic Monitoring (1 yr.)
June 2003	Vegetation Monitoring (1 yr.)
March- November 2004	Hydrologic Monitoring (1 yr.)
June 2004	Vegetation Monitoring (2 yr.)

Figure 1. Grimesland Phase II 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 16.¹ 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

Twenty groundwater gauges were installed in the Phase II area in April 2003 (Figure 2). The automatic monitoring gauges record daily readings of the groundwater depth. The 2004 data represents the second full growing season during which the water table was monitored in the Phase II area. 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.

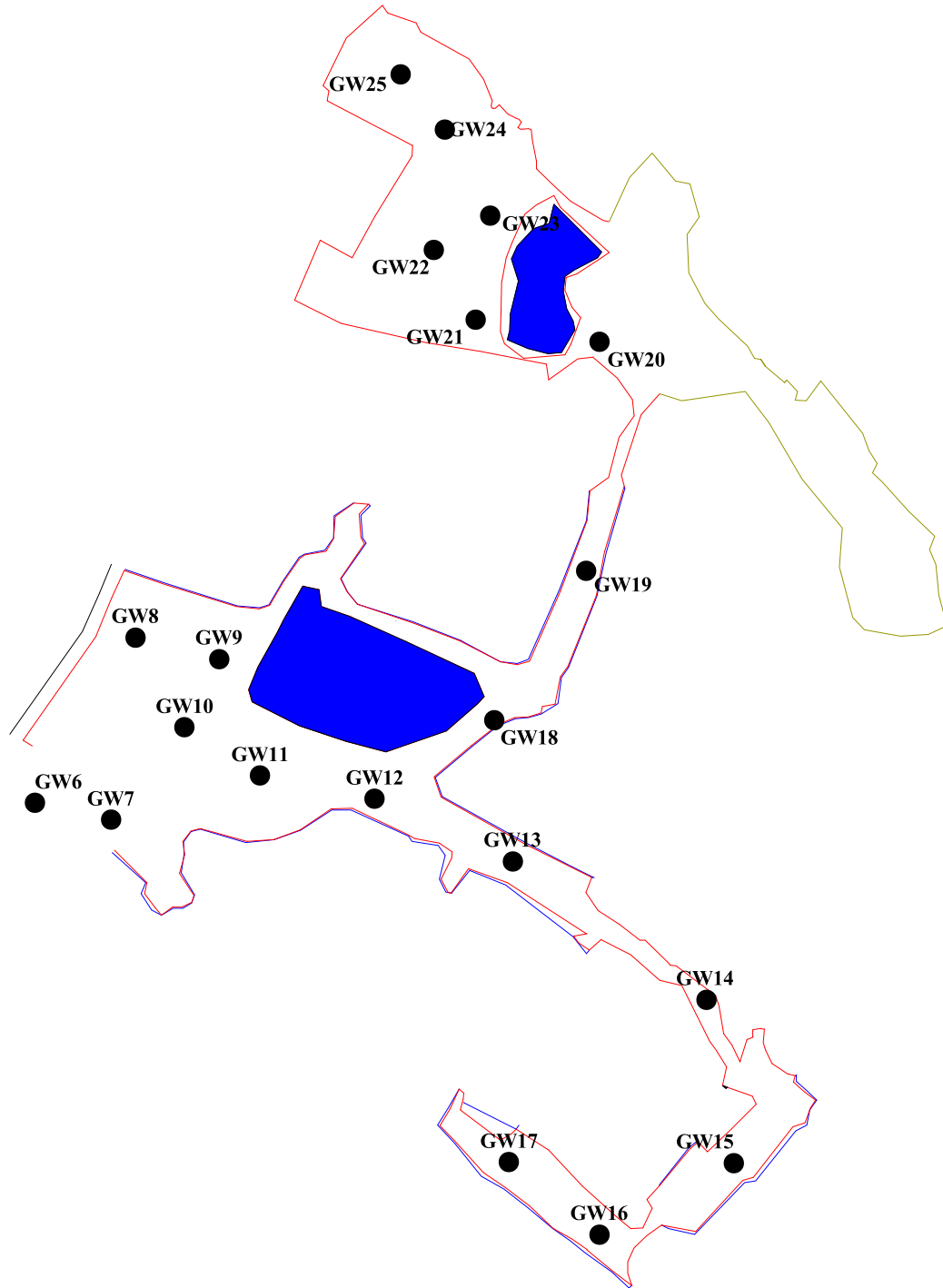
2.3 RESULTS OF HYDROLOGIC MONITORING

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 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%.

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



Phase II

Figure 2. Gauge Location Map

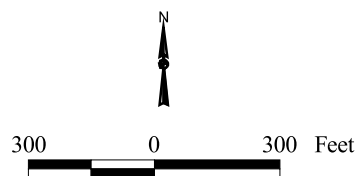
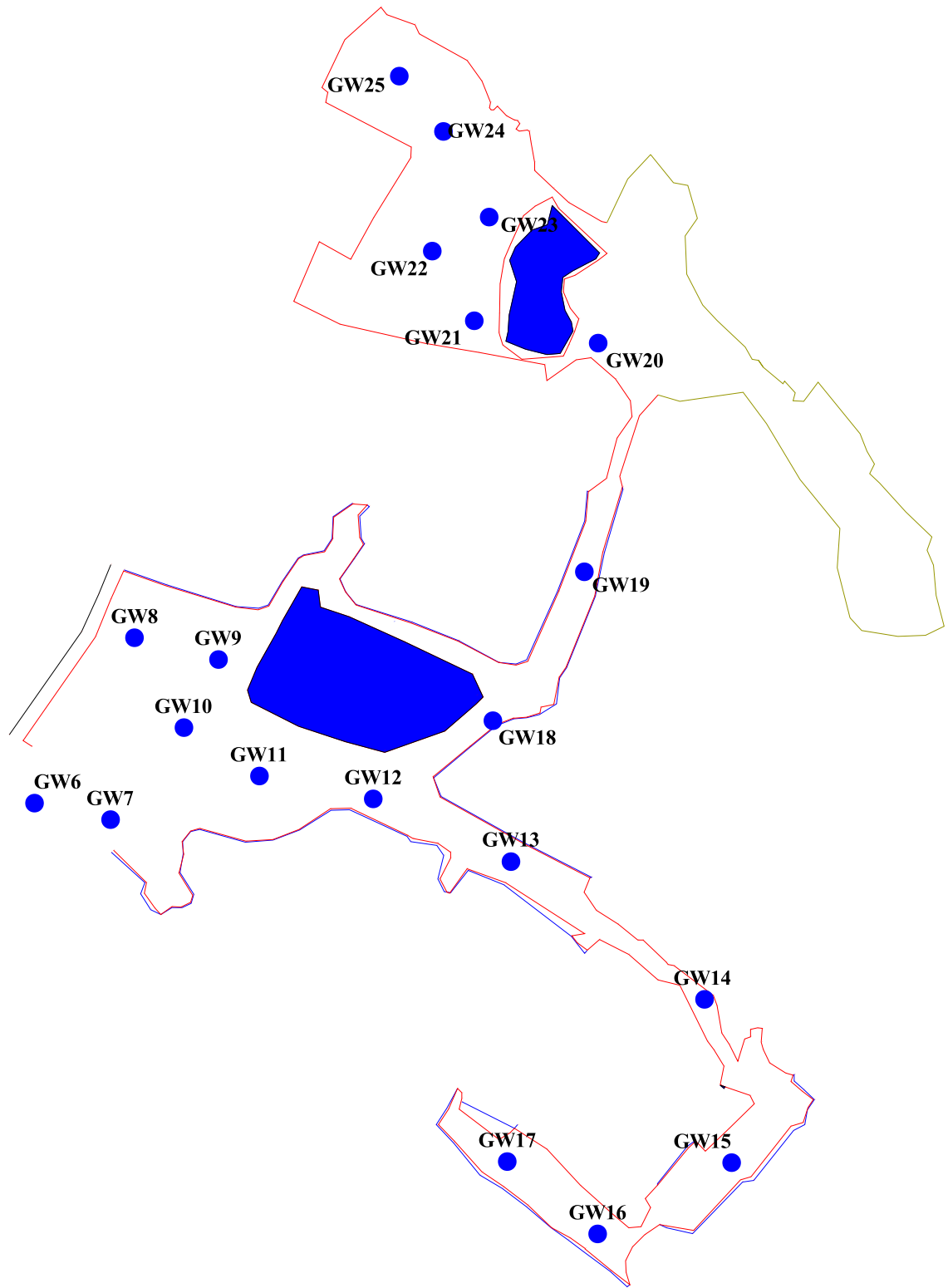


Table 1. 2004 Phase II Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 8%	8 – 12%	> 12.5%	Actual %	Success Dates
GSP-GW6+				×	32.4	March 15-June 2 June 5-July 15 Aug 13-Sept 24
GSP-GW7+				×	100	April 30-Nov 16
GSP-GW8+				×	100	April 30-Nov 16
GSP-GW9+				×	100	April 30-Nov 16
GSP-GW10+				×	100	April 30-Nov 16
GSP-GW11+				×	35.6	Aug 13-Nov 8
GSP-GW12+				×	100	April 30-Nov 16
GSP-GW13+				×	100	April 30-Nov 16
GSP-GW14+				×	100	April 30-Nov 16
GSP-GW15+				×	100	April 30-Nov 16
GSP-GW16+				×	100	April 30-Nov 16
GSP-GW17+				×	98	April 30-Nov 11
GSP-GW18+				×	100	April 30-Nov 16
GSP-GW19+				×	100	April 30-Nov 16
GSP-GW20+				×	100	April 30-Nov 16
GSP-GW21+				×	100	April 30-Nov 16
GSP-GW22+				×	33.6	April 30-May 20 Aug 26-Nov 16
GSP-GW23+				×	100	April 30-Nov 16
GSP-GW24+				×	54.7	April 30-July 27 Aug 26-Nov 16
GSP-GW25+				×	100	April 30-Nov 16

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

Appendix A contains plots of the groundwater depth at each monitoring gauge location during 2004. In addition to documenting the water table level relative to the ground surface, 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 also included on each graph. Plots of the data recorded at each of the two surface water gauges are included in Appendix A.



Phase II

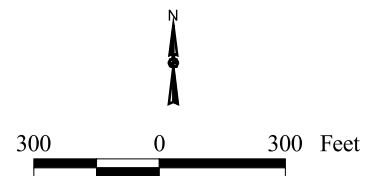
Figure 3. 2004 Hydrologic Monitoring Results



Hydrology Results

- < 5%
- 5 - 8%
- 8 - 12%
- > 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.

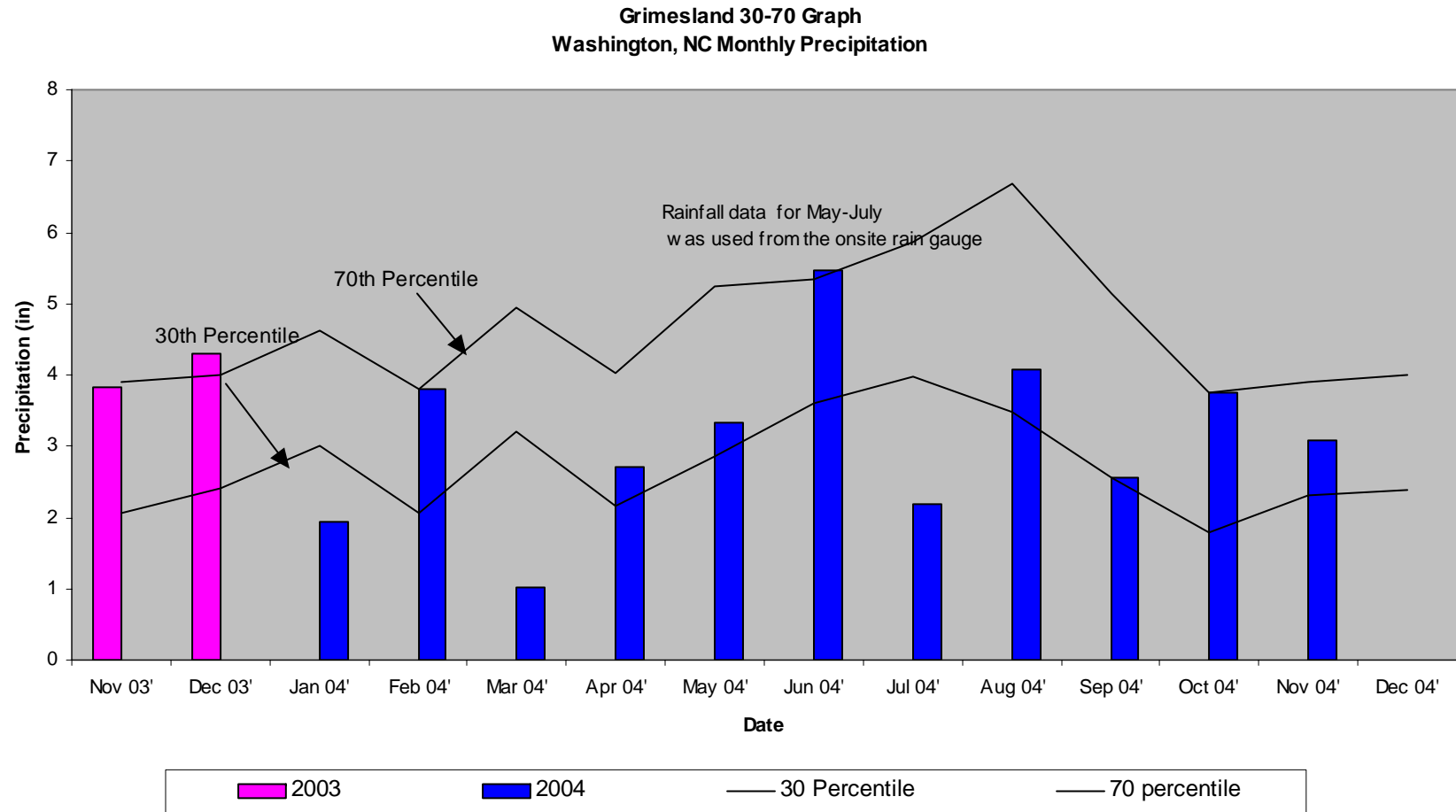
For the 2004 monitoring year, December (03') and June experienced above average rainfall. The months of January, March, and June recorded below average rainfall and November (03'), February, April, May, August, September, October, and November experienced average rainfall. Overall, 2004 experienced an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

