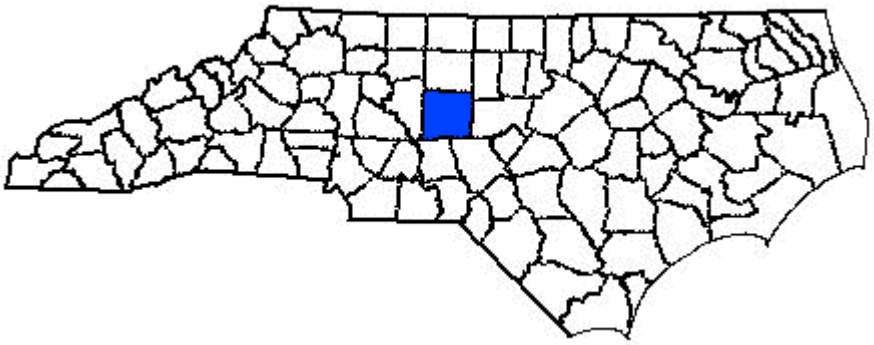
ANNUAL REPORT FOR 2002



SANDY CREEK MITIGATION SITE
RANDOLPH COUNTY
PROJECT NO. 8.U492301
TIP NO. I-2402WM

Prepared By:
Office of Natural Environment & Roadside Environmental Unit
North Carolina Department of Transportation
December 2002

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

SANDY CREEK MITIGATION SITE
2002 REPORT – EXECUTIVE SUMMARY

The following report summarizes the monitoring activities that have occurred in the past year at the Sandy Creek Mitigation Site. This site was constructed in 2000. Monitoring activities in 2002 represent the second year of monitoring following construction. The site must demonstrate hydrologic and vegetation success for a minimum of five years or until the project is deemed successful.

The site contains six groundwater monitoring gauges, one rain gauge, and three vegetation plots.

For 2002, rainfall data has been acquired from an onsite rain gauge. Also, daily rainfall data recorded from a rain gauge maintained by the NC State Climate Office in Randleman, NC was used for comparison.

Hydrologic monitoring indicated that the entire site is consistently meeting the success criteria. All six gauges met jurisdictional hydrologic success of at least 12.5% during the growing season.

The site was supplementally planted in March 2002. The 2002 vegetation monitoring of the site revealed an average tree density of 570 trees/acre.

Based on the monitoring results from the 2002 growing season, NCDOT recommends that monitoring continue.

1.0 INTRODUCTION

1.1 Project Description

The Sandy Creek Wetland Mitigation Site is located approximately four miles southwest of Liberty in Randolph County (Figure 1). It is sited on the south floodplain of Sandy Creek 1.5 miles upstream of SR 2442. Prior to construction the site was a nearly level floodplain with ditching and raised beds, and was converted to hay production.

The site encompasses 12.9 acres, of which 10 acres were planted, and was designed originally as a mitigation site primarily for the Greensboro Outer Loop (I-2402). However, it is now intended to provide mitigation for the Sanford Bypass (R-2417, COE Action I.D. No. 199502036).

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 fulfilled. 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 2002 at the Sandy Creek Mitigation Site.

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

1.3 Project History

June 2000	Construction Completed
March 2001	Tree Planting
March-November 2001	Hydrologic Monitoring (Year 1)
July 2001	Vegetation Monitoring (Year 1)
March 2002	Site Supplementally Planted
March-November 2002	Hydrologic Monitoring (Year 2)
June 2002	Vegetation Monitoring (Year 2)

Figure 1. Sandy Creek Mitigation Site Location

1.4 Debit Ledger

Table 1. Sandy Creek Mitigation Site Debit Ledger

Site Habitat	Mitigation Plan			TIP Debit	TIP Debit
	Acres at Start	Acres Remaining	% Remaining	R-2417	U-2524 BA/BB
BLH Restoration	10	4.3		2.2	3.5

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 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 factors such as the presence of hydrophytic vegetation and hydric soils.

There is no published soil survey for Randolph County. The growing season for Moore County (directly southeast of Randolph County) was determined to be the best comparison to the Randolph County growing season. The Moore County growing season begins March 23 and ends November 7. The dates correspond to a 50% probability that temperatures will drop to 28^{o} F or lower after March 23 and before November 7. The growing season is 228 days; therefore the optimum duration for wetland hydrology is 29 days. Local climate must represent average conditions for the area.

2.2 Hydrologic Description

Historically, wetlands on the tract were created by a combination of rainfall, runoff, and groundwater seepage upgradient areas. After an extensive study of the site's hydrology, it was concluded that placement of impermeable plugs along drainage structures and removal of the raised beds would elevate the groundwater to a level that would saturate the soil stratum within the required twelve inches. It was predicted that this, in addition to surface water and runoff, would be sufficient to restore wetland hydrology.

Six groundwater-monitoring gauges were installed in February 2001 (Figure 2). The automatic monitoring gauges record daily readings of groundwater depth.

Rainfall data was acquired from an onsite rain gauge. Also, daily rainfall data recorded from a rain gauge maintained by the NC State Climate Office in Randleman, NC was used for comparison.

