

# ANNUAL REPORT FOR 2001



**Long Creek Mitigation Site  
Mecklenburg County  
Project No. 8.U672204  
TIP No. R-2248**



Natural Systems Unit & Roadside Environmental Unit  
North Carolina Department of Transportation  
December 2001

# TABLE OF CONTENTS

<b>SUMMARY .....</b>	<b>1</b>
<b>1.0 INTRODUCTION .....</b>	<b>2</b>
1.1 PROJECT DESCRIPTION .....	2
1.2 PURPOSE.....	2
1.3 PROJECT HISTORY.....	2
1.4 DEBIT LEDGER.....	4
<b>2.0 HYDROLOGY.....</b>	<b>5</b>
2.1 SUCCESS CRITERIA .....	5
2.2 HYDROLOGIC DESCRIPTION.....	5
2.3 RESULTS OF HYDROLOGIC MONITORING .....	7
2.3.1 Site Data.....	7
2.3.2 Climatic Data.....	8
2.4 CONCLUSIONS.....	8
<b>3.0 VEGETATION: LONG CREEK MITIGATION SITE.....</b>	<b>11</b>
3.1 SUCCESS CRITERIA .....	11
3.2 DESCRIPTION OF SPECIES .....	11
3.3 RESULTS OF VEGETATION MONITORING .....	11
3.4 CONCLUSIONS.....	12
<b>4.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>13</b>

## **LIST OF FIGURES**

Figure 1.	Site Location Map .....	3
Figure 2.	Long Creek Site Gauge Location Map .....	6
Figure 3.	Long Creek Site 2001 Hydrologic Monitoring Results .....	9
Figure 4.	Long Creek 30-70 Percentile Graph, Charlotte, NC .....	10

## **LIST OF TABLES**

Table 1.	Long Creek Mitigation Site Debit Ledger.....	4
Table 2.	2001 Hydrologic Monitoring Results – Groundwater Gauges .....	7
Table 3.	Vegetation Monitoring Statistics, by plot .....	11

## **APPENDICES**

APPENDIX A	DEPTH TO GROUNDWATER PLOTS
APPENDIX B	SITE PHOTOS

## Summary

The Long Creek Mitigation Site is located in Mecklenburg County and was constructed in 1996. In order to receive mitigation credit, the site must meet jurisdictional success criteria for both wetland hydrology and vegetation for three consecutive years. The following report details the monitoring activities during the 2001-growing season. The 2001 data represents results from the fourth year of hydrologic monitoring and the fifth year of vegetation monitoring.

Two Infinity rain gauges were installed on the site April 29, 2000. Before that time, the Charlotte weather station data was utilized exclusively.

In 2001, 2 of the eighteen gauges met the hydrologic success criteria.

The vegetation monitoring indicated tree survival well above the required 320 trees per acre for the fifth consecutive year. Because of the overwhelming success of the planted vegetation, it is recommended that vegetation monitoring be discontinued. If any additional grading is performed or additional water is put on the site by the outer loop at some point in the future, then vegetation monitoring will resume to ensure the survival of the plants.

Due to unauthorized site use, a gate was installed at the site's entrance in 2001.

During a site visit during February 2001, the NCDOT identified 2 possible problem areas on the site, where water was leaving the site. Maintenance work was done to stop surface flow from leaving the site by constructing a berm perpendicular in the swale and by placing a clay plug at the inlet of the cross pipe in March 2001. The site maintenance work is expected to improve hydrology. NCDOT will continue hydrologic monitoring.

# 1.0 Introduction

## 1.1 PROJECT DESCRIPTION

Located in Mecklenburg County, the Long Creek Mitigation Site encompasses approximately 156 acres. It is situated off of Beatties Ford Road (SR 2074) and will be bisected by the future I-485 (Figure 1). This project provides compensatory mitigation for wetland impacts associated with sections of the proposed Charlotte Outer Loop.

The Long Creek Site is designed to restore a bottomland hardwood forest wetland. It was originally constructed in December of 1996, with 37 acres of the planting occurring in 1997. A five-acre portion, consisting of the former haul roads, was planted in early 1998. Groundwater, surface water, and rain gauges were installed in early 1998. 2001 is the fourth year of hydrologic monitoring and the fifth year of vegetation monitoring for the site.

## 1.2 PURPOSE

Monitoring of the Long Creek Site is required to demonstrate successful mitigation. The success of a wetland site is based predominantly on federal guidelines for wetland mitigation; these guidelines include minimum standards for hydrologic conditions and vegetation survival. Both hydrologic and vegetation monitoring is conducted throughout the growing season; success criteria must be met for three consecutive years. The following report details the results of the hydrologic and vegetation monitoring for 2001 at the Long Creek Mitigation Site.

## 1.3 PROJECT HISTORY

December 1996	Grading Construction
March 1997	Site planted (except 5 ac. of haul roads)
September 1997	Vegetation Monitoring (1 yr.)
October 1997	Monitoring Gauges Installed
March 1998	Haul Roads Planted
March- November 1998	Hydrologic Monitoring (1 yr.)
September 1998	Vegetation Monitoring (2 yr.)
March- November 1999	Hydrologic Monitoring (2 yr.)
September 1999	Vegetation Monitoring (3 yr.)
March- November 2000	Hydrologic Monitoring (3 yr.)
September 2000	Vegetation Monitoring (4 yr.)
March 2001	Site Maintenance
March- November 2001	Hydrologic Monitoring (4 yr.)
June 2001	Vegetation Monitoring (5 yr.)



**1.4 DEBIT LEDGER**

**Table 1. Long Creek Mitigation Site Debit Ledger**

Site Habitat	Mitigation Plan			TIP Debit					
	Acres at Start	Acres Remaining	Percent Remaining	R-2112B	R-2112 Bmod	R-2112 BA&BBmod	R-2112 Bmod	R-218A*	R-218B*
SPH Restoration/Creation	42.9	5.66	13.19	7.2	15	2	9.8	2.54	1.6

SPH: Swamp Hardwood      \*: proposed

## **2.0 Hydrology**

### **2.1 SUCCESS CRITERIA**

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

The growing season in Mecklenburg County begins March 22 and ends November 11, lasting 235 days. These dates correspond to a 50% probability that air temperatures will not drop below 28F or lower after March 22 and before November 11.<sup>1</sup> Minimum wetland hydrology is required for at least 12.5% of this growing season; for Mecklenburg County, this 12.5% equals 30 consecutive days. Local climate must represent average conditions for the area in order for the hydrologic data to be considered successful.

### **2.2 HYDROLOGIC DESCRIPTION**

Eighteen groundwater gauges, four surface water gauges, and two rain gauges were installed in October 1997 (Figure 2). Daily readings of the groundwater depth were taken throughout the growing season. 2001 is the fourth full growing season that the hydrology has been monitored. The rainfall data used to analyze the site's water level data is from onsite rain gauges.

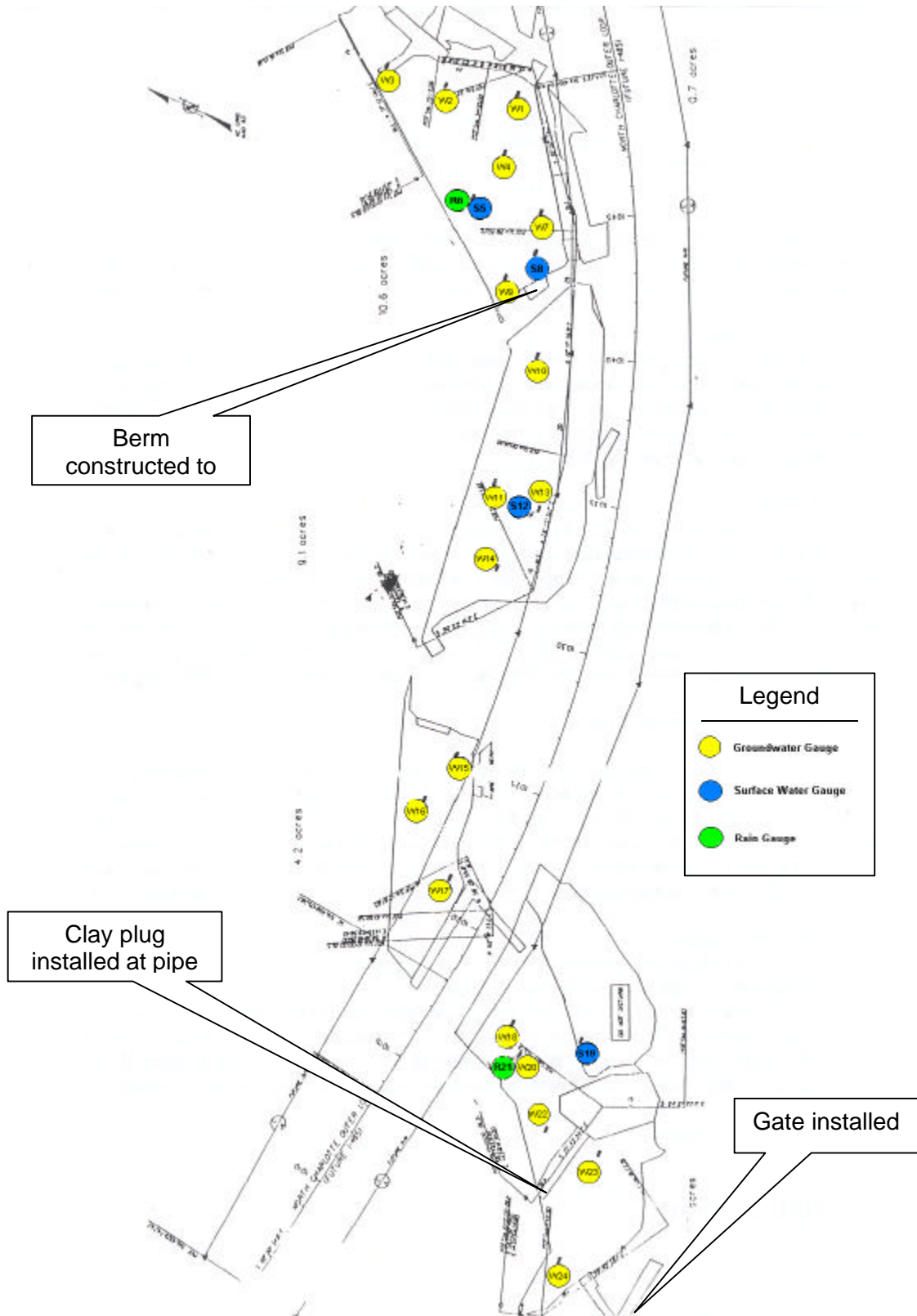
The Long Creek site was designed to function with rainfall as its primary hydrologic influence. Per the original mitigation plan for this site, a section of the Charlotte Outer Loop is scheduled for construction through the middle of the mitigation site. This new roadway should improve the hydrology of the site through the addition of runoff. Monitoring will continue through the construction phase of I-485 in order to determine whether this work will have any adverse effects on the mitigation site. Current monitoring is designed to show the influence of rainfall on site hydrology. The influence of Long Creek itself should be reflected in the data from the surface gauges.