2.4 CONCLUSIONS

The 2004-year concludes the second complete year of hydrology monitoring at the Grimesland Phase II Site. The 2004 data shows that the Phase II site met jurisdictional success with all twenty groundwater gauges exceeding the 12.5% minimum success criterion (fifteen gauges met for the entire growing season). A comparison of 2004 rainfall versus historical precipitation shows that 2004 experienced average rainfall conditions.

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

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



3.0 VEGETATION: GRIMESLAND PIT MITIGATION SITE – PHASE II (YEAR 2 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 II:

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Fraxinus pennsylvanica, Green Ash

Quercus phellos, Willow Oak

Quercus nigra, Water Oak

Taxodium distichum, Baldcypress

Quercus lyrata, Overcup Oak

Platanus occidentalis, Sycamore

3.3 RESULTS OF VEGETATION MONITORING

Table 2. Vegetation Monitoring Statistics

Plot #	Baldcypress	Green Ash	Swamp Blackgum	Water Oak	Willow Oak	Overcup Oak	Sycamore	Total (Year 2)	Total (at planting)	Density (Trees/Acre)
1	7	9		7	3	14	1	41	50	558
2	4	5		3		3		15	31	329
3	3		5	1	1	4		14	31	307
4	11		11					22	22	680
5	24	4	2			3		33	45	499
6	3	10						13	26	340
7	1	5	4					10	40	170
AVERAGE TREE DENSITY										412

Site Notes: Other species noted: black willow, *Juncus* sp., woolgrass, cattail, *Cyperus* sp., *Scirpus* sp., smartweed, volunteer sycamore, volunteer swamp blackgum, and various grasses. Standing water 6” – 12” deep in plot 7.

3.4 CONCLUSIONS

Phase II consisted of approximately 48.8 acres of tree planting. There were seven vegetation-monitoring plots established throughout the Phase II planting areas. The 2004 vegetation monitoring of the site revealed an average tree density of 412 trees per acre in Phase II. This average is above the minimum success criteria of 320 trees per acre.

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

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

The Grimesland Sand Pit Phase II Mitigation Site was monitored for the second year in 2004. All twenty groundwater-monitoring gauges indicated jurisdictional success of at least 12.5% for the 2004-monitoring year, with fifteen gauges meeting for 100% of the growing season. An analysis of rainfall in nearby Washington, NC shows that the region experienced average rainfall for the year. Therefore, the site the met jurisdictional success criteria under average climatic conditions.

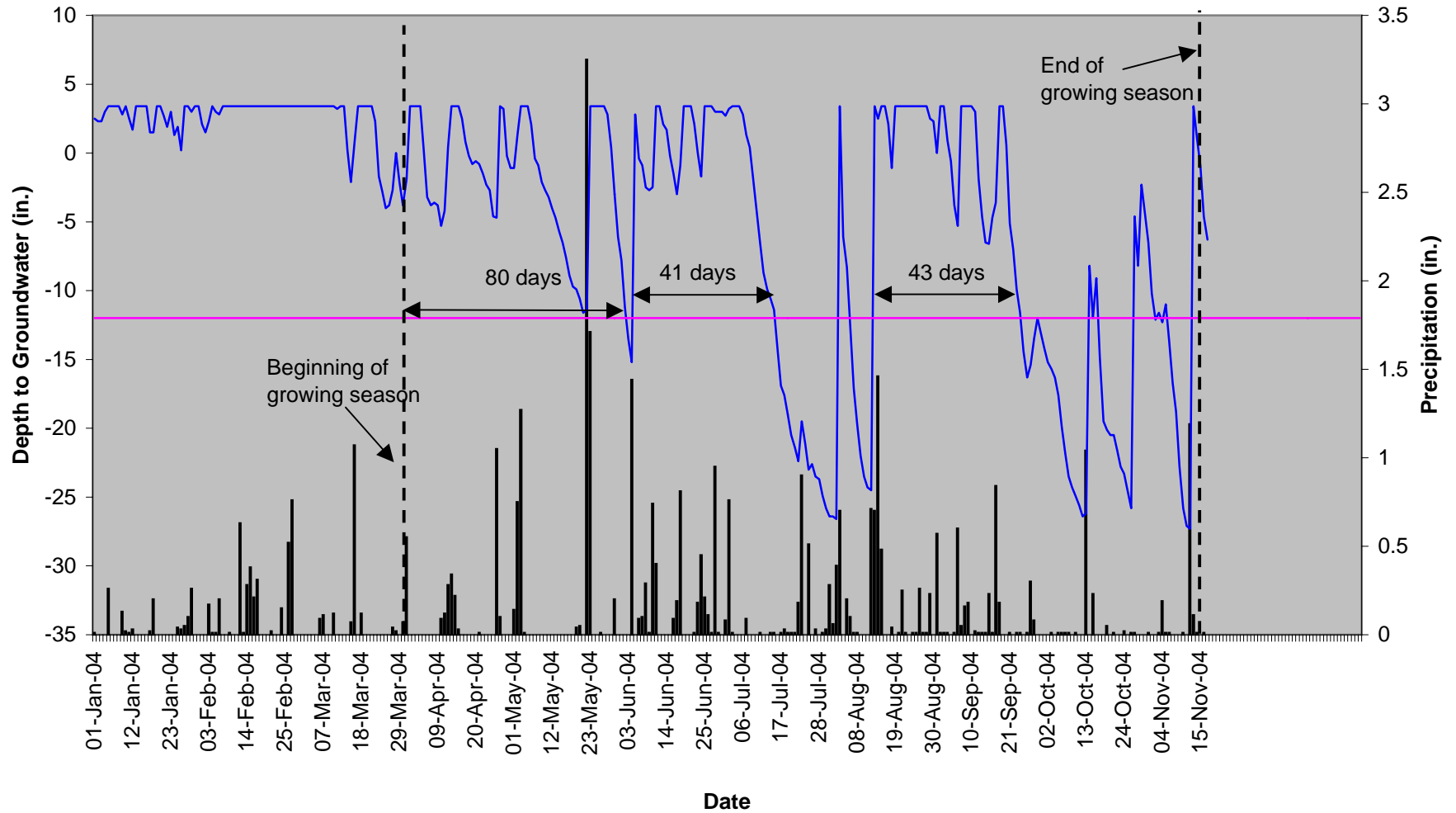
Approximately 48.8 acres of the site were planted; seven vegetation plots within this area are used for vegetation monitoring. The established success criteria state that the minimum survival rate in the first three years following planting is 320 trees per acre. Monitoring results showed an average survival rate of 412 trees per acre in the second 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