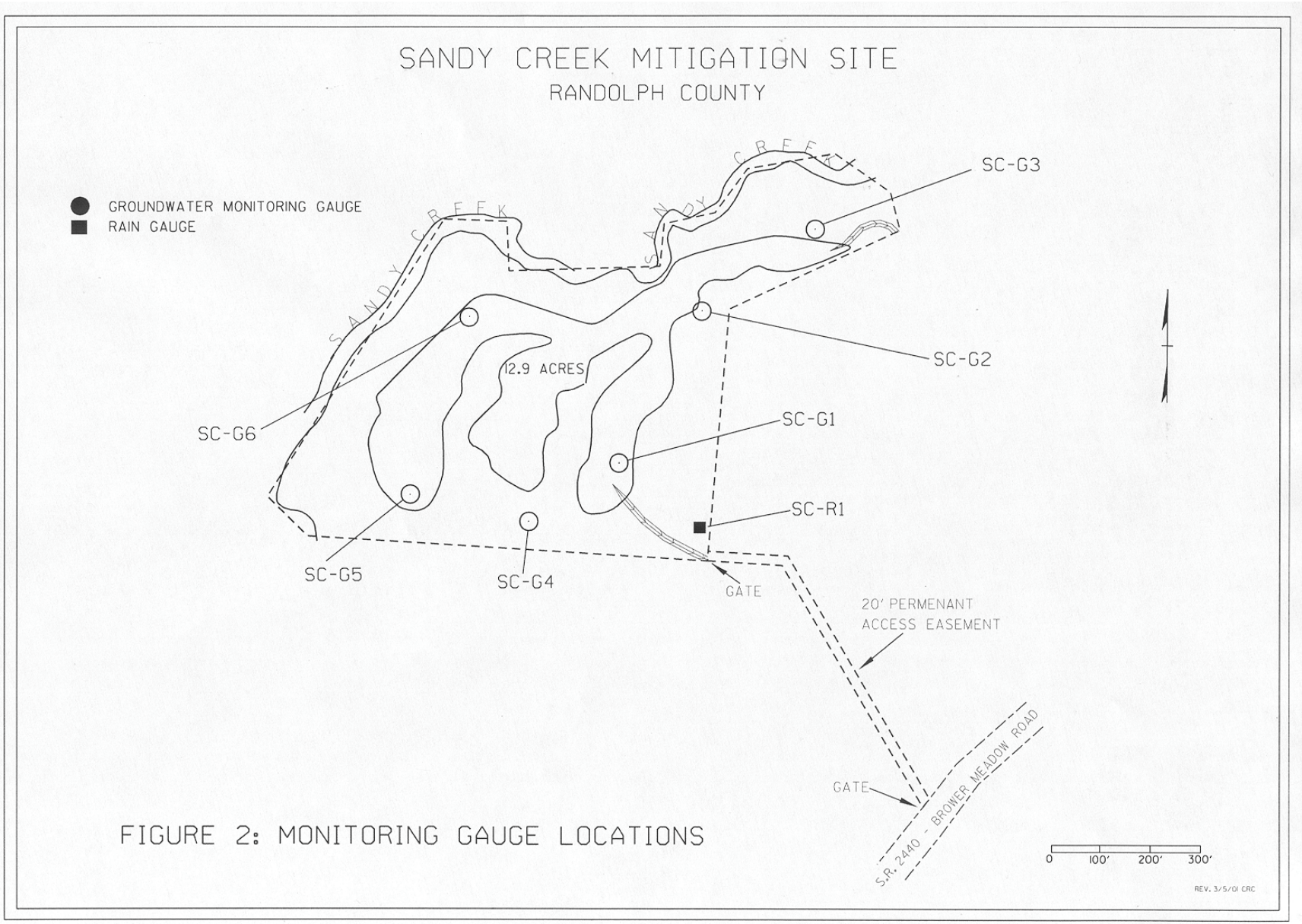


FIGURE 2: MONITORING GAUGE LOCATIONS

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 gauge. This number was converted into a percentage of the 228-day growing season. Table 2 presents the 2002 results.

Appendix A contains a graph of the groundwater depth for each monitoring gauge. The maximum number of consecutive days is noted on each graph. Graph data determined to be erroneous was omitted; therefore, some gaps appear in the plots. Local precipitation events are included on each graph as bars.

Table 2
2002 HYDROLOGIC MONITORING RESULTS

Monitoring Gauge	< 5%	5 - 8%	8 - 12.5%	> 12.5%	Actual %	Dates Meeting Success
SC-G1				✓	30.3	March 23-April 22 Aug 31-Nov 7
SC-G2				✓	34.7	March 23-June 9 June 28-August 9 Aug 26-Nov 7
SC-G3				✓	31.6	March 23-April 29 Aug 28-Nov 7
SC-G4				✓	23.4	Sept 15-Nov 7
SC-G5				✓	32.5	March 23-May 17 June 28-August 20 Aug 26-Nov 7
SC-G6				✓	18.9	May 2-June 10 June 28-August 9

Specific Gauge Problems

- **SC-G4:** The gauges battery was replaced and lost data from (February 27-April 9), which may have affected the gauge from meeting the success criteria.

All six gauges met jurisdictional hydrologic success of at least 12.5% during the growing season.

Figure 3 is a graphical representation of the hydrologic monitoring results for this year. A blue dot represents wetland hydrology for more than 12.5% of the season; a red dot indicates hydrology between 8% and 12.5%; a green dot represents hydrology between 5% and 8%.