During a site visit in February 2001, a swale and a pipe were determined to be draining two areas of the site. Both drainage issues were addressed in March 2001. Maintenance work was done to stop water from leaving the site by constructing a berm perpendicular in the swale and by placing a clay plug at the inlet of the cross pipe in March 2001.

---

<sup>1</sup> Natural Resources Conservation Service, Soil Survey of Mecklenburg County, North Carolina, p.61.

Figure 2. Long Creek Site Gauge Location Map



## 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 235-day growing season. The results are presented in Table 2.

Appendix A contains charts of the water depth for each monitoring gauges and surface gauges. Precipitation is shown on each graph as bars. These graphs show the reaction at each monitoring location of the groundwater level to specific rainfall events. If 5% of the growing season is met, the maximum number of consecutive days is noted on each graph. Several of the data sets were interrupted due to dead batteries; specifically groundwater gauges 2, 14, 23, and 24. These interruptions are noted on the graphs.

The placement of the groundwater gauges and a graphical representation of the hydrologic monitoring results are provided in Figure 3.

**Table 2.** 2001 Hydrologic Monitoring Results – Groundwater Gauges

Monitoring Gauge	<5%	5-8%	8-12.5%	>12.5%	Actual %	Dates of Success
LCW-1			✓		10.2	Mar 22 – Apr 14
LCW-2*	✓				0.0	
LCW-3				✓	17.9	Mar 22 – May 2
LCW-4			✓		11.1	Mar 22 – Apr 16
LCW-7			✓		10.2	Mar 22 – Apr 14
LCW-9	✓				1.7	Mar 30 – Apr 2
LCW-10			✓		8.5	Mar 22 – Apr 10
LCW-11			✓		10.2	Mar 22 – Apr 14
LCW-13			✓		12.3	Mar 22 – Apr 19
LCW-14*	✓				0.0	
LCW-15				✓	13.2	Mar 22 – Apr 21
LCW-16	✓				3.8	Mar 30 – Apr 8
LCW-17			✓		11.5	Mar 22 – Apr 17
LCW-18	✓				4.3	Mar 30 – Apr 8
LCW-20	✓				0.0	
LCW-22			✓		11.1	Mar 22 – Apr 16
LCW-23*	✓				0.0	

LCW-24**	✓				2.6	May 26 – May 31
----------	---	--	--	--	-----	-----------------

\* Gauge malfunctioned from Mar 22 – May 1. \*\* Gauge malfunctioned from Apr 12 – May 1.

### 2.3.2 Climatic Data

Figure 4 is a comparison of the 2001 monthly rainfall to historical precipitation (collected between 1948 and 2000) for the Charlotte area. Rainfall data presented in the figure represents an average of the onsite gauges. It is assumed that, if the 2001 rainfall totals represented by bars fall between the average precipitation lines for each month, then the local climate was experiencing average conditions for that particular region. This comparison gives an indication of how 2001 relates to historical data in terms of average rainfall.

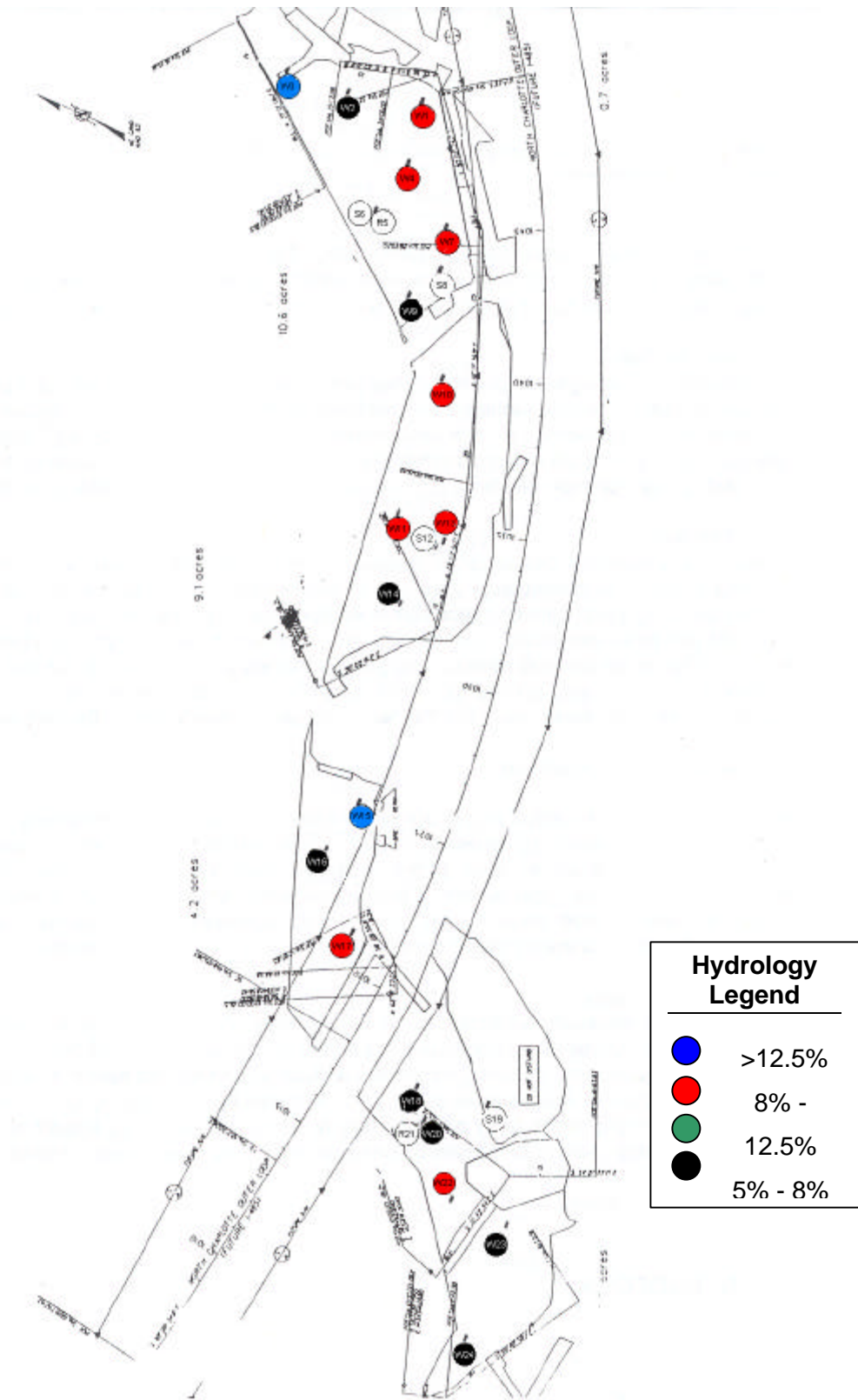
Months below the normal rainfall include: January, February, April, August, and October. Months with normal rainfall include: May, June, July, and September. The only month with above normal rainfall conditions was March. November and December 2001 rainfall were not available for this report, so data from 2000 was used.