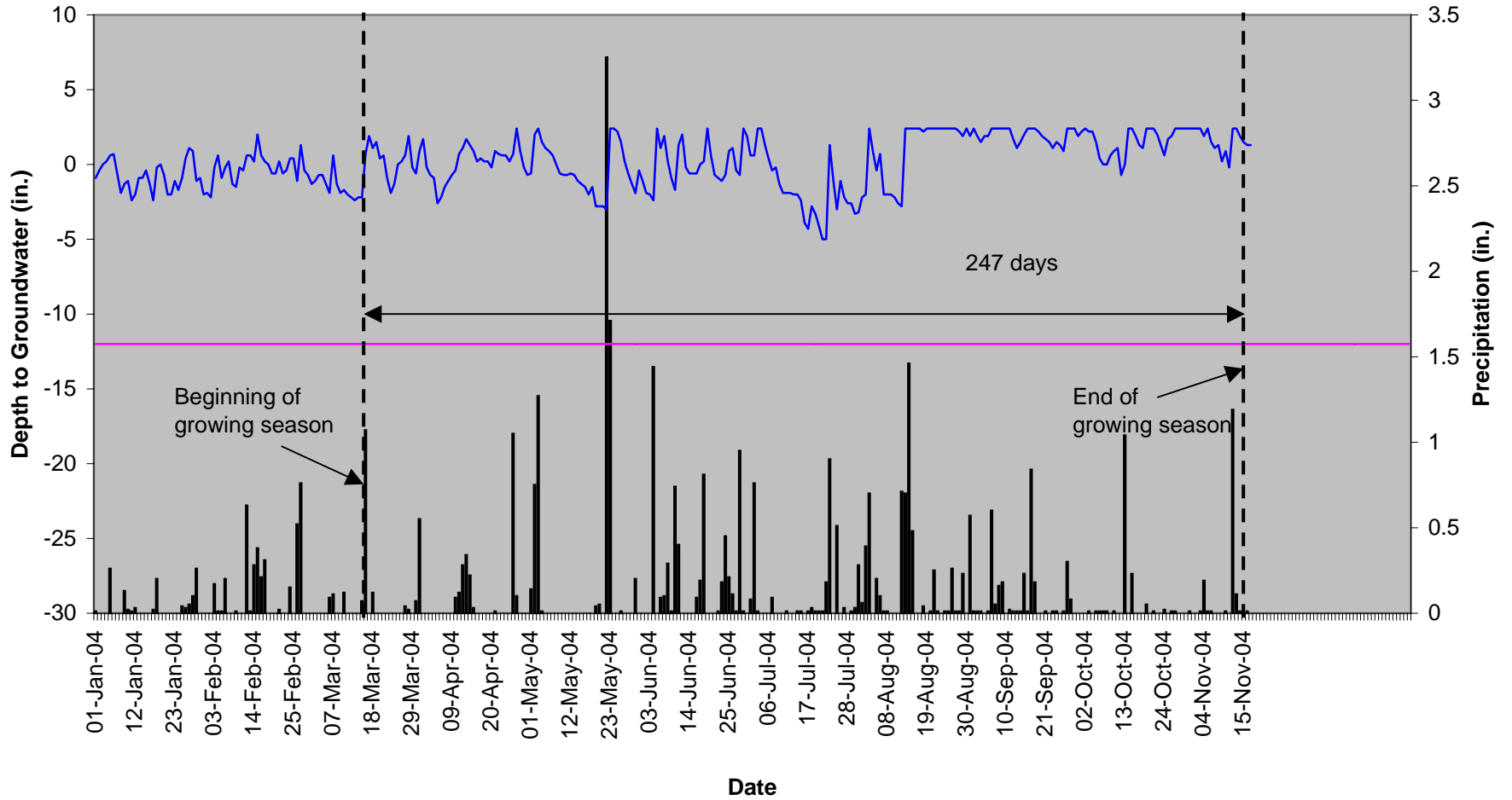
DEPTH TO GROUNDWATER CHARTS

Grimesland GSP-GW6 Phase II 40" Groundwater



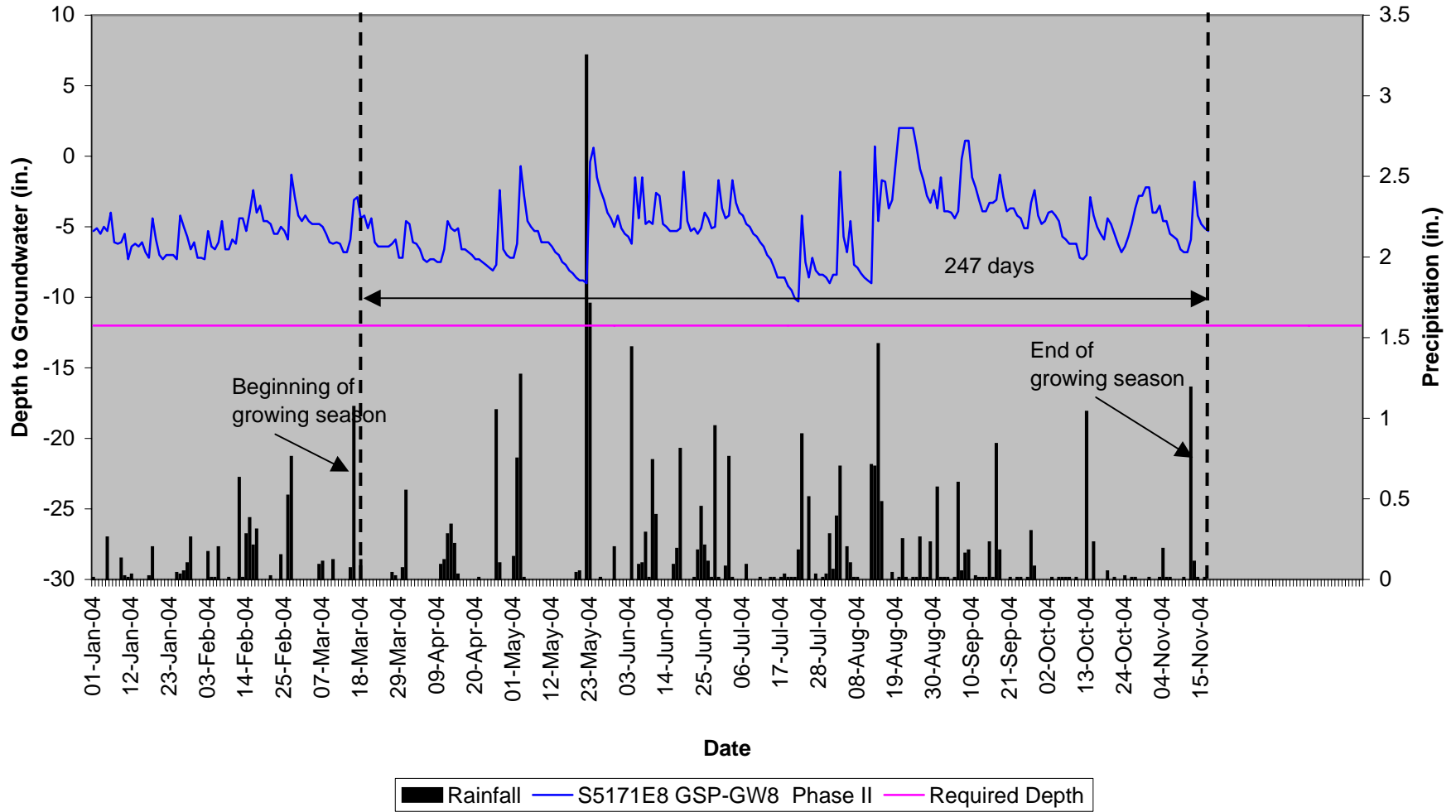
■ Rainfall — S51744E GSP-GW6 Phase II — Required Depth