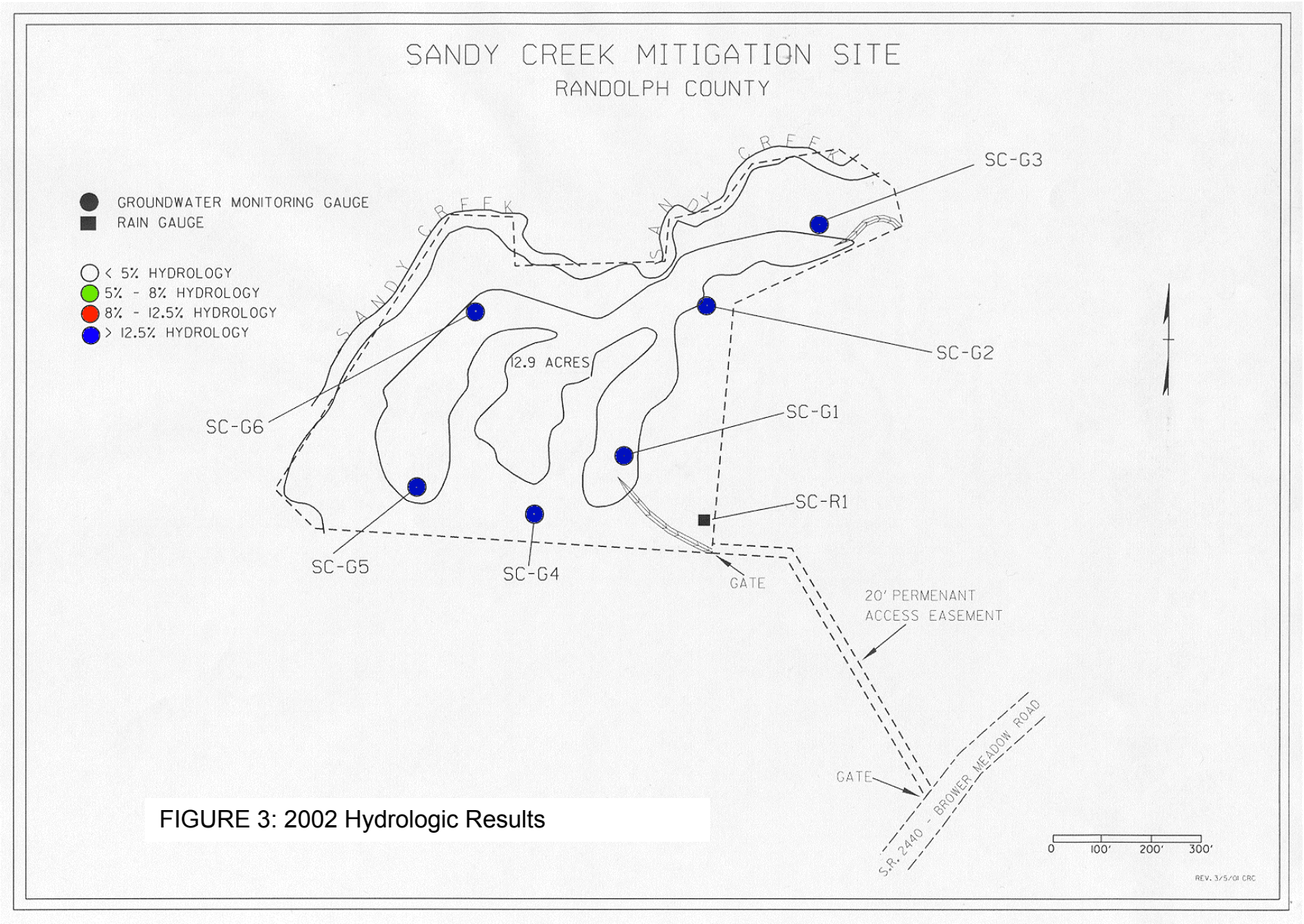


FIGURE 3: 2002 Hydrologic Results

2.3.2 Climatic Data

Figure 4 represents an examination of year 2002 rainfall in comparison with historical rainfall data in order to determine whether 2002 was “average” in terms of precipitation. The historical rainfall data was collected from 1971 through 2002 (30 years). All rainfall data was collected from the NC Climate Office, Randleman weather station.

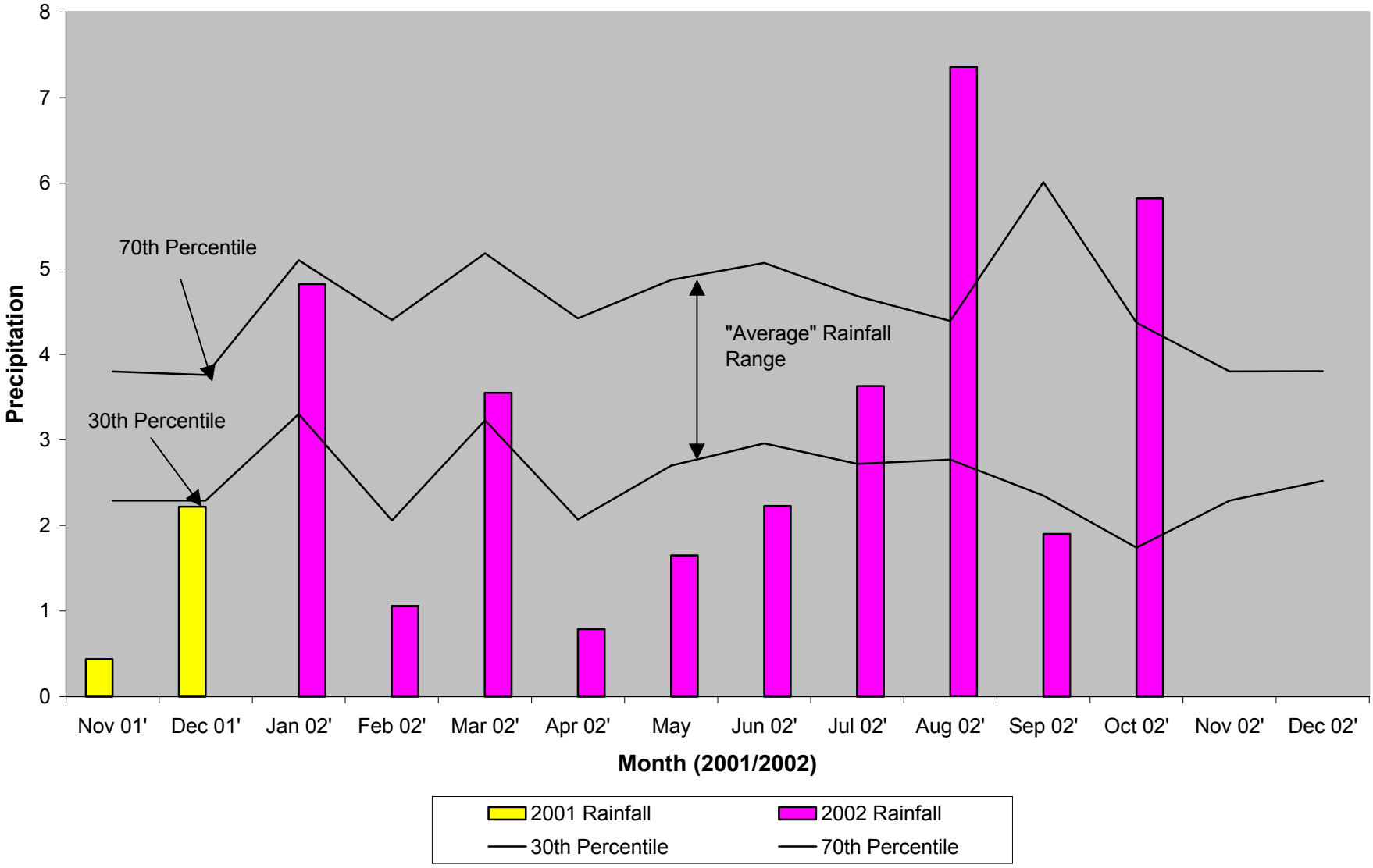
Months below the normal rainfall include February, April, May, June, and September. Months with normal rainfall include January, March, and July. August and October were the only months to experience above normal rainfall conditions. The site experienced less than average rainfall for 2002.