### 2.4 CONCLUSIONS

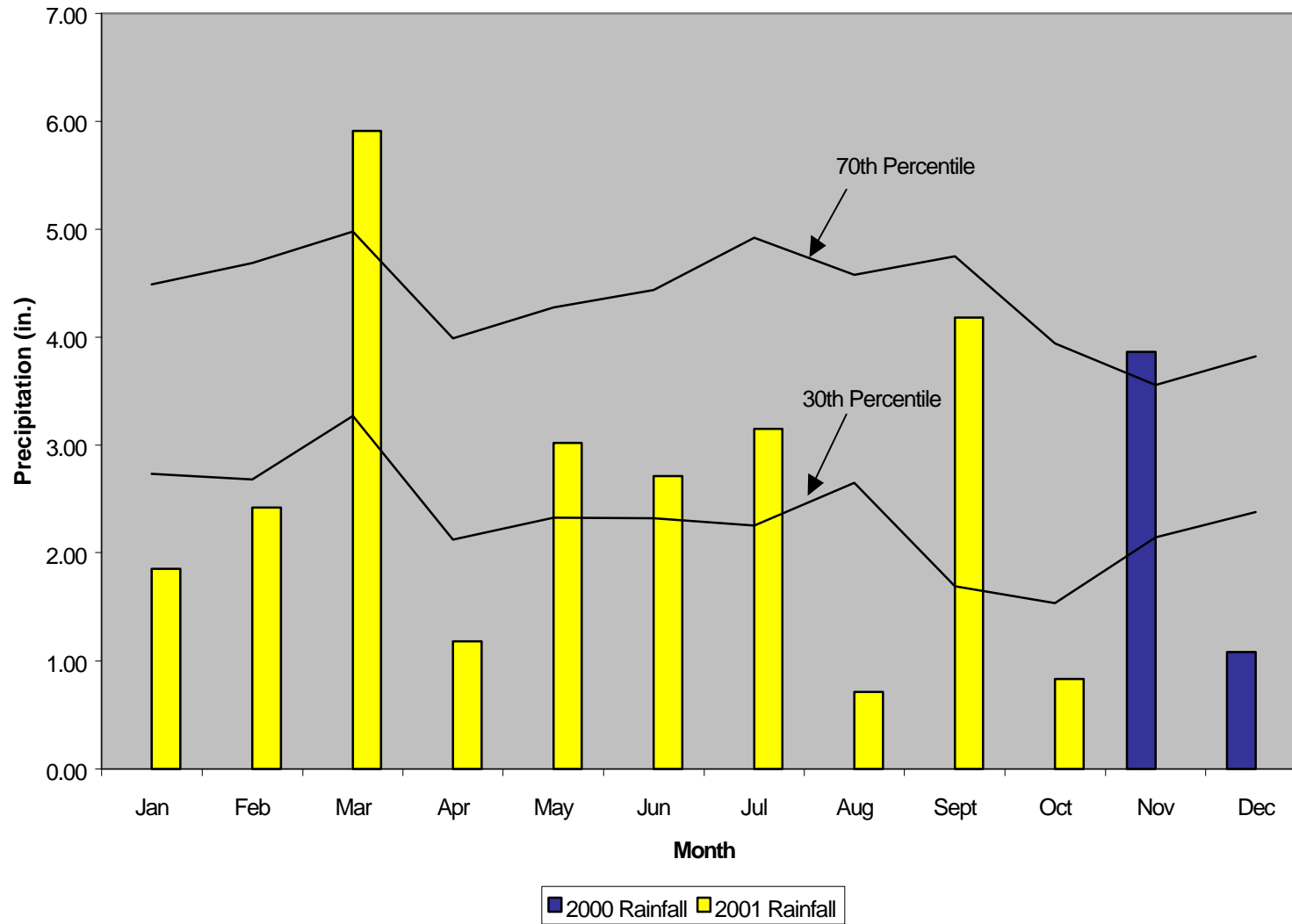
Charlotte experienced dry climatic conditions and several gauges experienced malfunctions during the spring of 2001. Two of the eighteen gauges showed saturation for 12.5% of the growing season, 8 of the gauges showed between 8 and 12.5% saturation, and 8 of the gauges showed less than 5% saturation during the growing season.

Hydrology is expected to improve due to the maintenance work performed in March of 2001. DOT will continue hydrologic monitoring the site.

**Figure 3. Long Creek Site 2001 Hydrologic Monitoring Results**



**Figure 4.** Long Creek 30-70 Percentile Graph, Charlotte, NC



### 3.0 Vegetation: Long Creek Mitigation Site (Year 5 Monitoring)

#### 3.1 SUCCESS CRITERIA

Success Criteria states that there must be a minimum mean density of 320 trees per acre of approved target species surviving for at least three years.

#### 3.2 DESCRIPTION OF SPECIES

The following tree species were planted in the Wetland Restoration Area:

- Fraxinus pennsylvanica*, Green Ash
- Fraxinus caroliniana*, Carolina Ash
- Betula nigra*, River Birch
- Quercus phellos*, Willow Oak
- Liriodendron tulipifera*, Tulip Poplar
- Quercus michauxii*, Swamp Chestnut Oak
- Quercus falcata* var. *pagodaefolia*, Cherrybark Oak
- Ulmus americana*, American Elm

#### 3.3 RESULTS OF VEGETATION MONITORING

**Table 3.** Vegetation Monitoring Statistics, by plot

Plot # (Type)	Green Ash	Carolina Ash	Cherrybark Oak	Swp. Chestnut Oak	American Elm	Tulip Poplar	River Birch	Willow Oak	Total	Total (at planting)	Density (Tree/Acre)
1(BLH)	11	1	6	6			1	8	33	35	641
2(BLH)	8	1	9	7			2	8	35	35	680
3(BLH)	9	1		10	4		9	2	35	35	680
4(BLH)	12	9	2		6		3	3	35	35	680
5(BLH)	9	1	9	1	7	2	4	2	35	35	680
6(BLH)	8	1	7	1	8	2		8	35	35	680
<b>AVERAGE DENSITY</b>											<b>674</b>

**Site Notes:** Other species noted: lespedeza, ragweed, cottonwood, dense briars, blackberry, sycamore, volunteer green ash, volunteer red cedar, various grasses, aster, boxelder, fennel, broomsedge, multiflora rose, and sweetgum (numerous sweetgum in Plots 4, 5, and 6). The presence of these species does not appear to be affecting the survival of the planted trees.

### **3.4 CONCLUSIONS**

Approximately 37 acres of this site was planted in bottomland hardwoods in March 1997. The remaining 5 acres of the site was planted in March 1998. There were 6 vegetation-monitoring plots established throughout the planting areas. The 2001 vegetation monitoring revealed an average tree density of 674 trees per acre. This average is gauge above the minimum success criteria of 320 trees per acre.

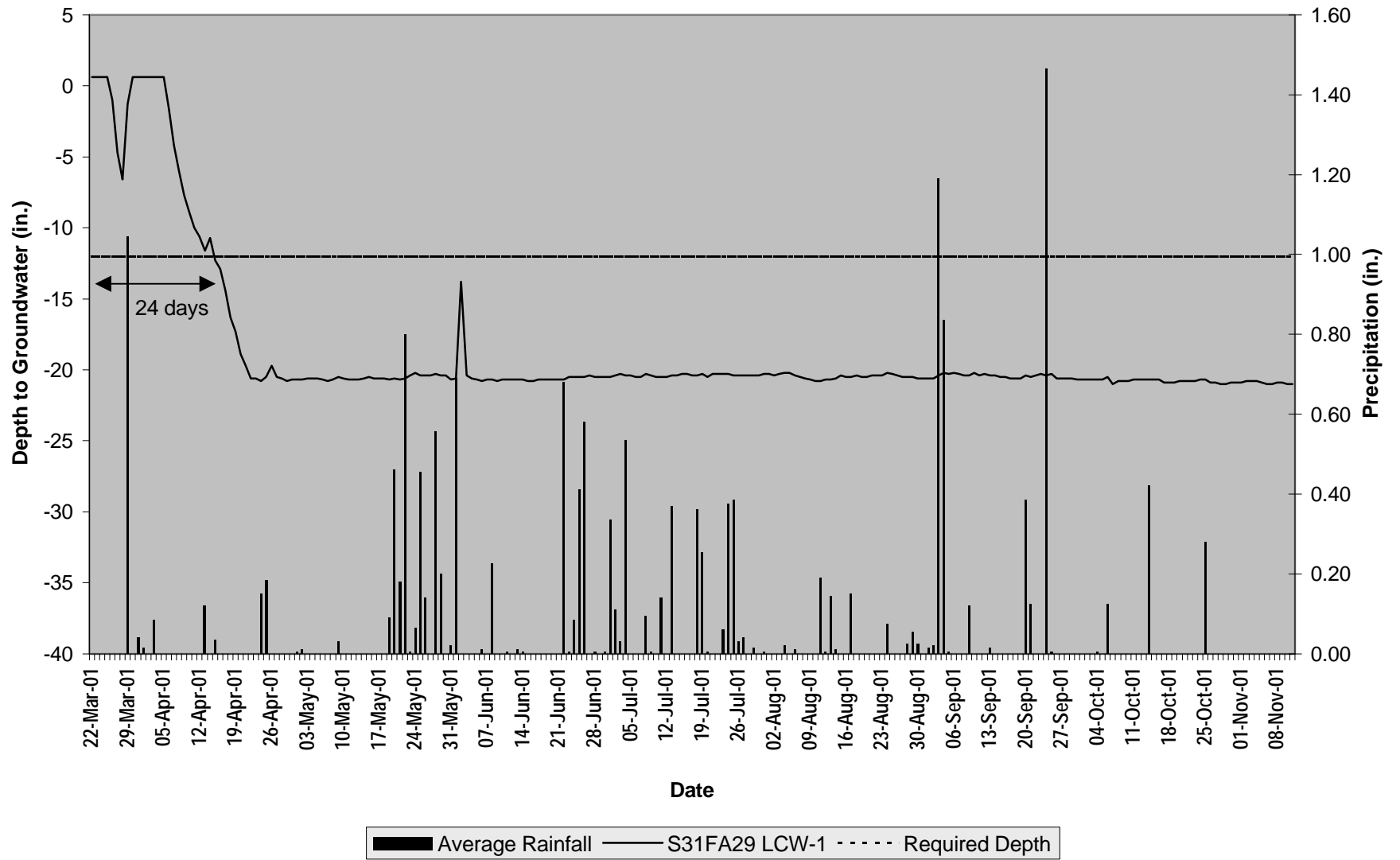
## **4.0 Overall Conclusions and Recommendations**