**Grimesland GSP-GW7
Phase II
40" Groundwater**

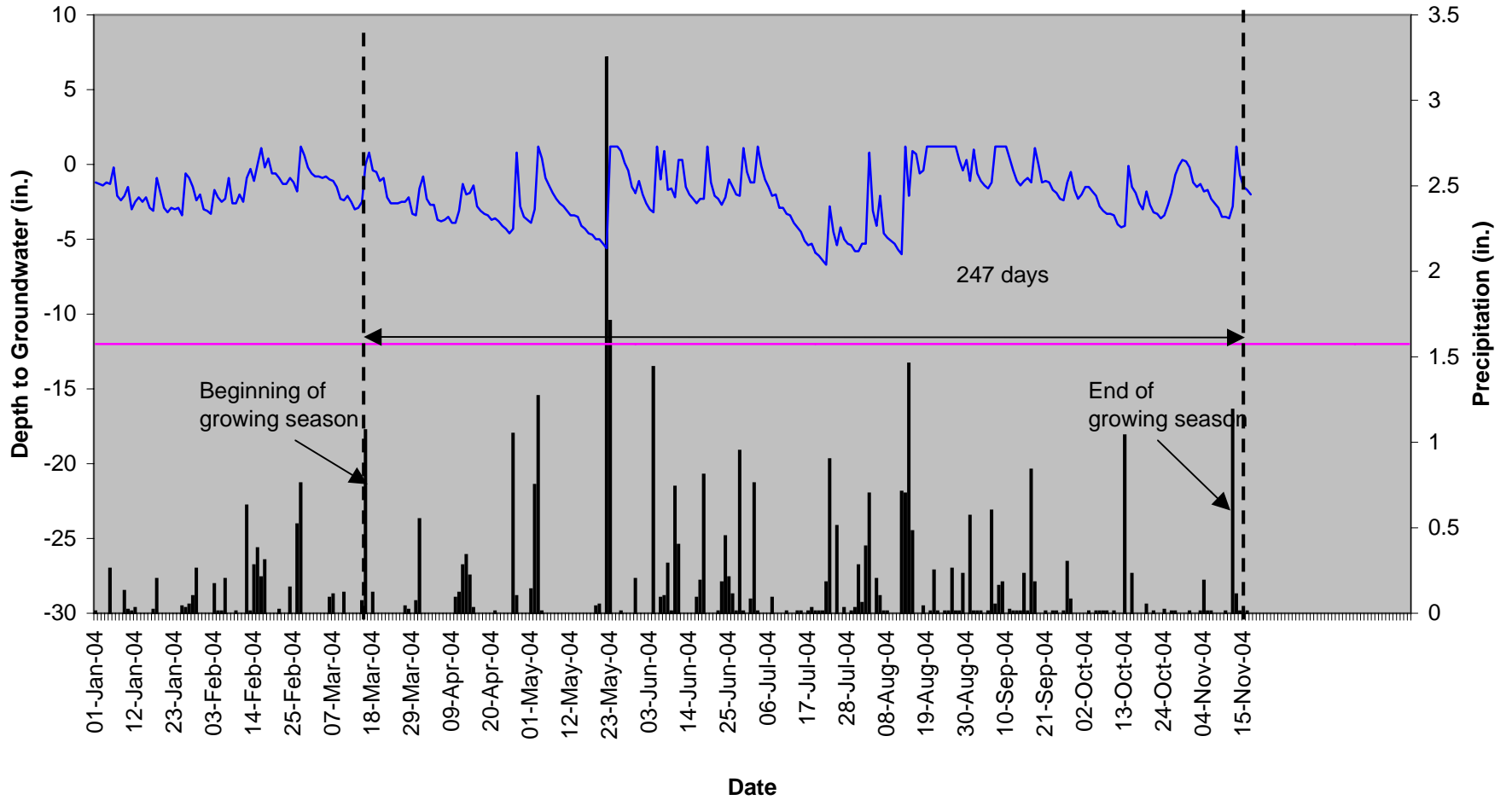


■ Rainfall — S5176AF GSP-GW7 Phase II — Required Depth

**Grimesland GSP-GW8
Phase II
40" Groundwater**

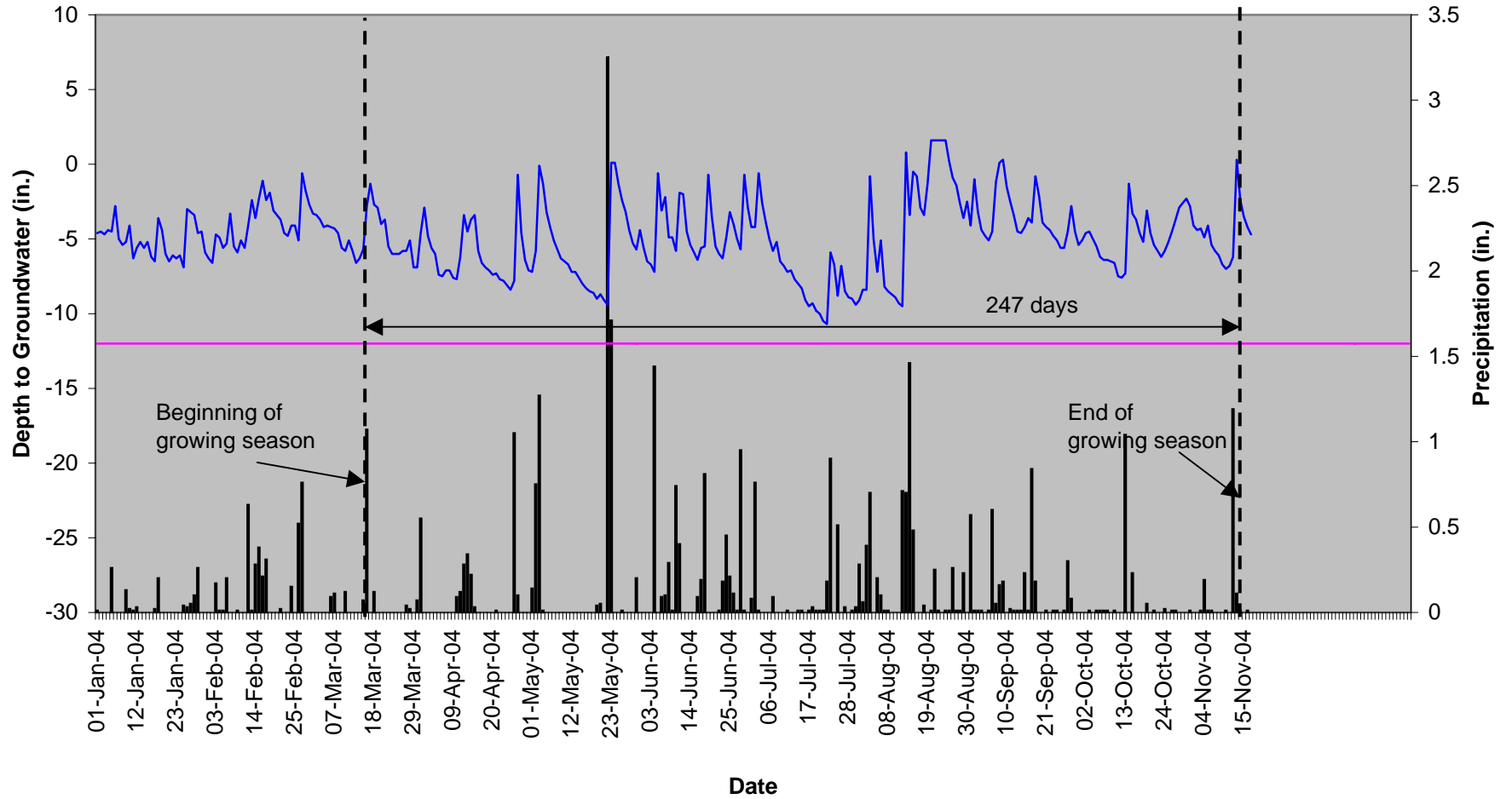


**Grimesland GSP-GW9
Phase II
40" Groundwater**



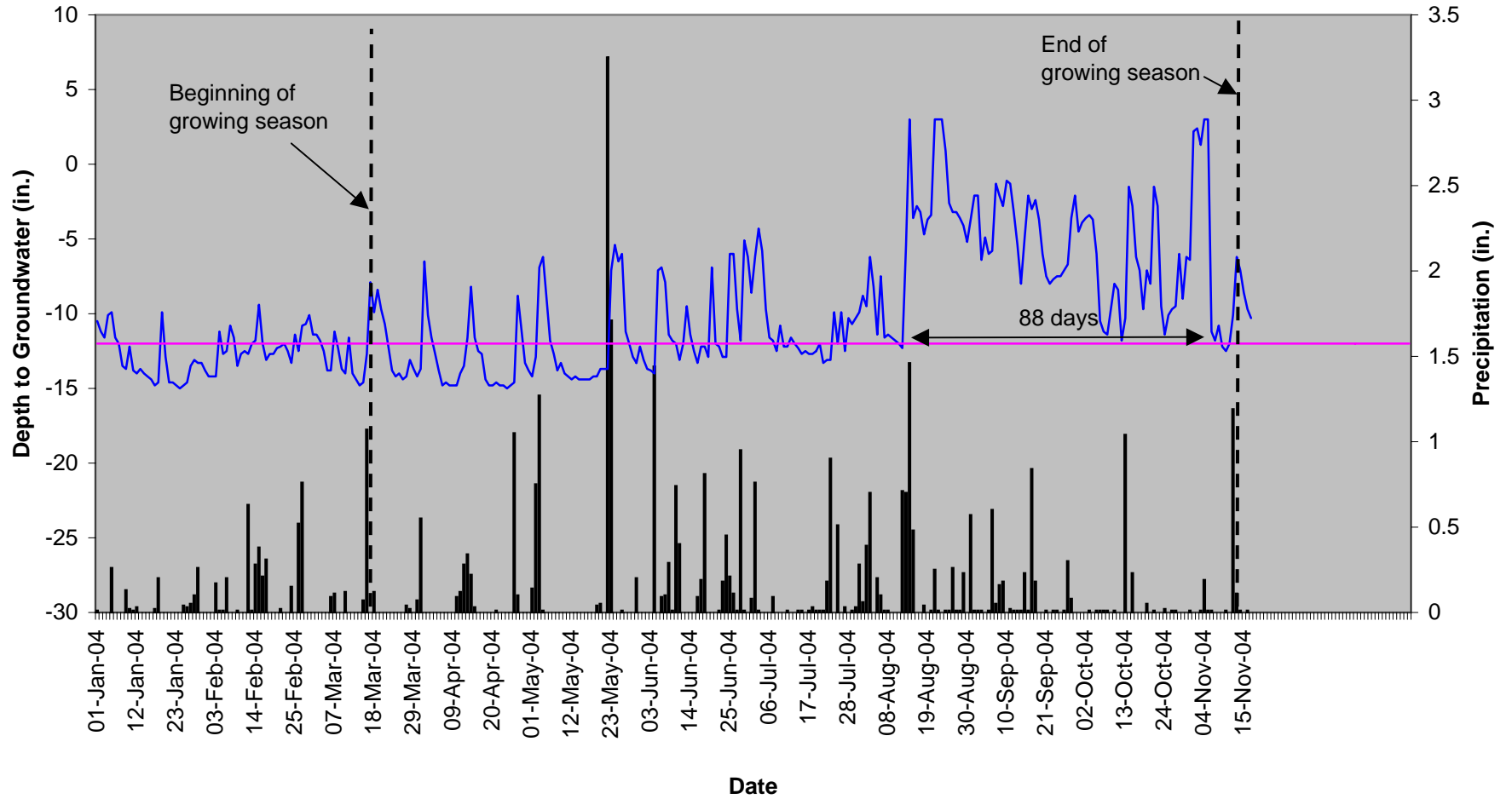
■ Rainfall — S503E59 GSP-GW9 Phase II — Required Depth

**Grimesland GSP-GW10
Phase II
40" Groundwater**



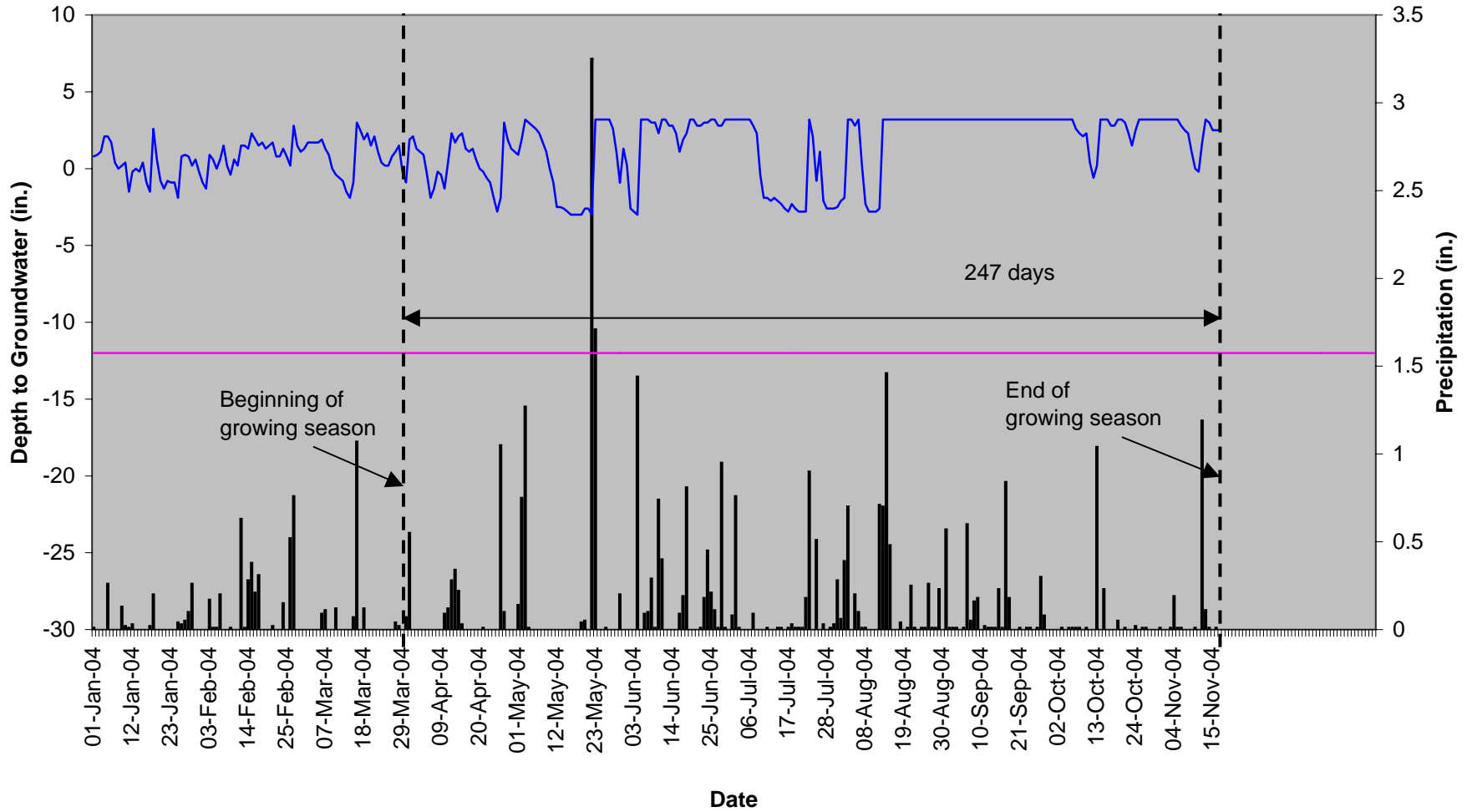
■ Rainfall — S5043CA GSP-GW10 Phase II — Required Depth

**Grimesland GSP-GW11
Phase II
40" Groundwater**



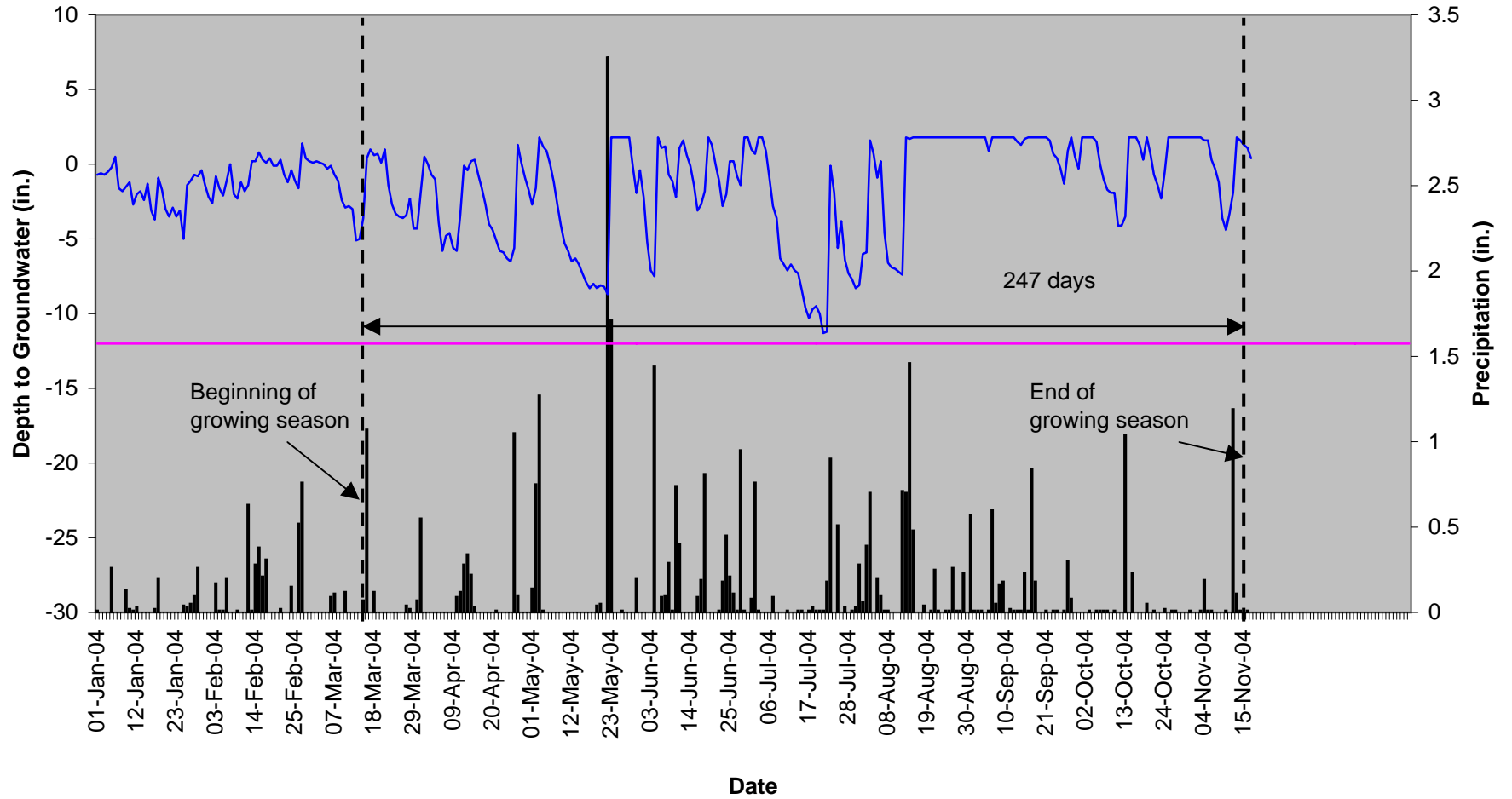
■ Rainfall — S51B986 GSP-GW11 Phase II — Required Depth