2.4 Conclusions

2002 represents the second full growing season that the hydrologic data has been examined. All six monitoring gauges met the jurisdictional wetland hydrology for 12.5% of the growing season.

Despite 2002 being a much drier year than average, hydrologic monitoring has indicated that the site is consistently meeting the success criteria.

Figure 4: Sandy Creek 30-70 Percentile Graph
Randolph County



3.0 VEGETATION: SANDY CREEK MITIGATION SITE (YEAR 2 MONITORING)

3.1 Success Criteria

Success Criteria states that there must be a minimum of 240 trees per acre living for at least five consecutive years.

3.2 Description of Species

The following species were planted in the Wetland Restoration Area: (approximately 10 acres)

Nyssa sylvatica, Blackgum

Fraxinus pennsylvanica, Green Ash

Quercus phellos, Willow Oak

Betula nigra, River Birch

Quercus falcata var. *pagodaefolia*, Cherrybark Oak

Quercus nigra, Water Oak

Quercus falcata, Southern Red Oak

3.3 Results of Vegetation Monitoring

Table 3. 2002 Vegetative Monitoring Results

Plot #	Blackgum	Green Ash	Willow Oak	River Birch	Cherrybark Oak	Water Oak	Tulip Poplar	Southern Red Oak	Total (2 year)	Total (at planting)	Density (Trees/Acre)
1	3	19	10	8	4	2	3		49	56	595
2	1	16	9	10	2	2			40	55	495
3	5	12	13	10	7	5		1	53	58	621
									AVERAGE DENSITY		570

Site Notes: Other species noted: smartweed, fescue, barnyard grass, various grasses, sedges, and jewelweed. Site was very dry. Standing water was not present on any area of site at time of monitoring.

3.4 Conclusions

Of the 12.9 acres on this site, approximately 10 acres involved tree planting. There were 3 vegetation monitoring plots established throughout the planting areas. The site was supplementally planted in March 2002. The 2002 vegetation monitoring of the site revealed an average tree density of 570 trees per acre. This average is well above the minimum success criteria of 240 trees per acre.

NCDOT will continue vegetation monitoring at the Sandy Creek Mitigation Site.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

Hydrologic monitoring indicated that the site is consistently meeting the success criteria. The shortest period of inundation/saturation was 18.9 percent of the growing season and all gauge locations exhibited much longer periods of inundation/saturation.

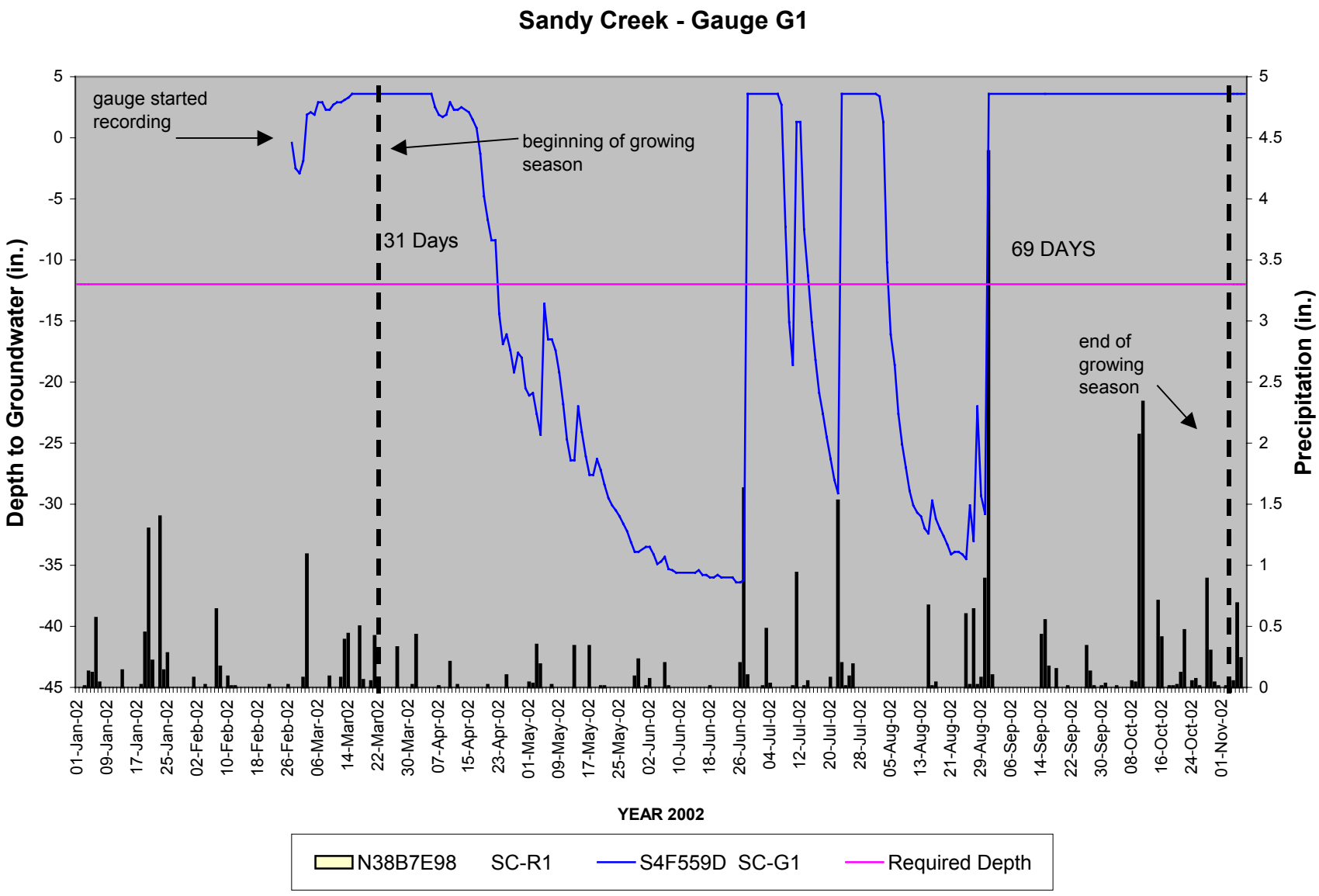
The site was supplementally planted in March 2002. The 2002 vegetation monitoring of the site revealed an average tree density of 570 trees/acre.