- Five years of vegetation monitoring has shown that the trees planted in 1997 are surviving. NCDOT would propose discontinuing the vegetation monitoring for the site. NCDOT recognizes that if any changes were made which would affect site hydrology, the vegetation would need to be monitored again to ensure there were no damaging effects to the plants.
- By stopping the drainage from the swale and pipe, hydrology is expected to improve at two locations. Additional runoff from the Charlotte outer loop is expected to improve the hydrology.
- Monitoring of groundwater and surface water levels will continue.

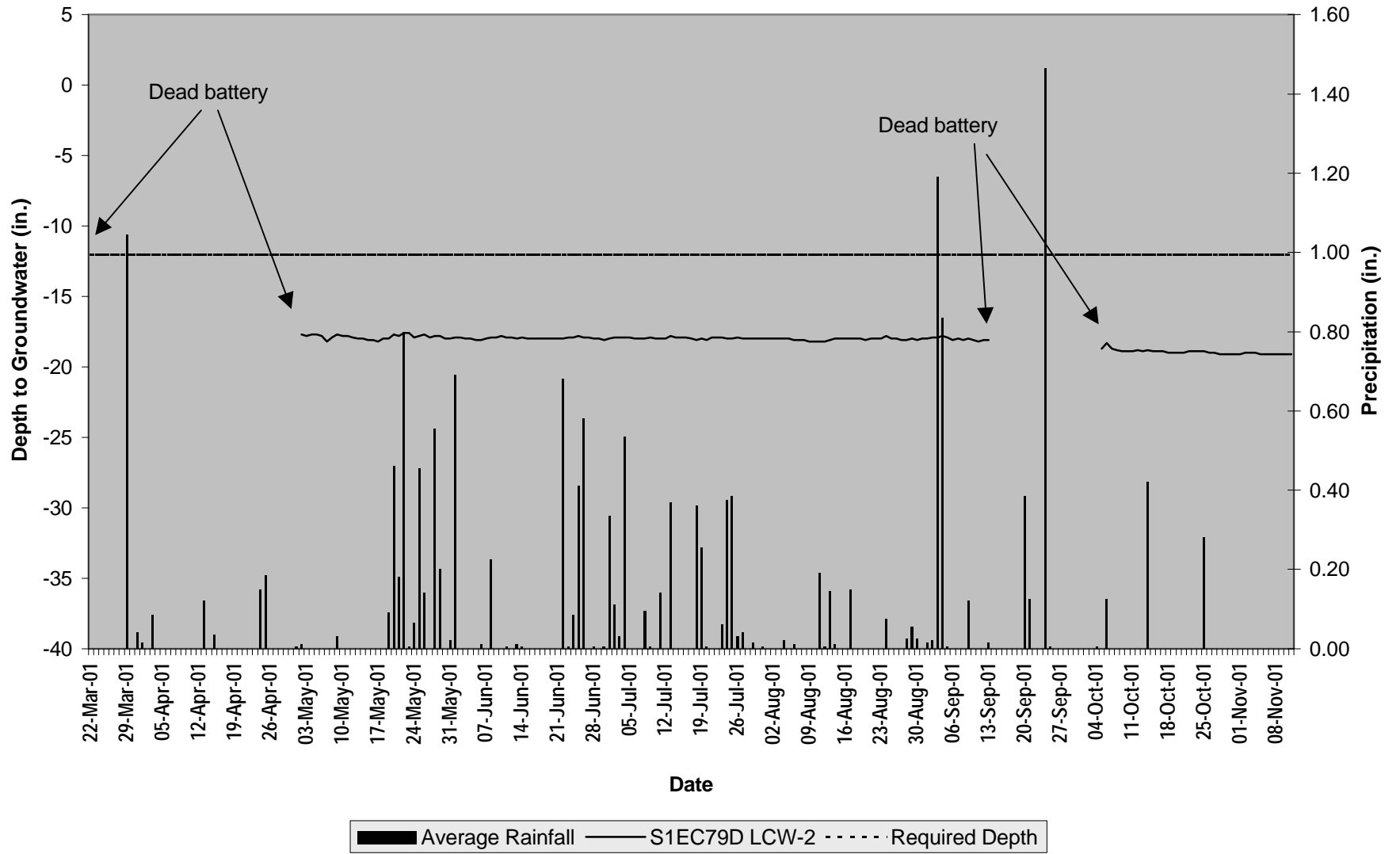
## **APPENDIX A**

### **DEPTH TO GROUNDWATER PLOTS**

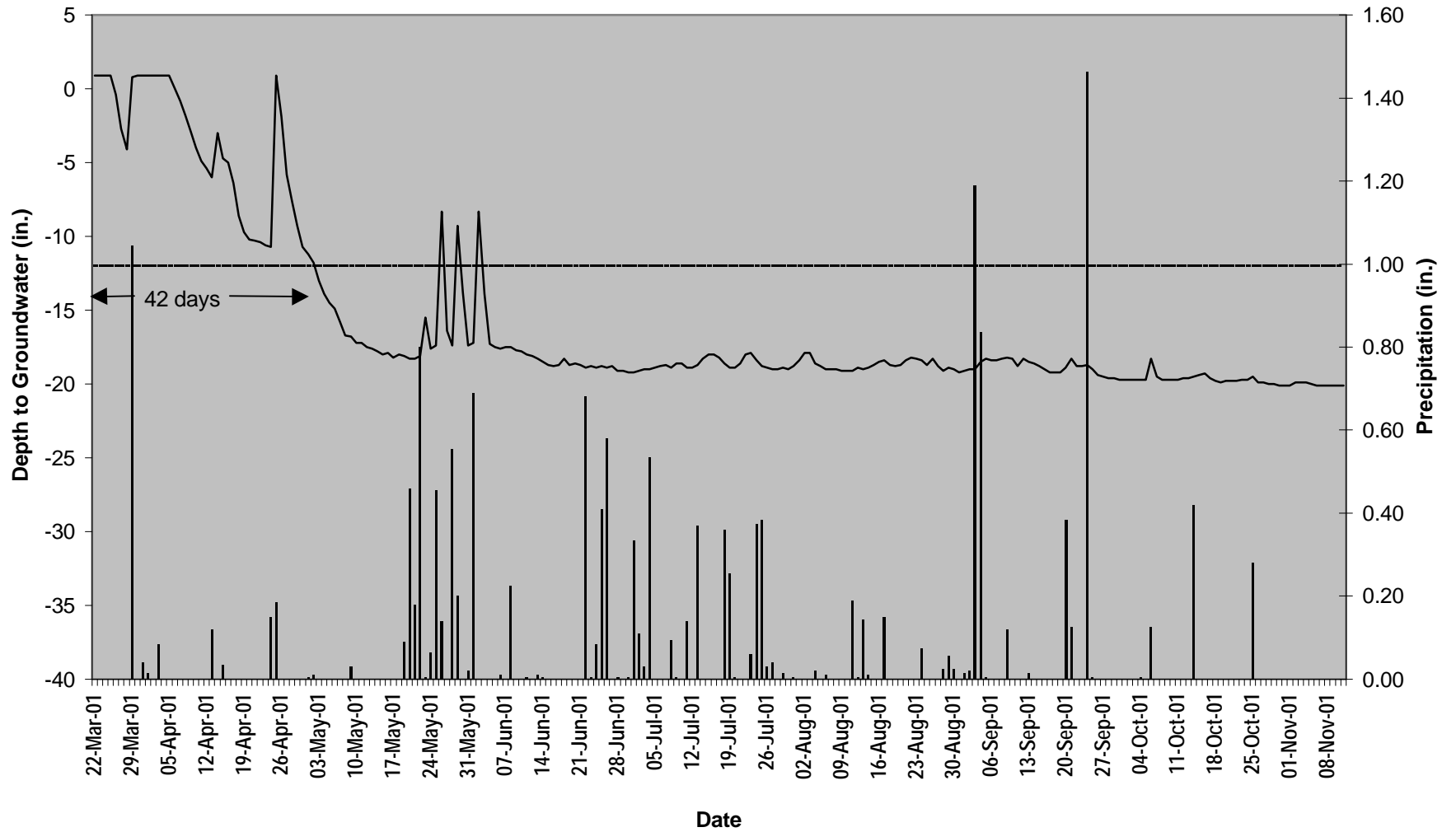
# Long Creek LCW-1



# Long Creek LCW-2

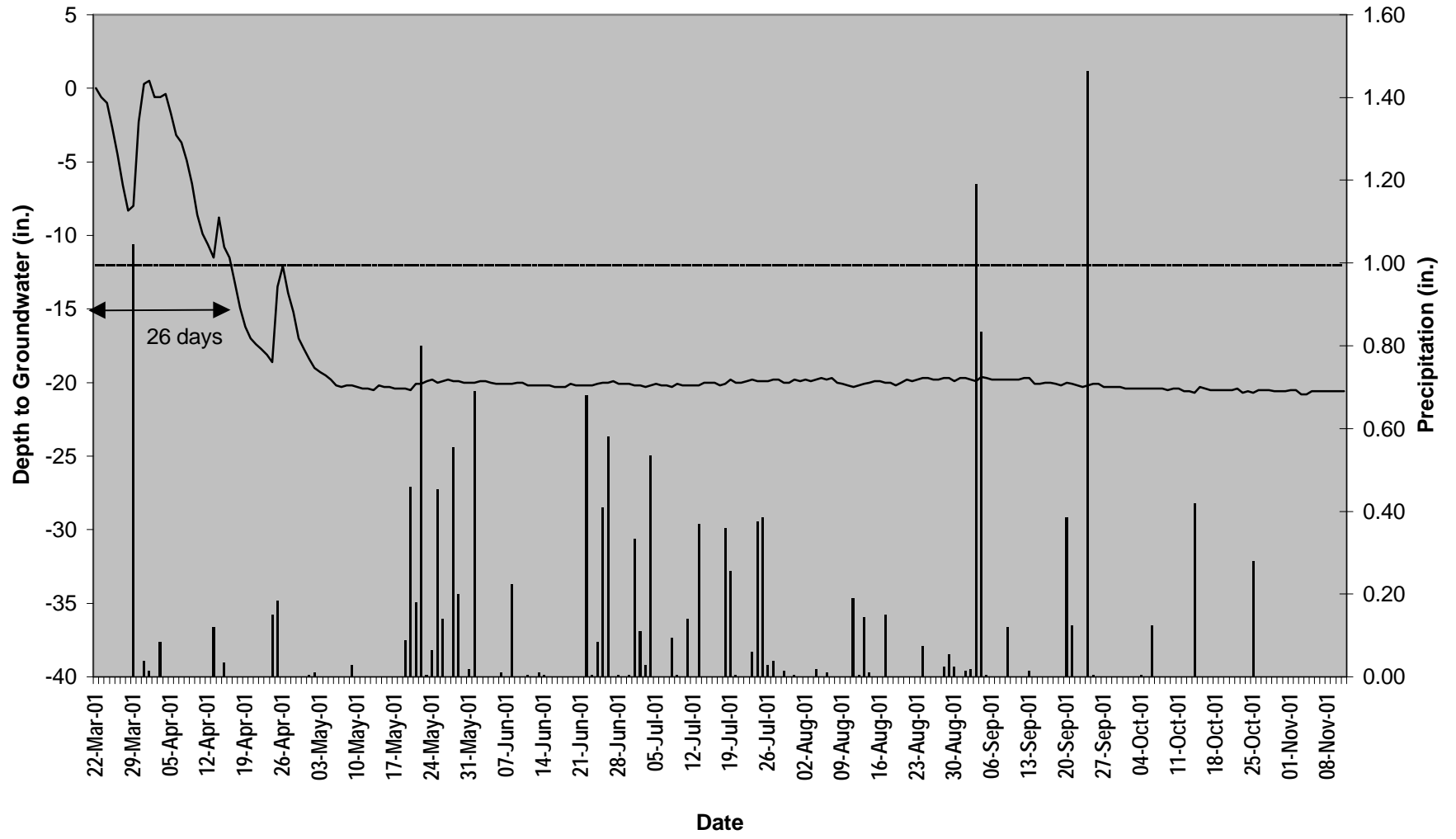


# Long Creek LCW-3



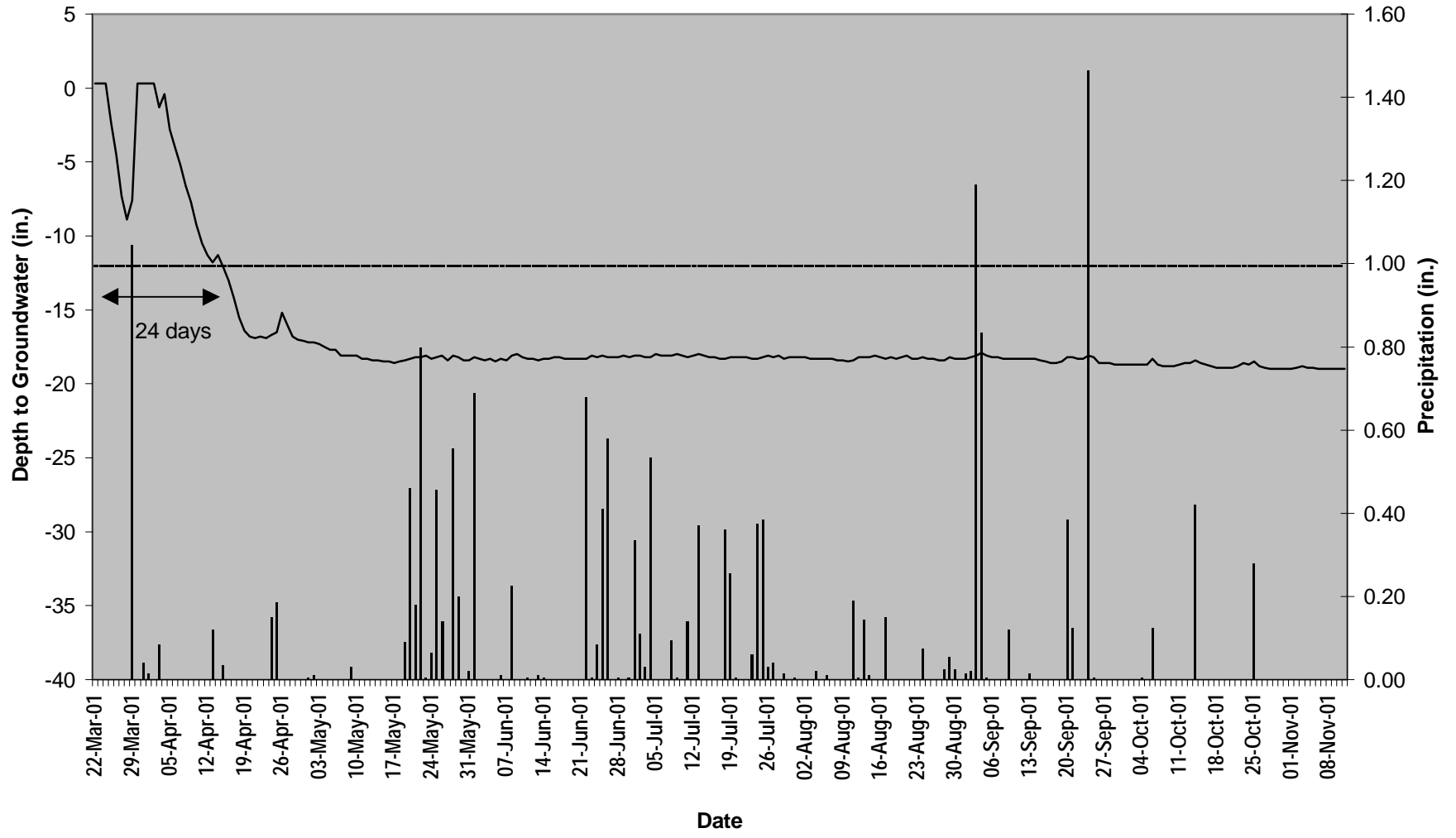
■ Average Rainfall    — S1EC9E3 LCW-3    - - - - Required Depth