**Grimesland GSP-GW12
Phase II
40" Groundwater**



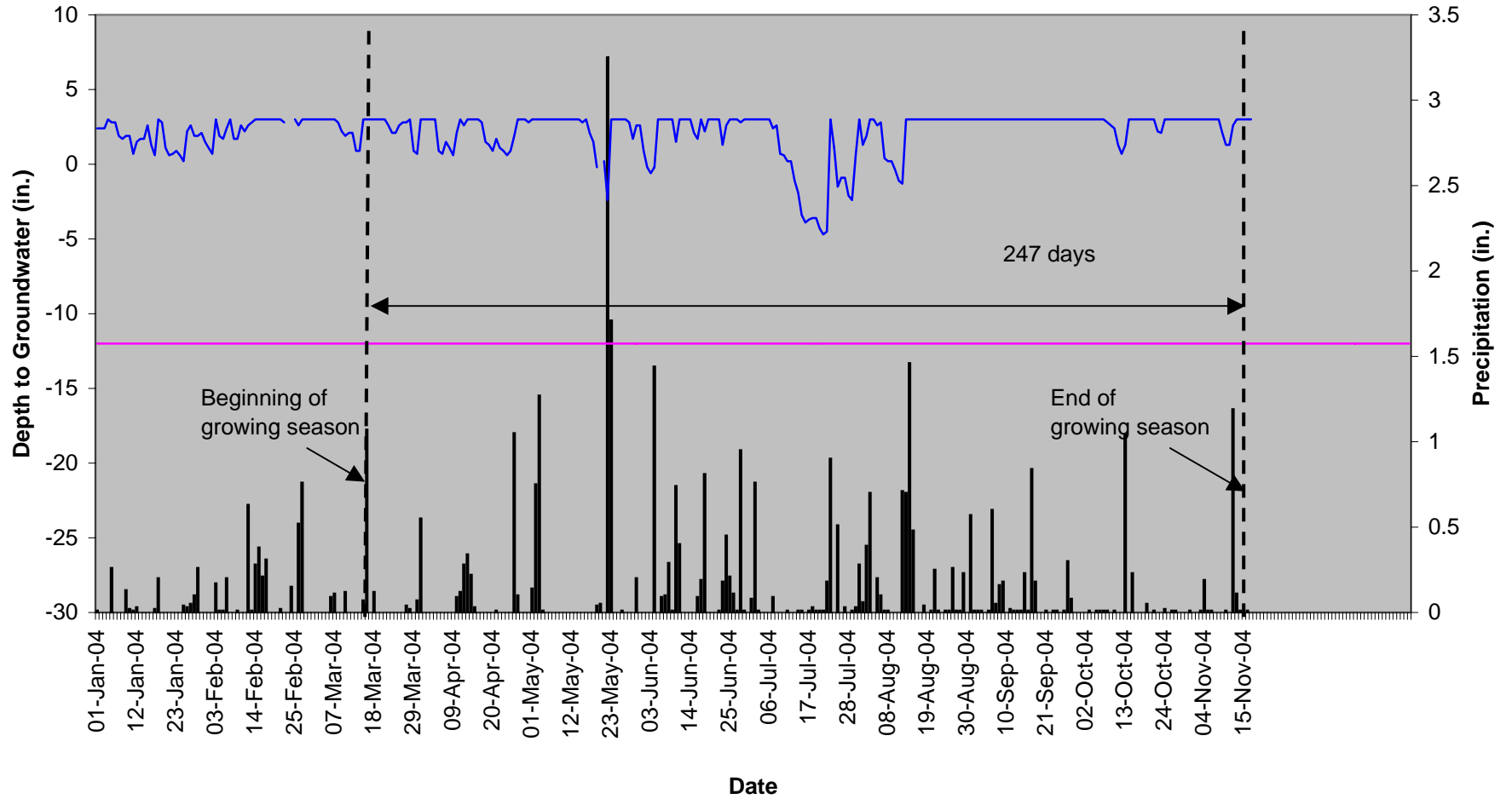
■ Rainfall — S517407 GSP-GW12 Phase II — Required Depth

**Grimesland GSP-GW13
Phase II
40" Groundwater**



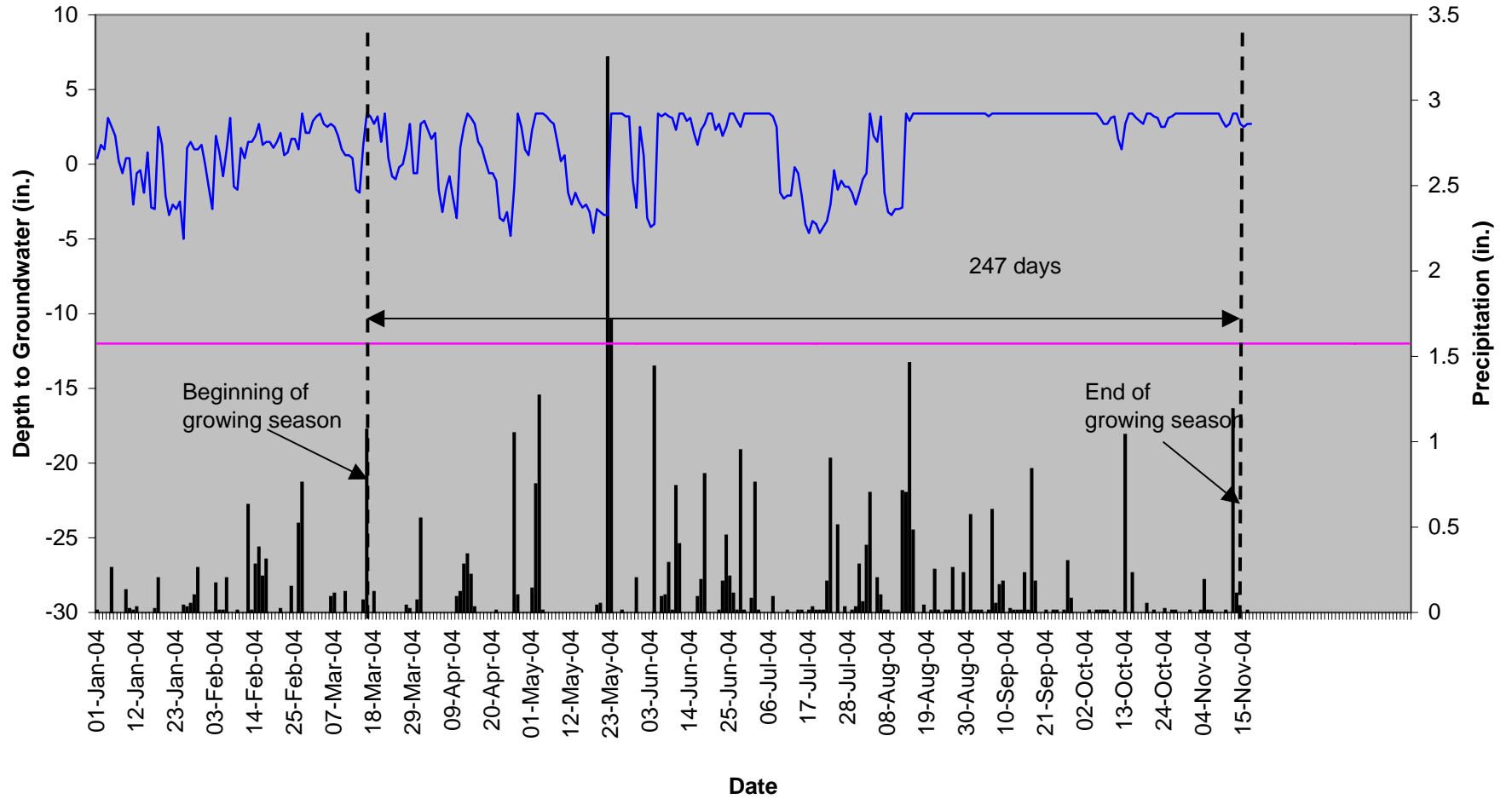
■ Rainfall — S50410D GSP-GW13 Phase II — Required Depth

**Grimesland GSP-GW14
Phase II
40" Groundwater**



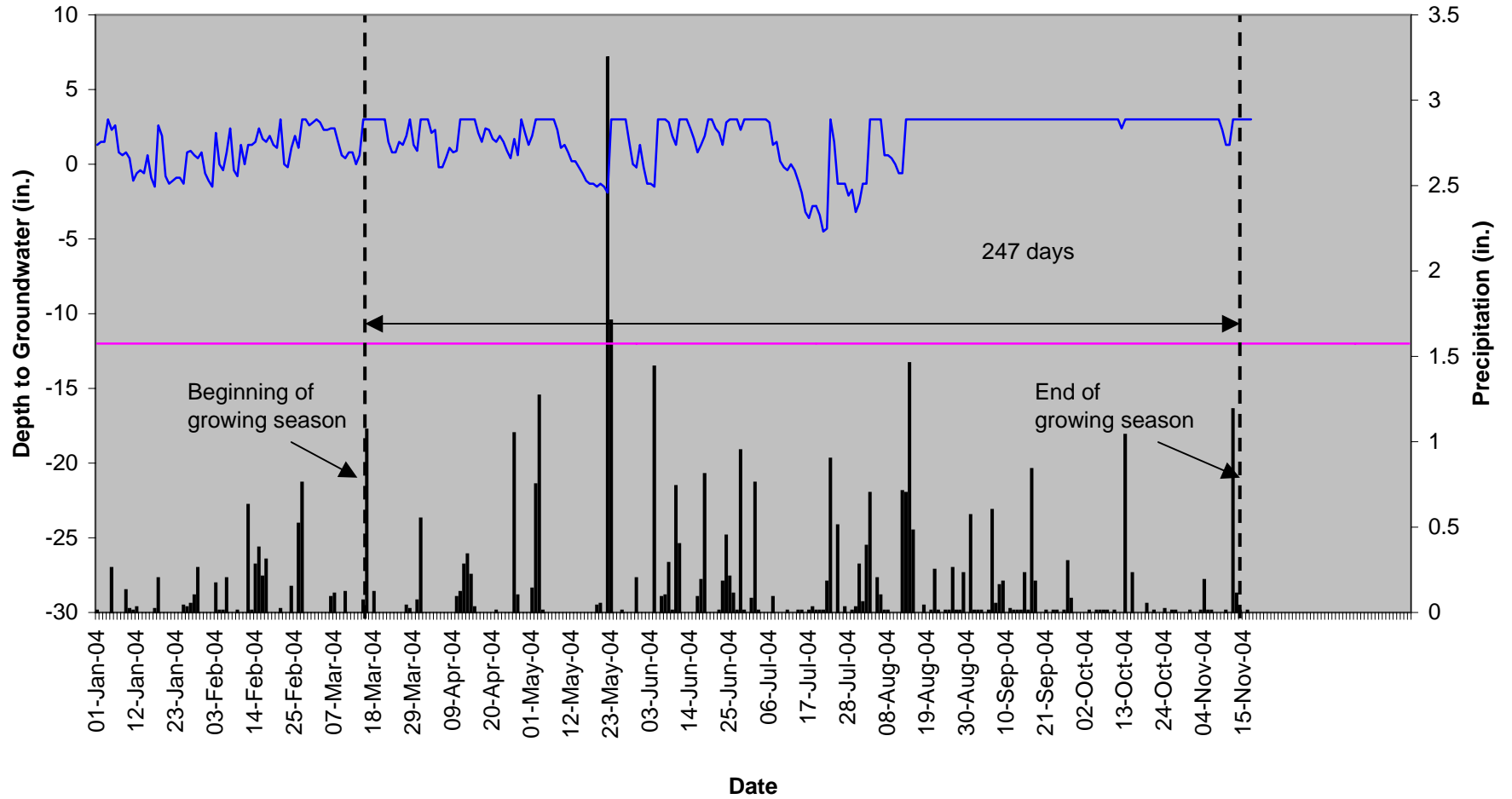
■ Rainfall — S50448D GSP-GW14 Phase II — Required Depth

**Grimesland GSP-GW15
Phase II
40" Groundwater**



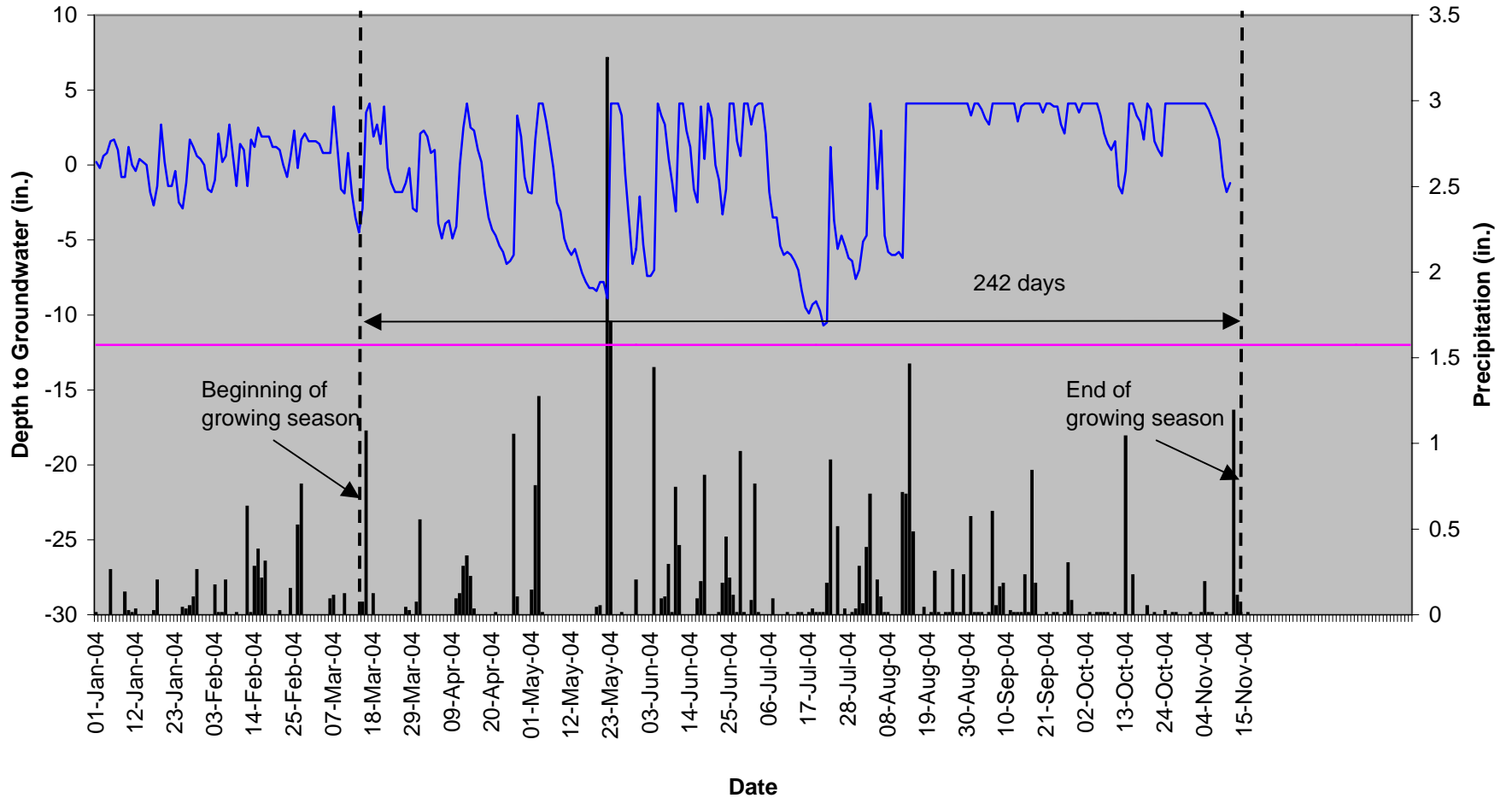
■ Rainfall — S503E58 GSP-GW15 Phase II — Required Depth