NCDOT will continue to monitor the site for hydrologic success and vegetative success.

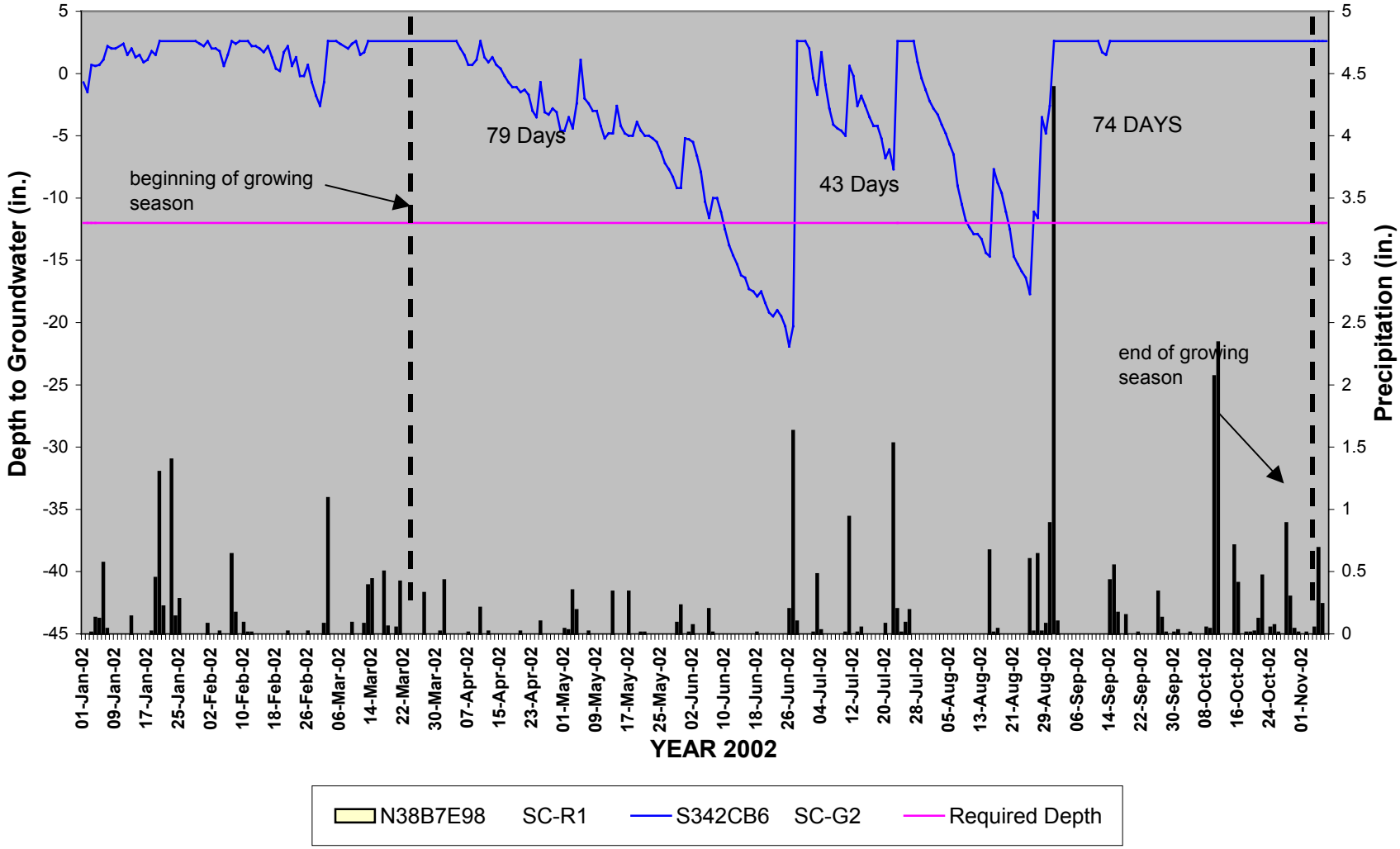
APPENDIX A

DEPTH TO GROUNDWATER GRAPHS

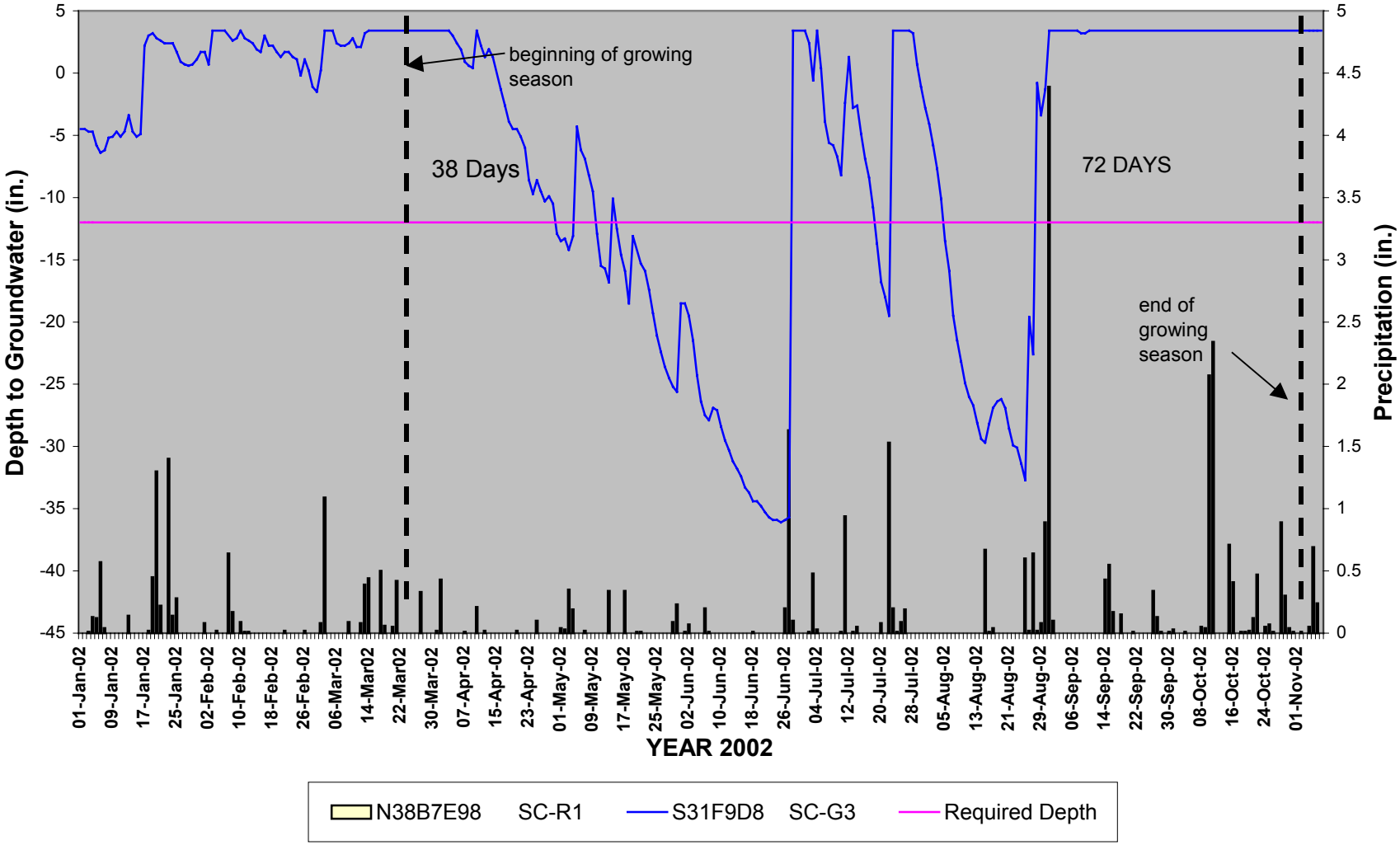
SANDY CREEK MONITORING GROUNDWATER GRAPHS