# Long Creek LCW-4



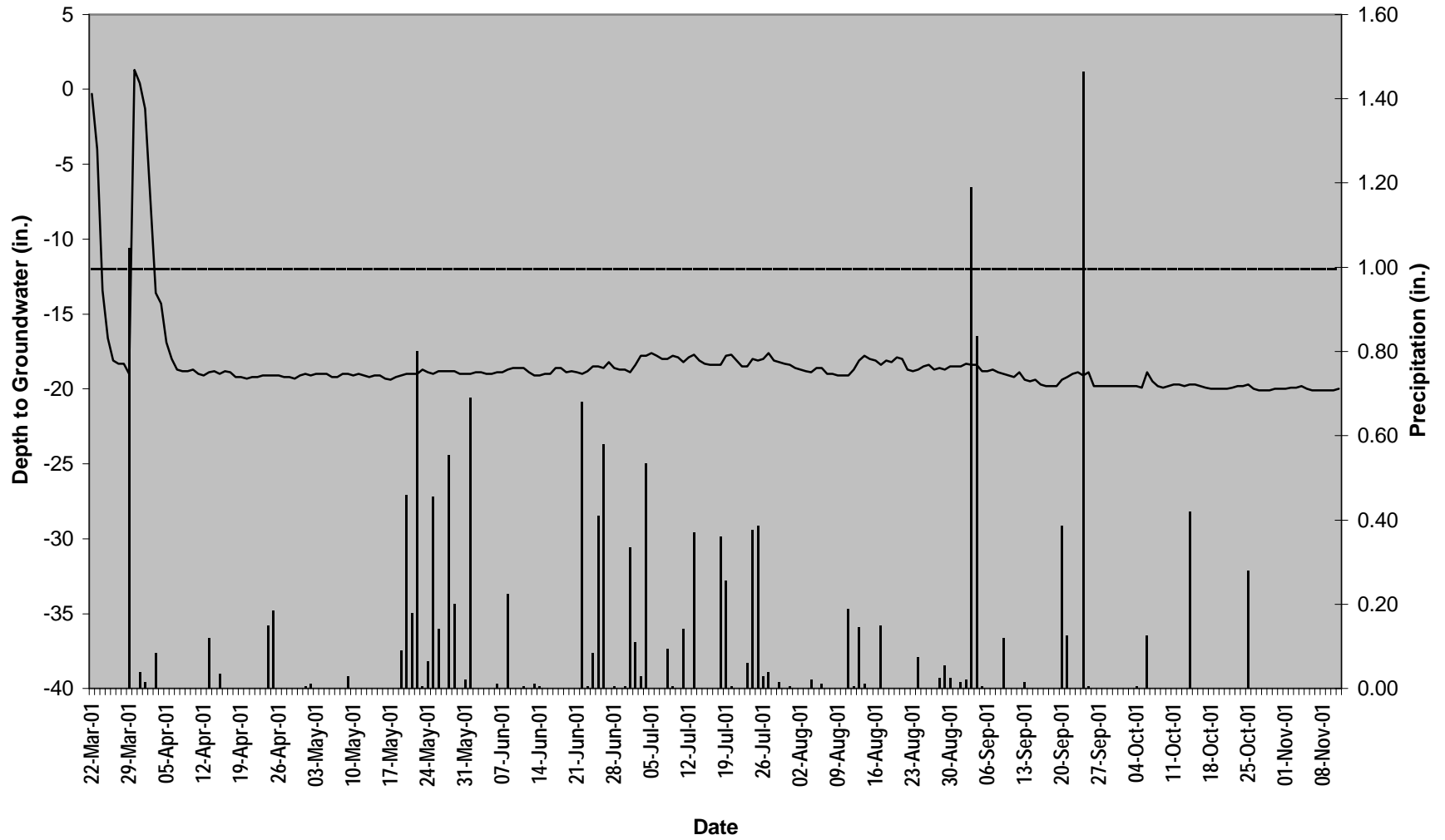
■ Average Rainfall    — S2EAA7C LCW-4    - - - - Required Depth

# Long Creek LCW-7



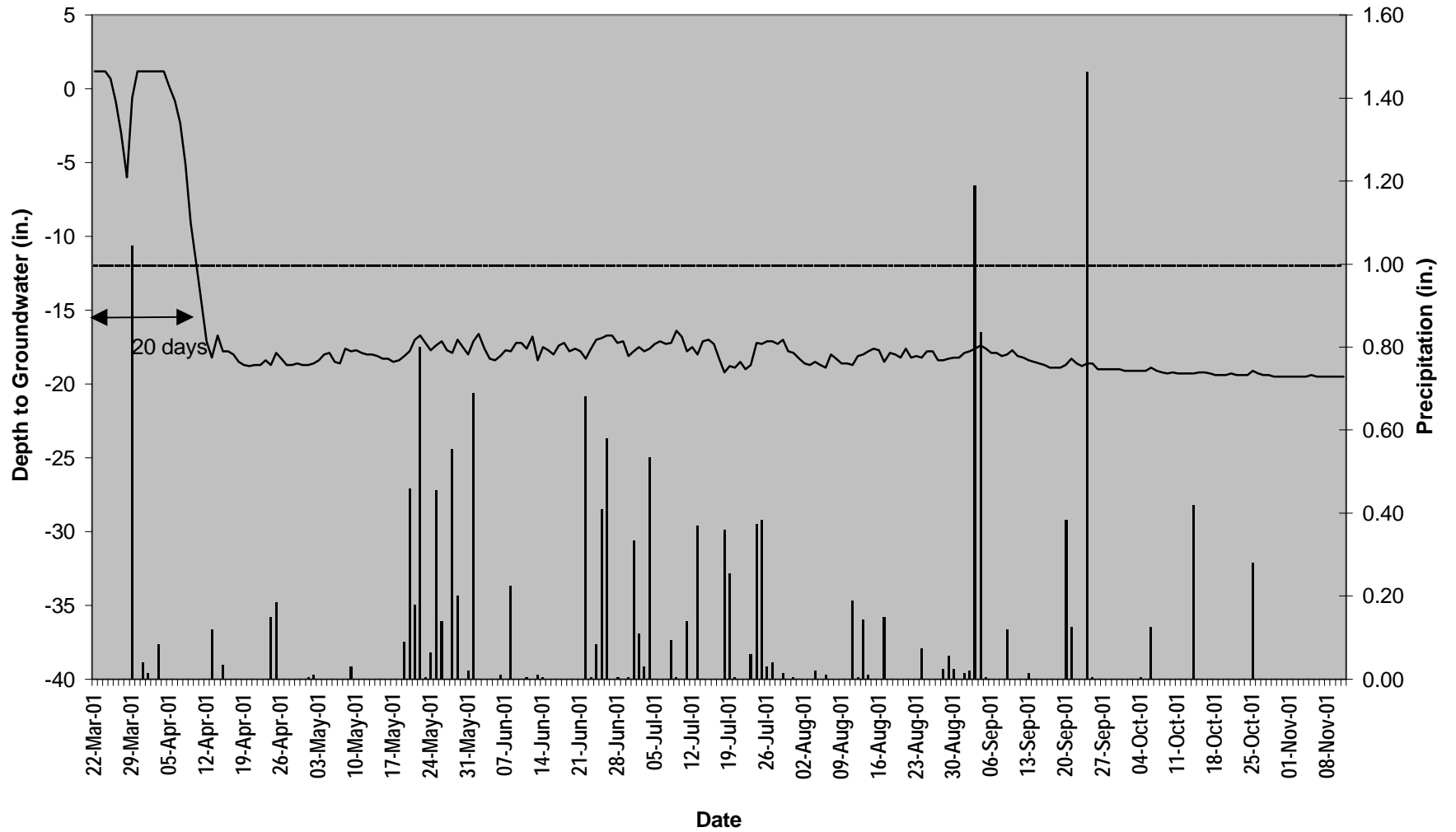
■ Average Rainfall    — S158C2D LCW-7    - - - - Required Depth