**Grimesland GSP-GW16
Phase II
40" Groundwater**



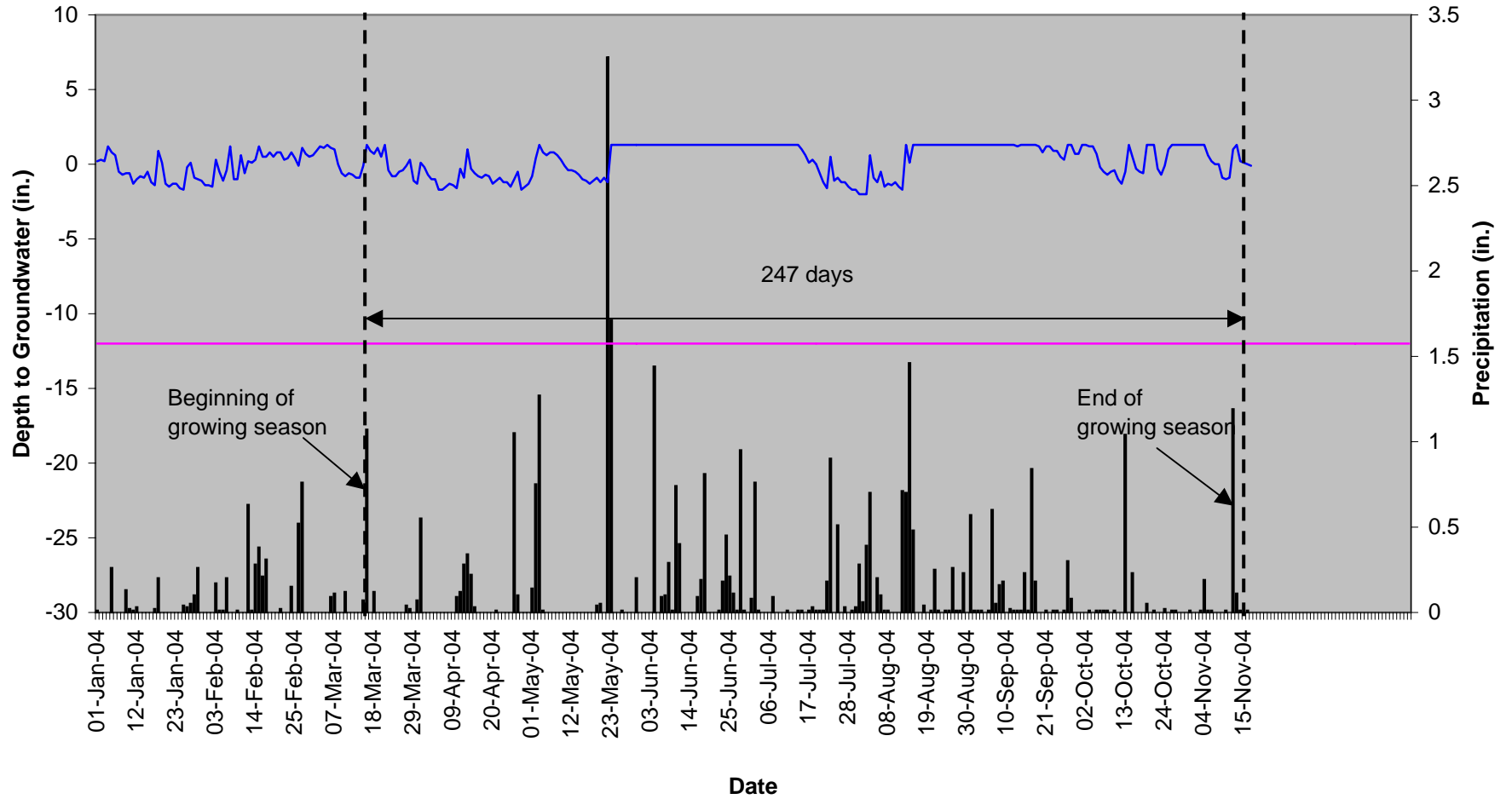
■ Rainfall — S50457E GSP-GW16 Phase II — Required Depth

**Grimesland GSP-GW17
Phase II
40" Groundwater**



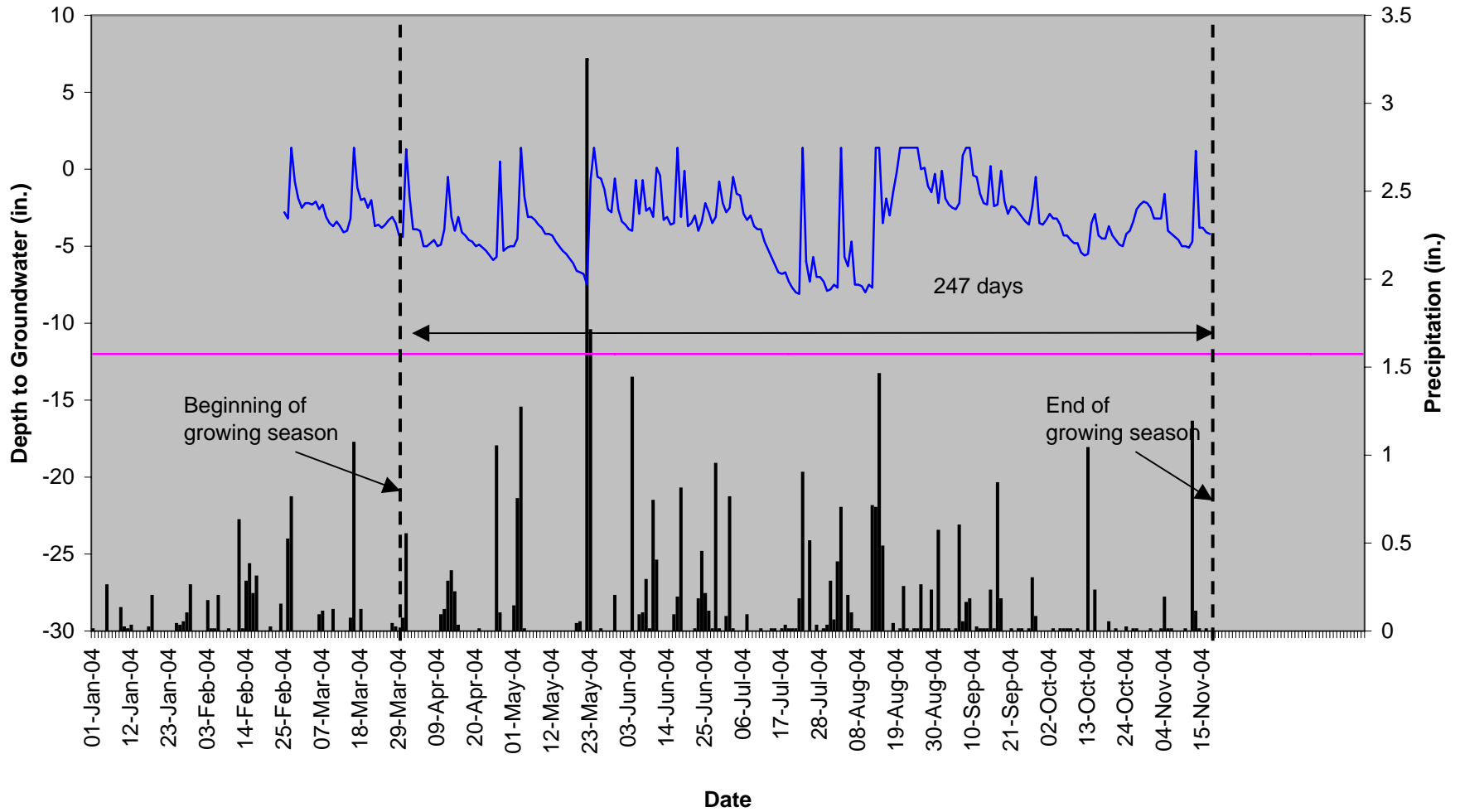
■ Rainfall — S504321 GSP-GW17 Phase II — Required Depth

**Grimesland GSP-GW18
Phase II
40" Groundwater**



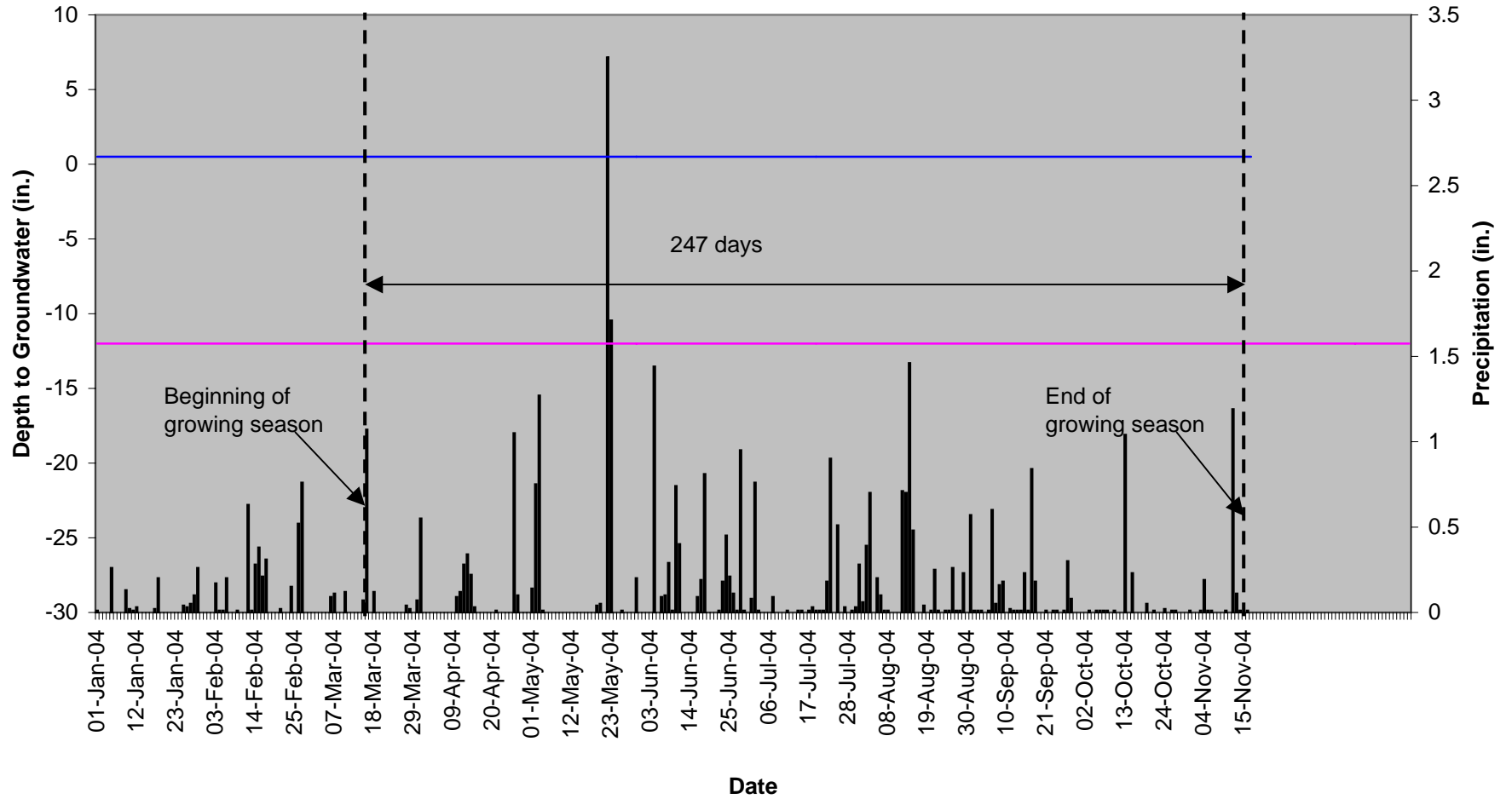
■ Rainfall — S2EACB5 GSP-GW18 Phase II — Required Depth