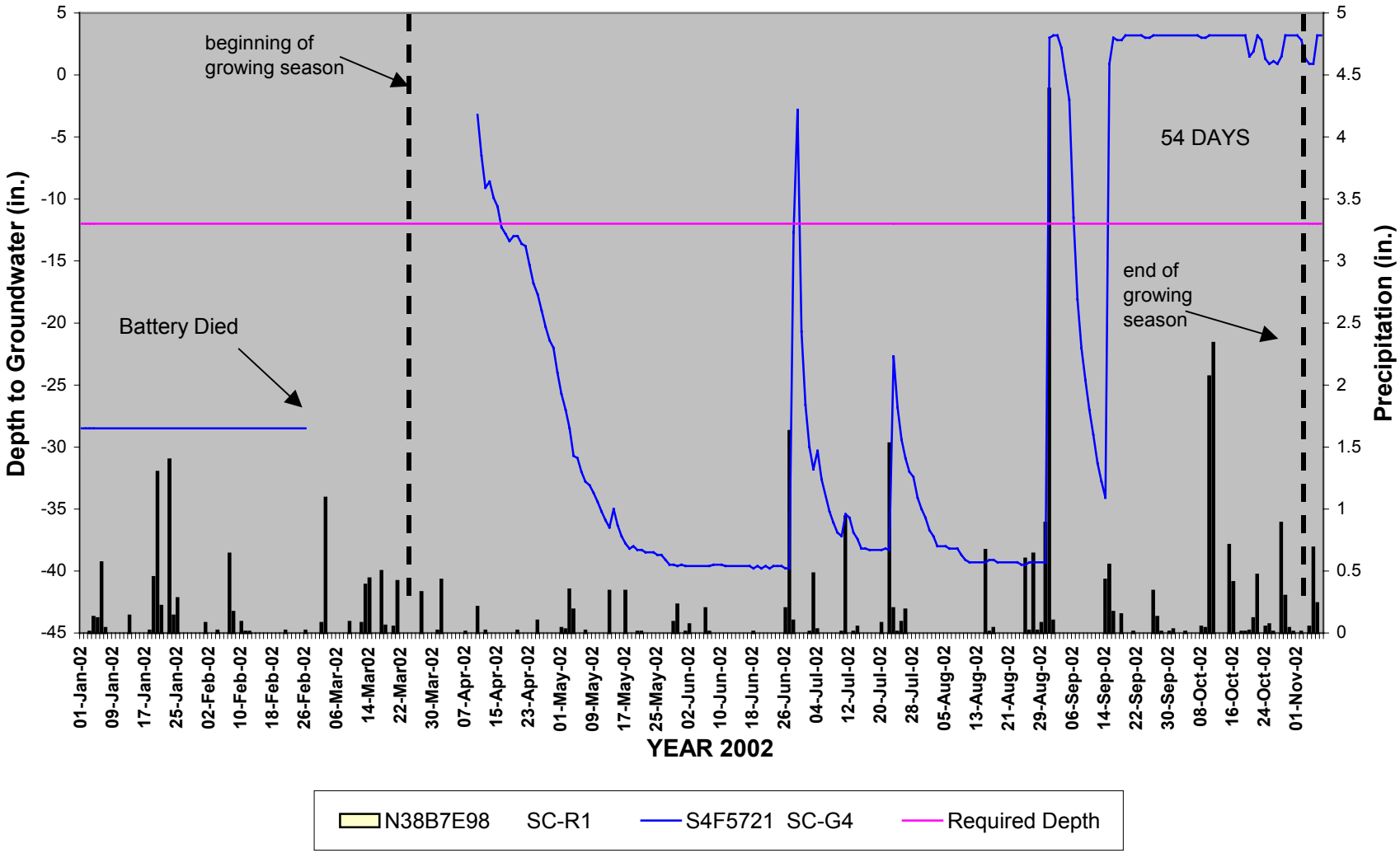
Sandy Creek - Gauge G2



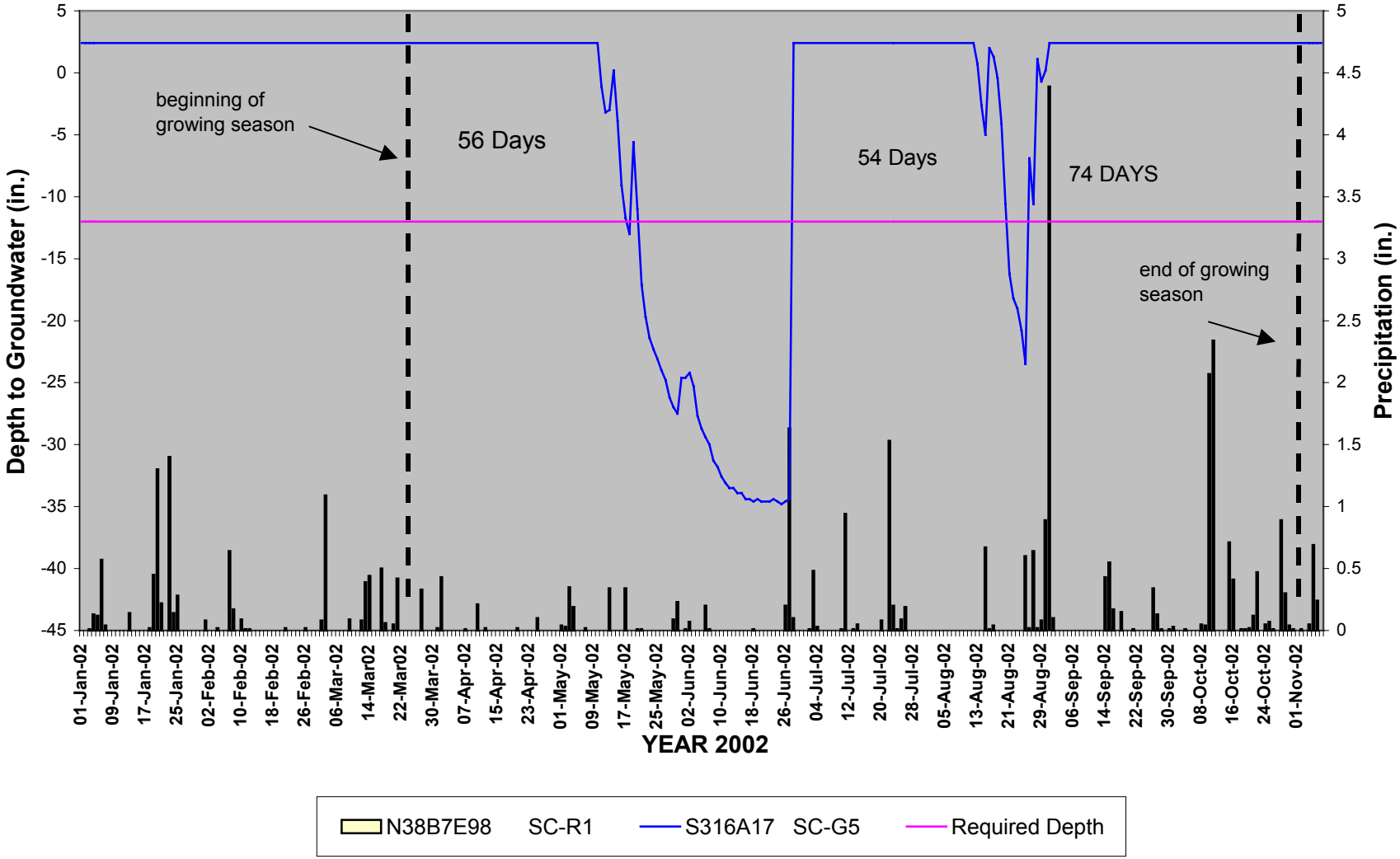
Sandy Creek - Gauge G3

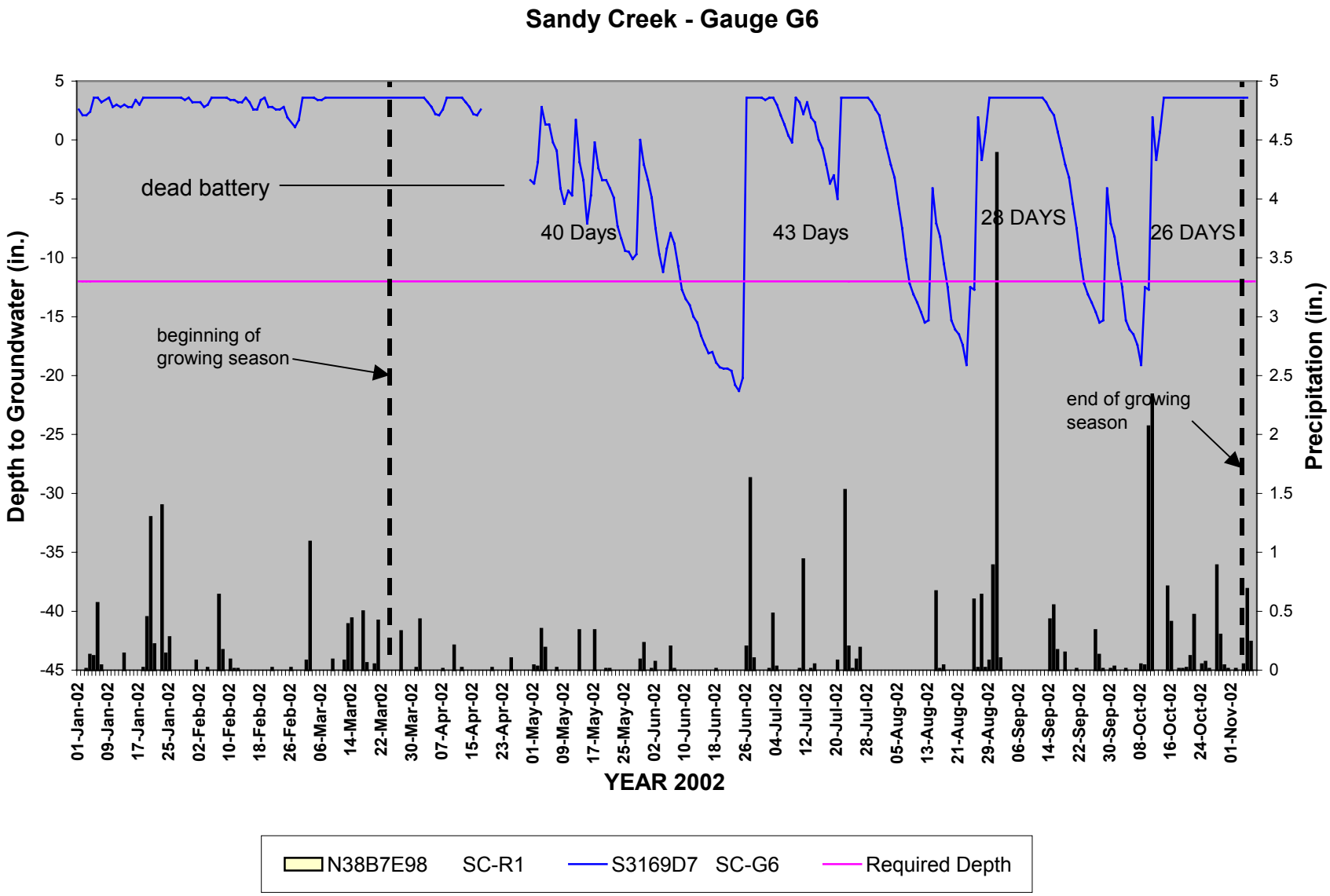


Sandy Creek - Gauge G4



Sandy Creek - Gauge G5