# Long Creek LCW-9



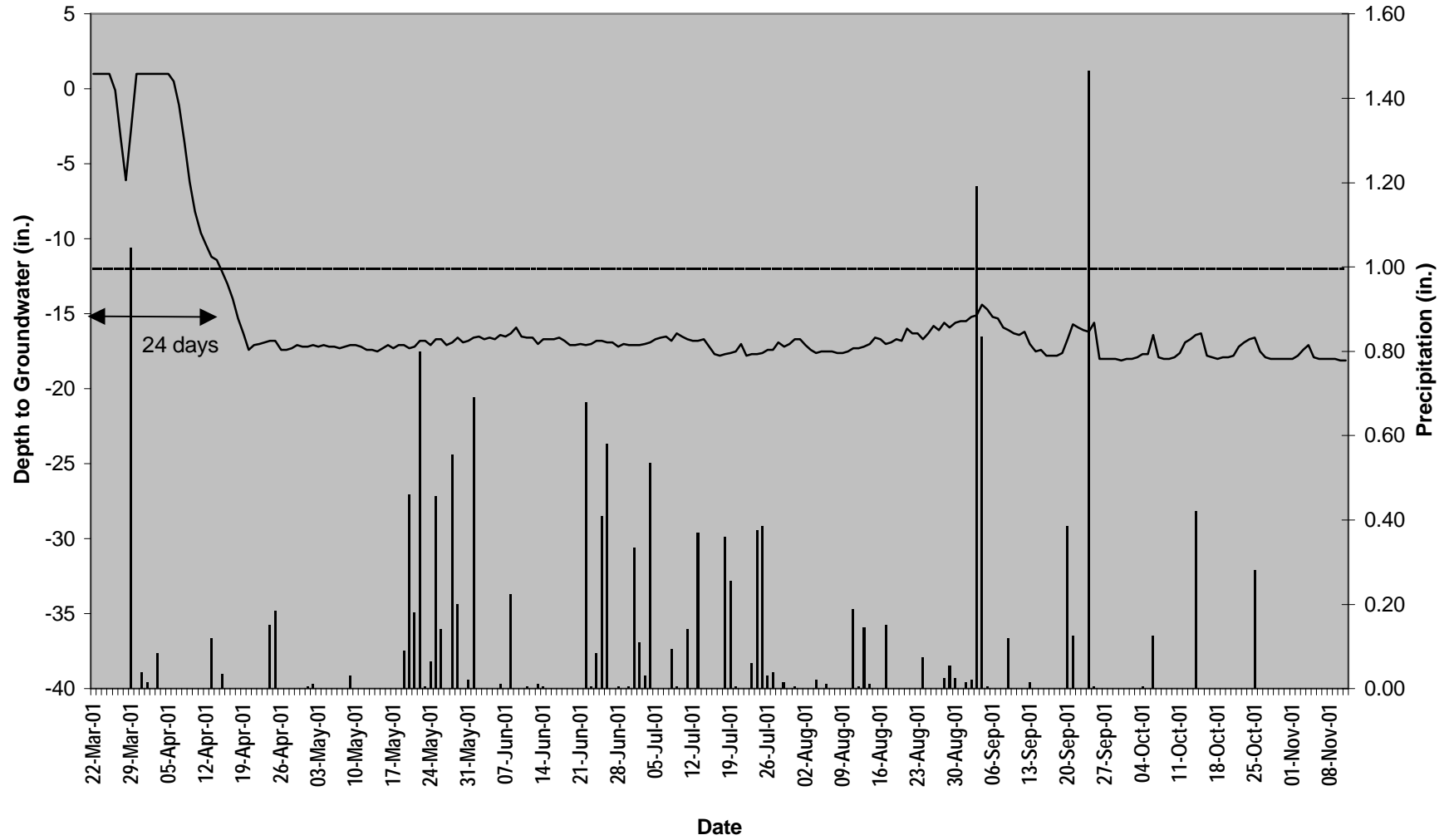
■ Average Rainfall    — S2C98E0 LCW-9    - - - - Required Depth

# Long Creek LCW-10



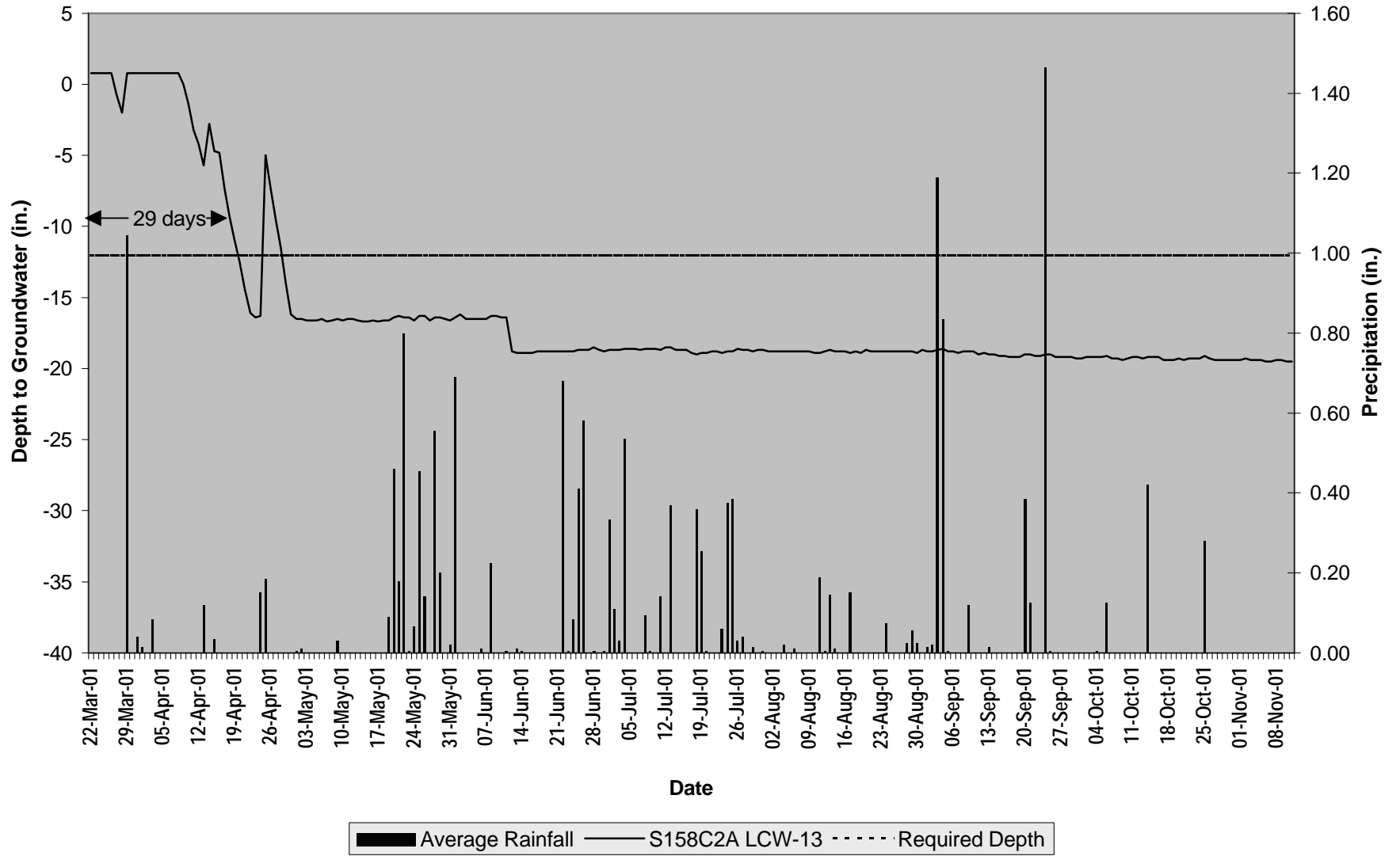
■ Average Rainfall    — S1164B9 LCW-10    - - - - Required Depth