**Grimesland GSP-GW19
Phase II
40" Groundwater**



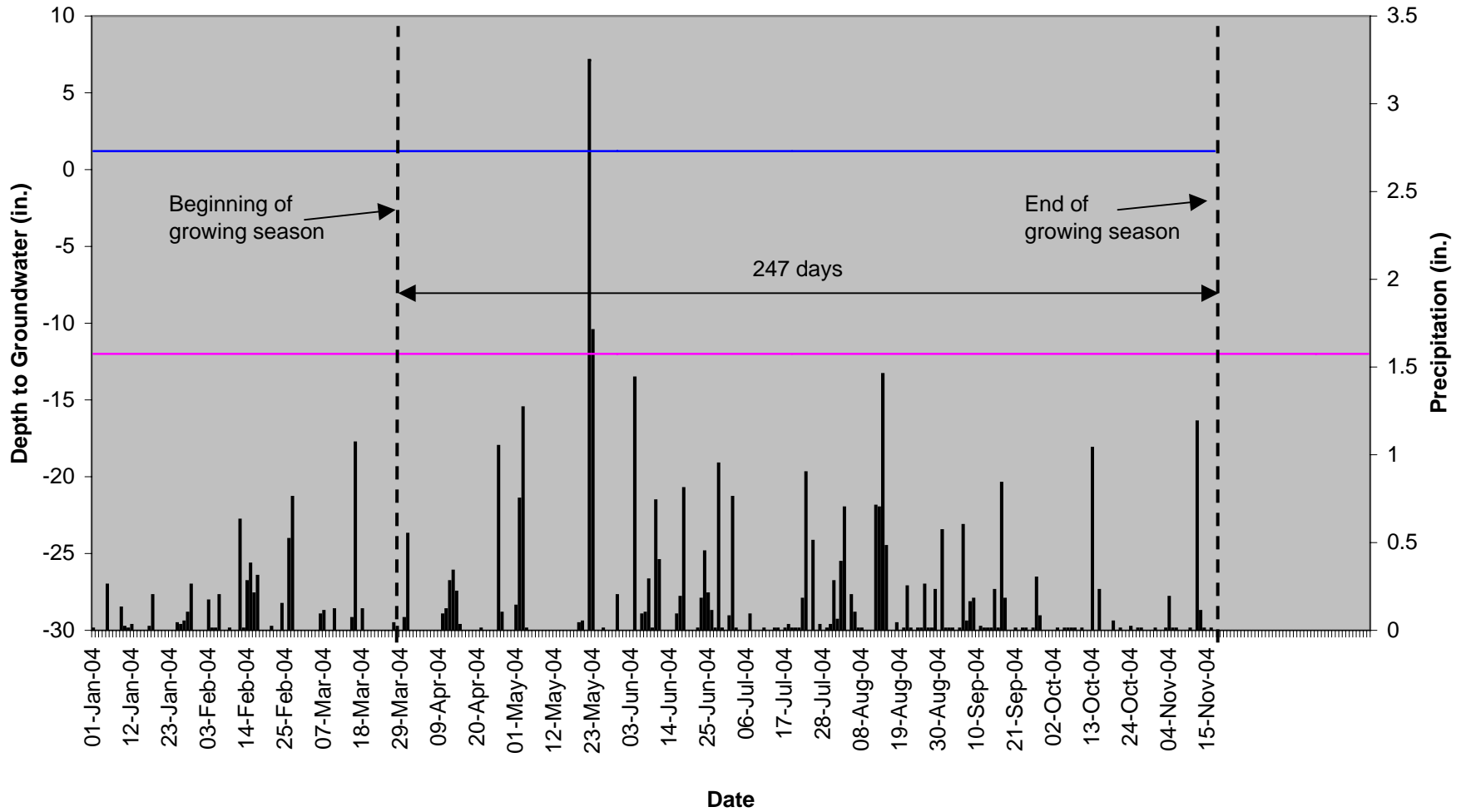
■ Rainfall — S2EACB7 GSP-GW19 Phase II — Required Depth

Grimesland GSP-GW20
Phase II
40" Groundwater



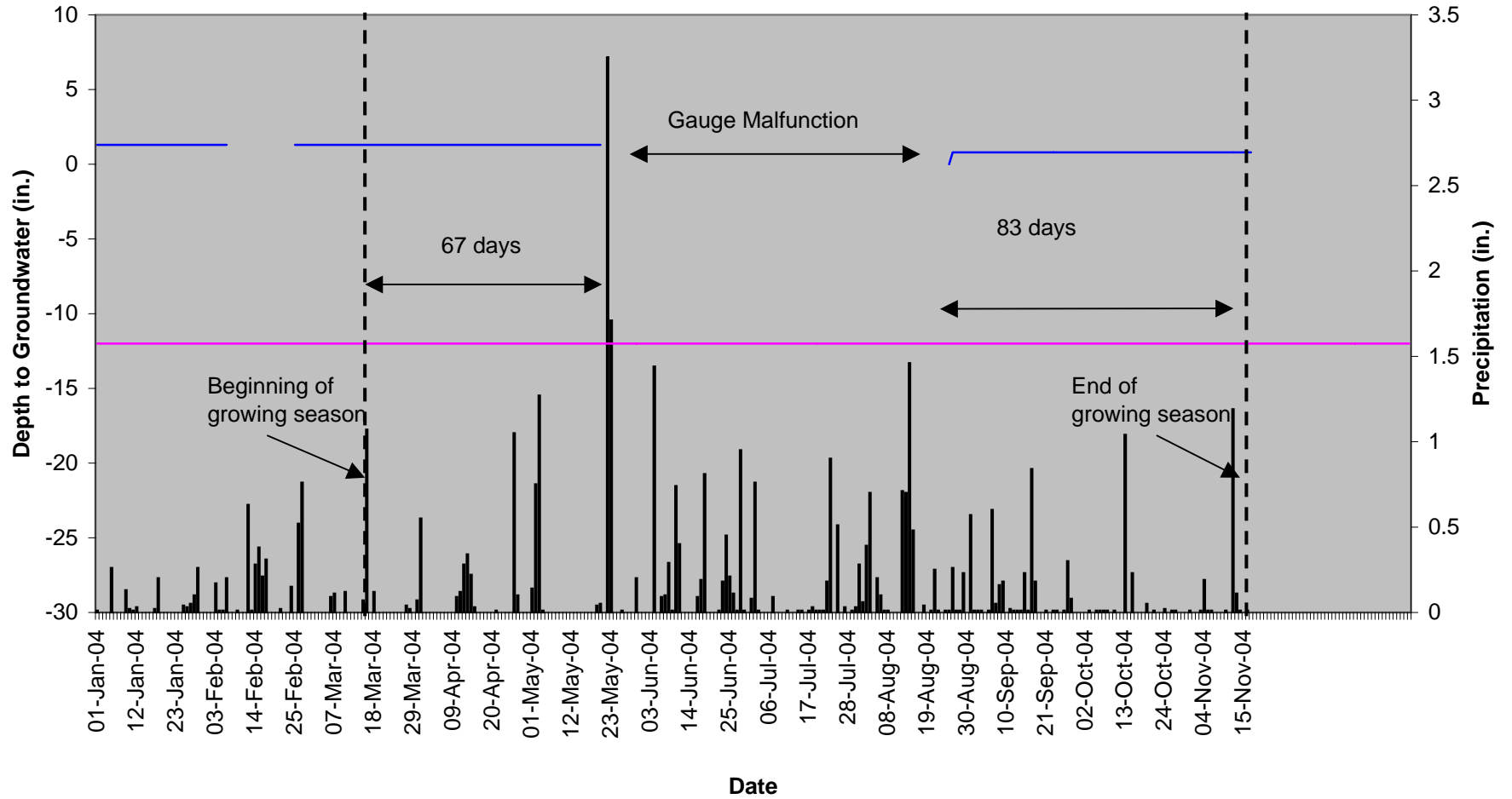
■ Rainfall — S504037 GSP-GW20 Phase II — Required Depth

Grimesland GSP-GW21
Phase II
40" Groundwater



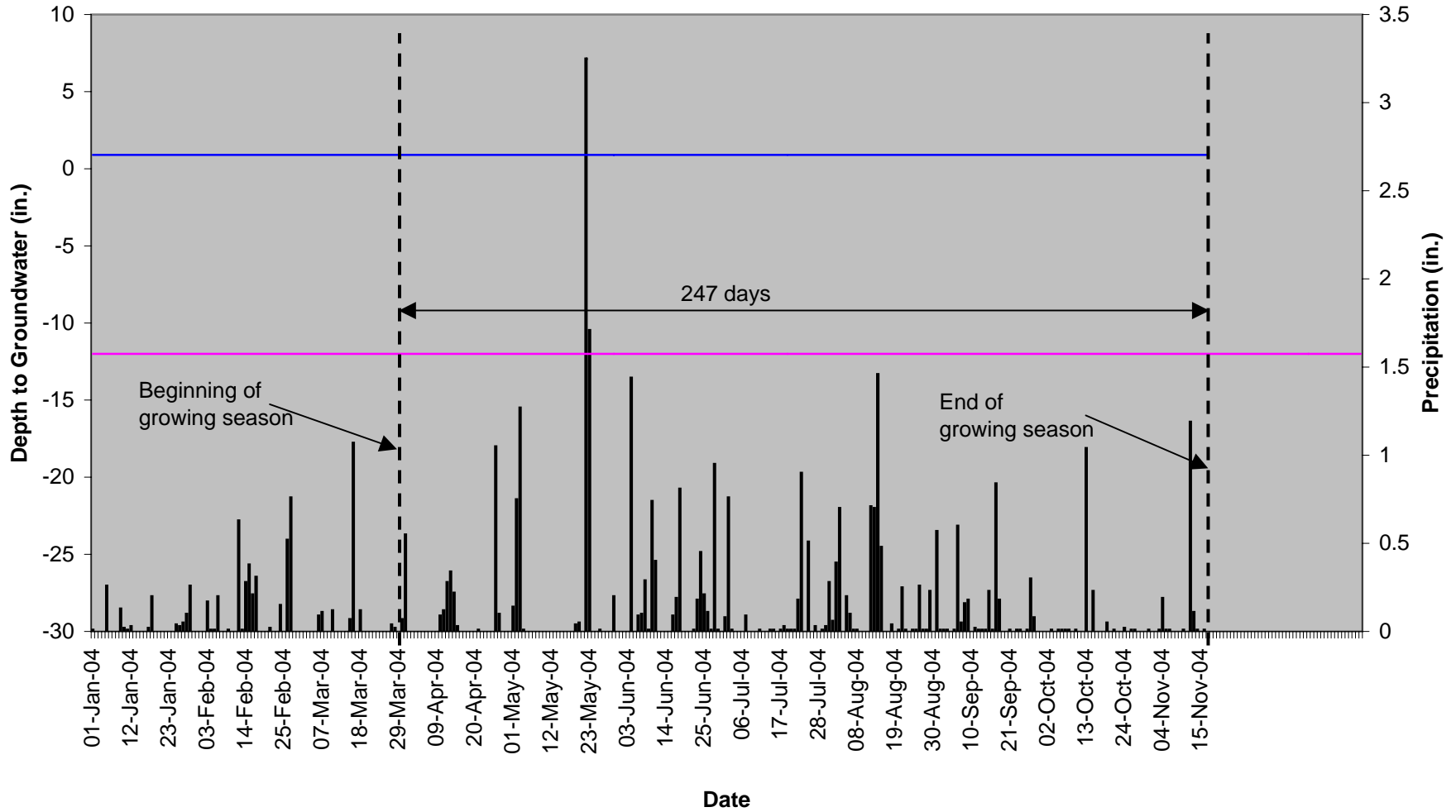
■ Rainfall — S503FC8 GSP-GW21 Phase II — Required Depth