Sandy Creek - Gauge G6
Depth to Groundwater (in.)
Precipitation (in.)
dead battery
beginning of growing season
40 Days
43 Days
28 DAYS
26 DAYS
end of growing season
YEAR 2002
N38B7E98 SC-R1
S3169D7 SC-G6
Required Depth

APPENDIX B

PHOTO AND VEGETATION PLOT LOCATIONS, SITE PHOTO

SANDY CREEK MITIGATION SITE

Photo and Plot Locations

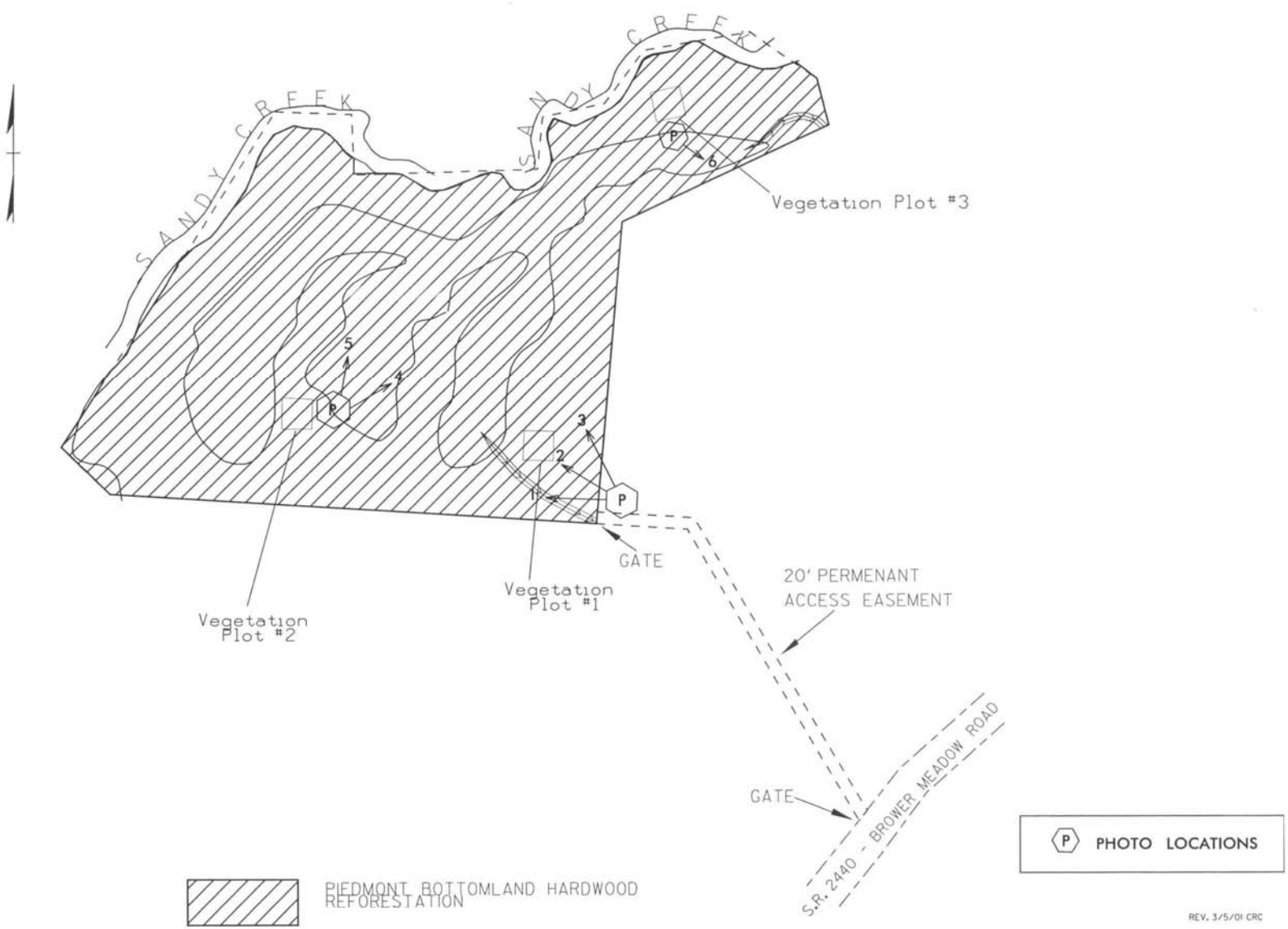


Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6