**Grimesland GSP-GW22
Phase II
40" Groundwater**



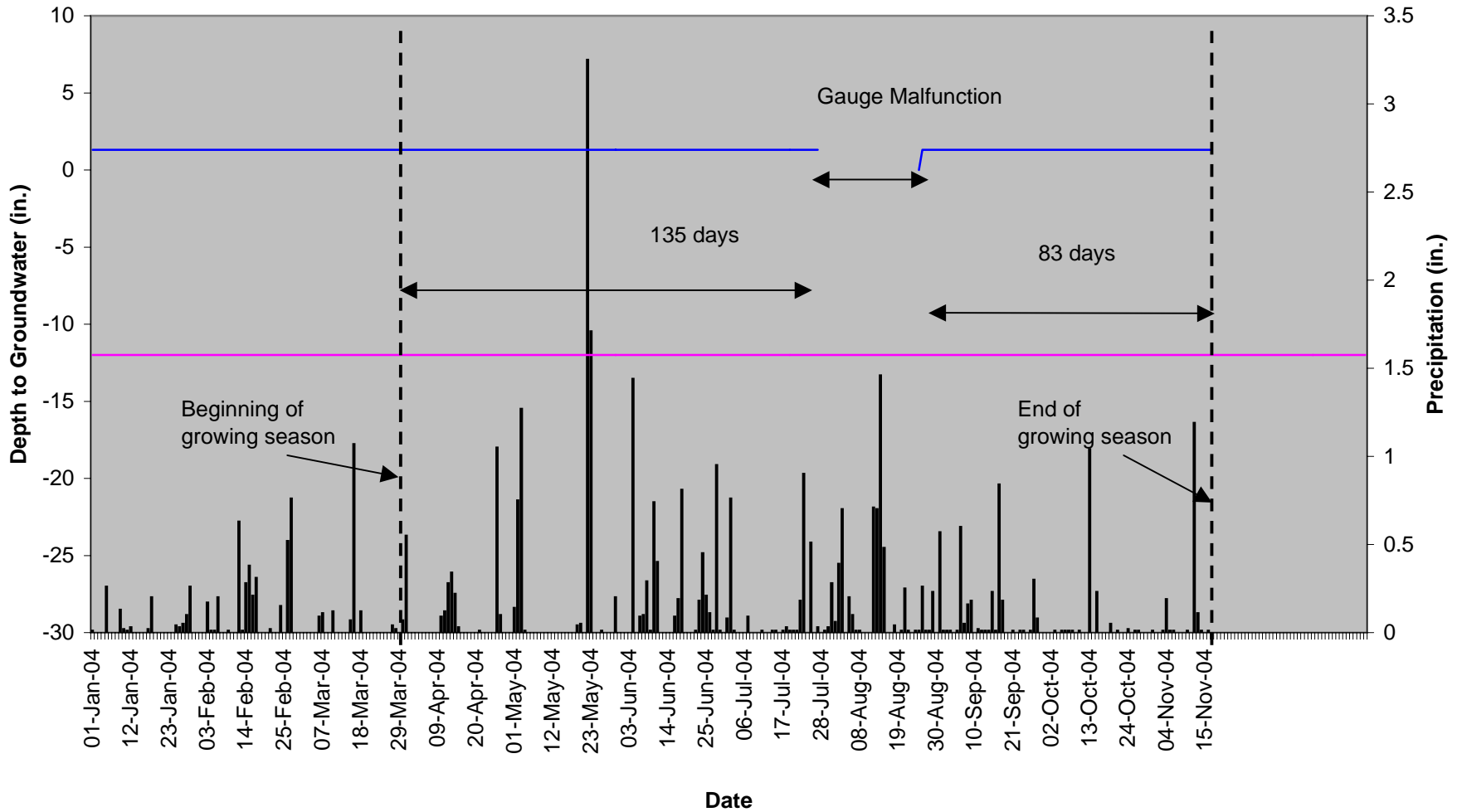
Rainfall
 S213FC9 GSP-GW22 Phase II
 Required Depth

Grimesland GSP-GW23
Phase II
40" Groundwater



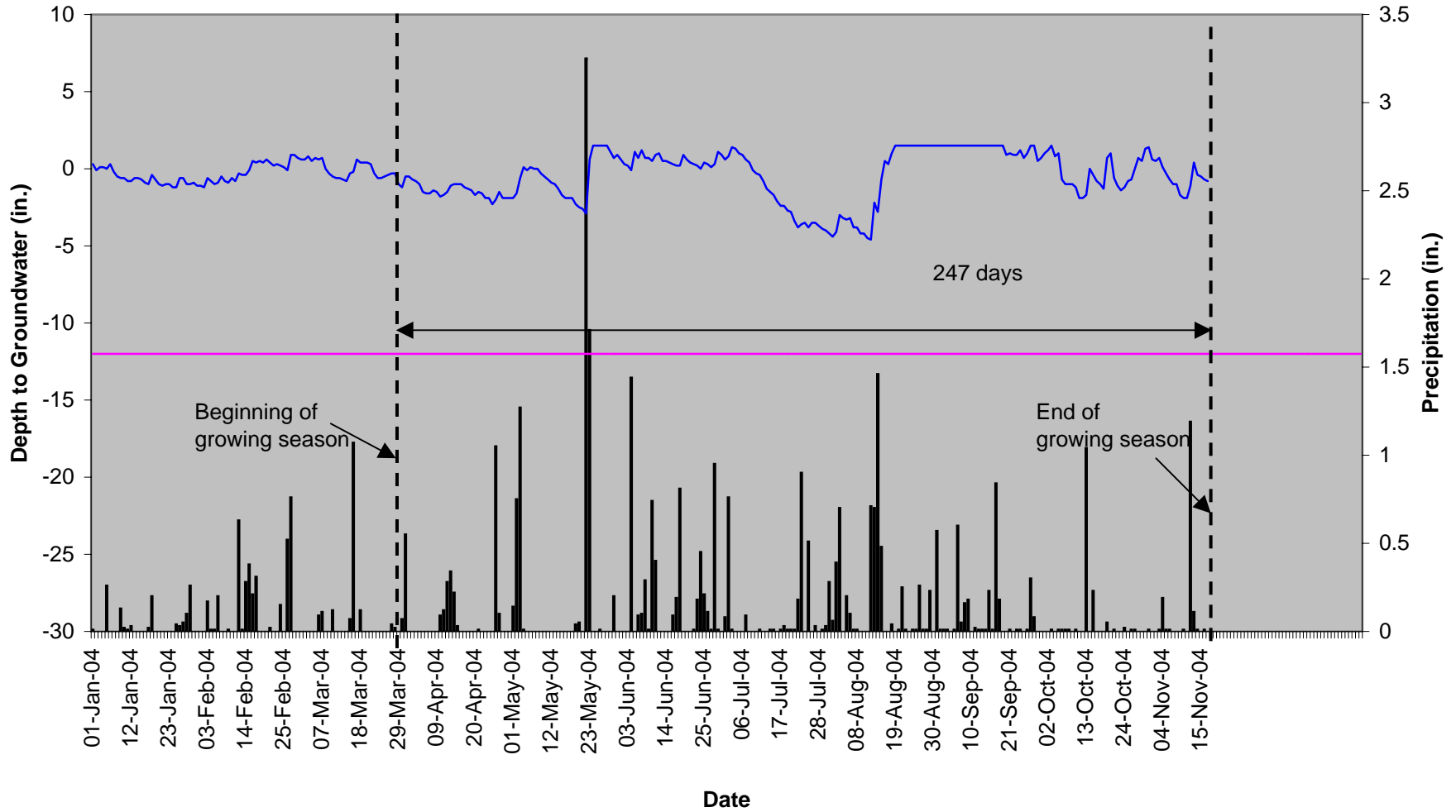
■ Rainfall — S50449D GSP-GW23 Phase II — Required Depth

**Grimesland GSP-GW24
Phase II
40" Groundwater**



Rainfall
 S1EC72B GSP-GW24 Phase II
 Required Depth

**Grimesland GSP-GW25
Phase II
40" Groundwater**



Rainfall
 S2EACBE GSP-GW25 Phase II
 Required Depth

APPENDIX B

SITE PHOTOS AND PHOTO AND PLOT LOCATIONS MAP

Grimesland Pit – Phase II



Photo 1



Photo 2



Photo 3

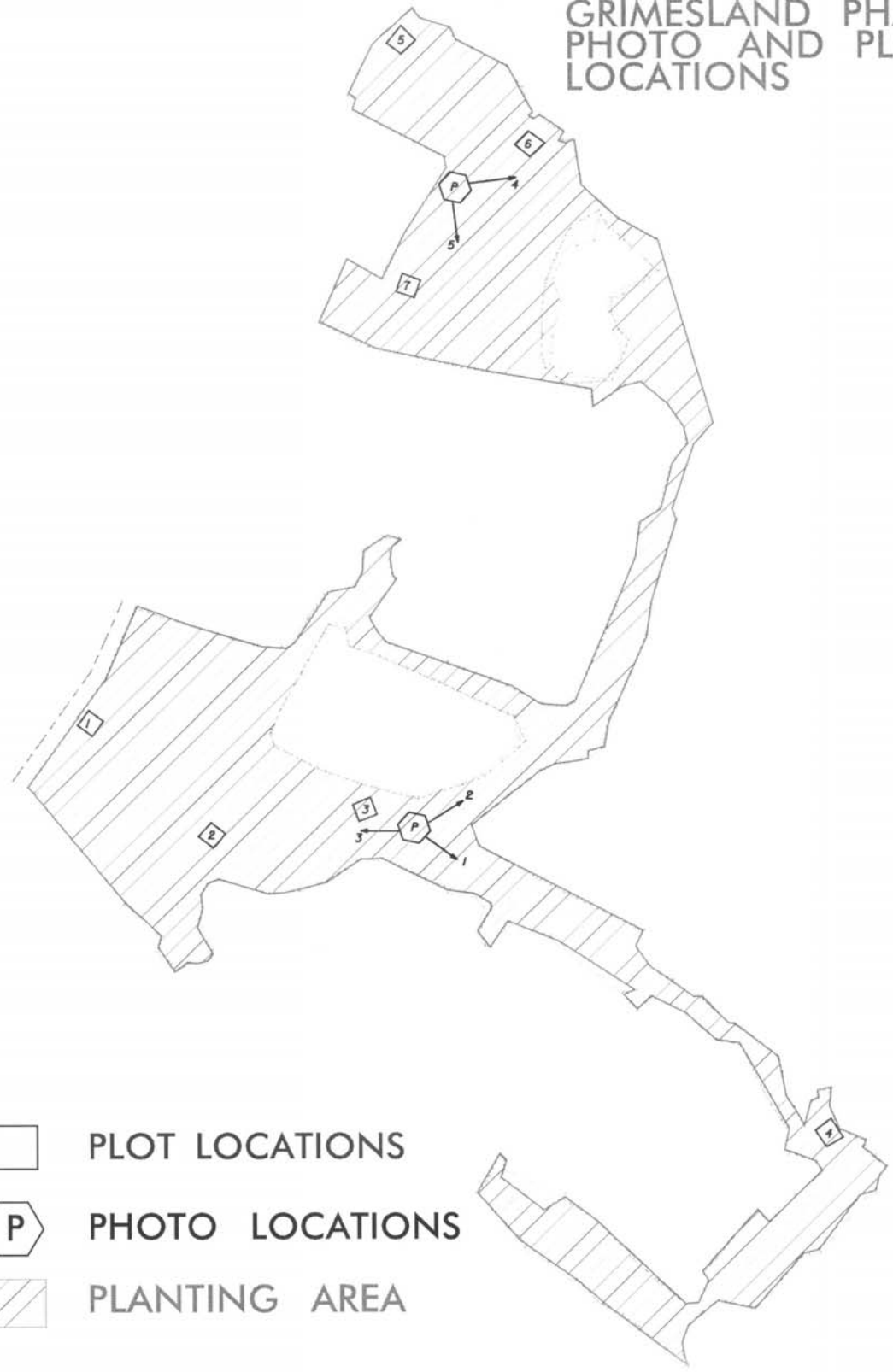


Photo 4



Photo 5

GRIMESLAND PHASE II PHOTO AND PLOT LOCATIONS



-  PLOT LOCATIONS
-  PHOTO LOCATIONS
-  PLANTING AREA