# Long Creek LCW-11

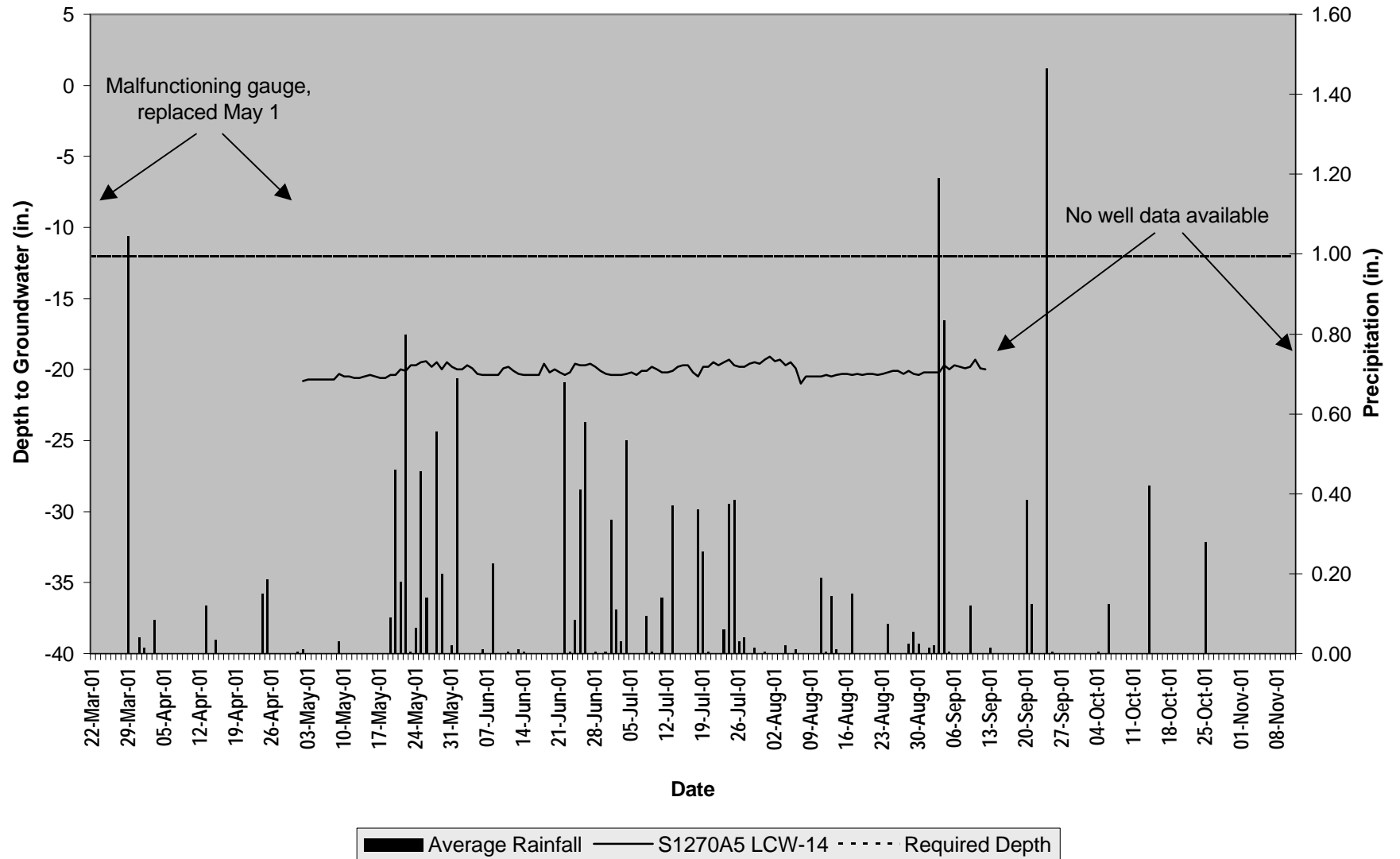


■ Average Rainfall    — S1EC9F7 LCW-11    - - - - Required Depth

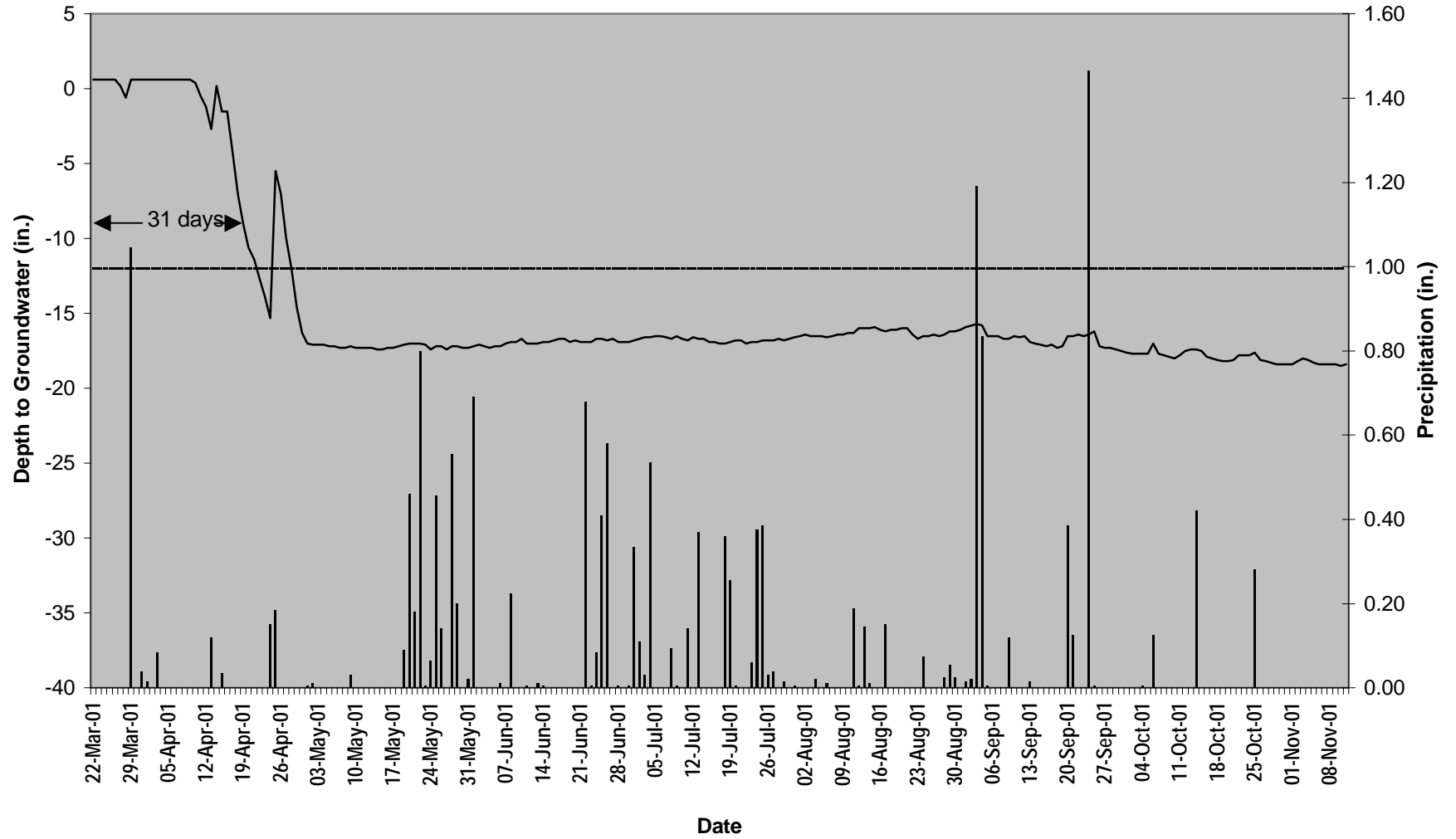
# Long Creek LCW-13



# Long Creek LCW-14

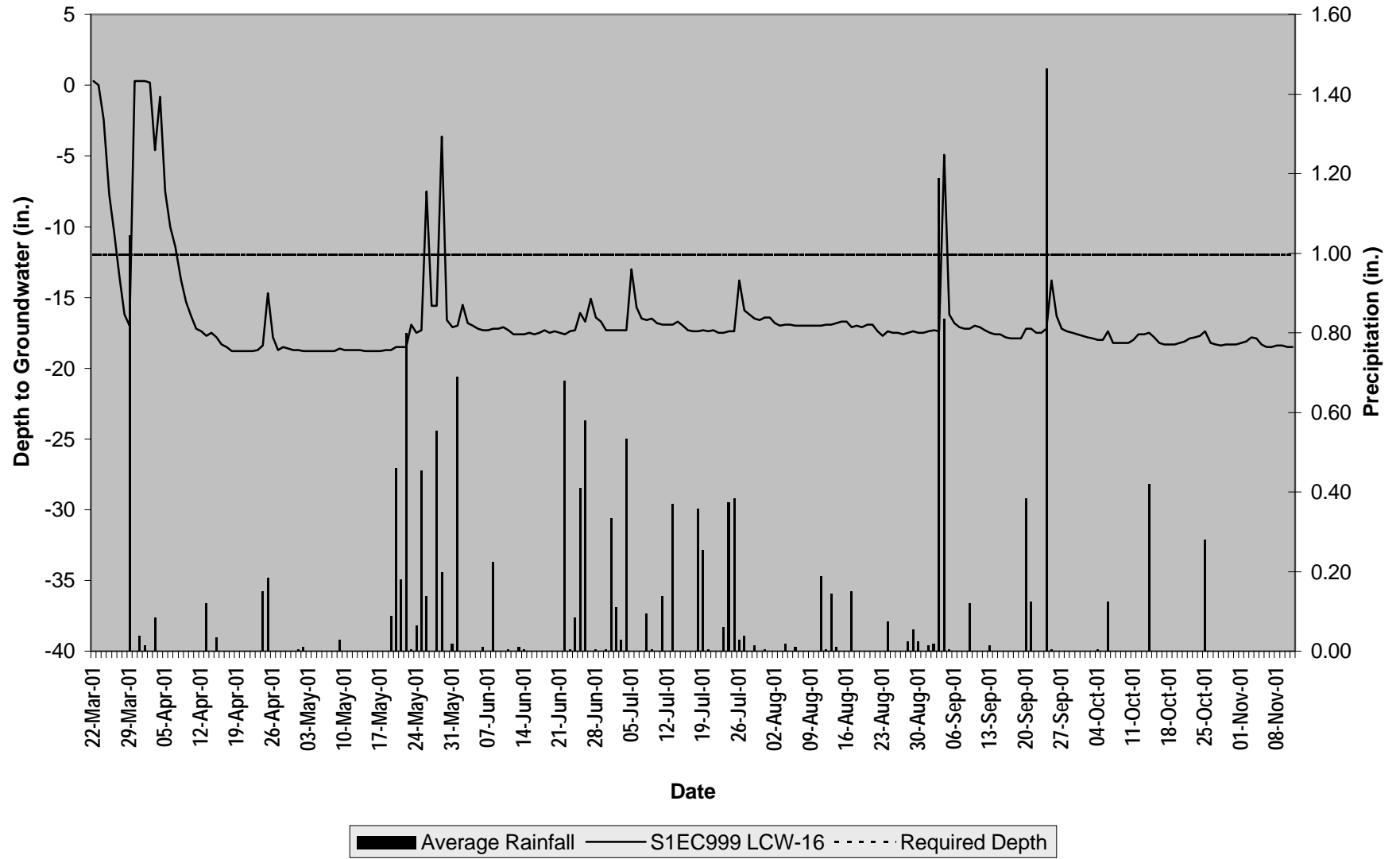


# Long Creek LCW-15

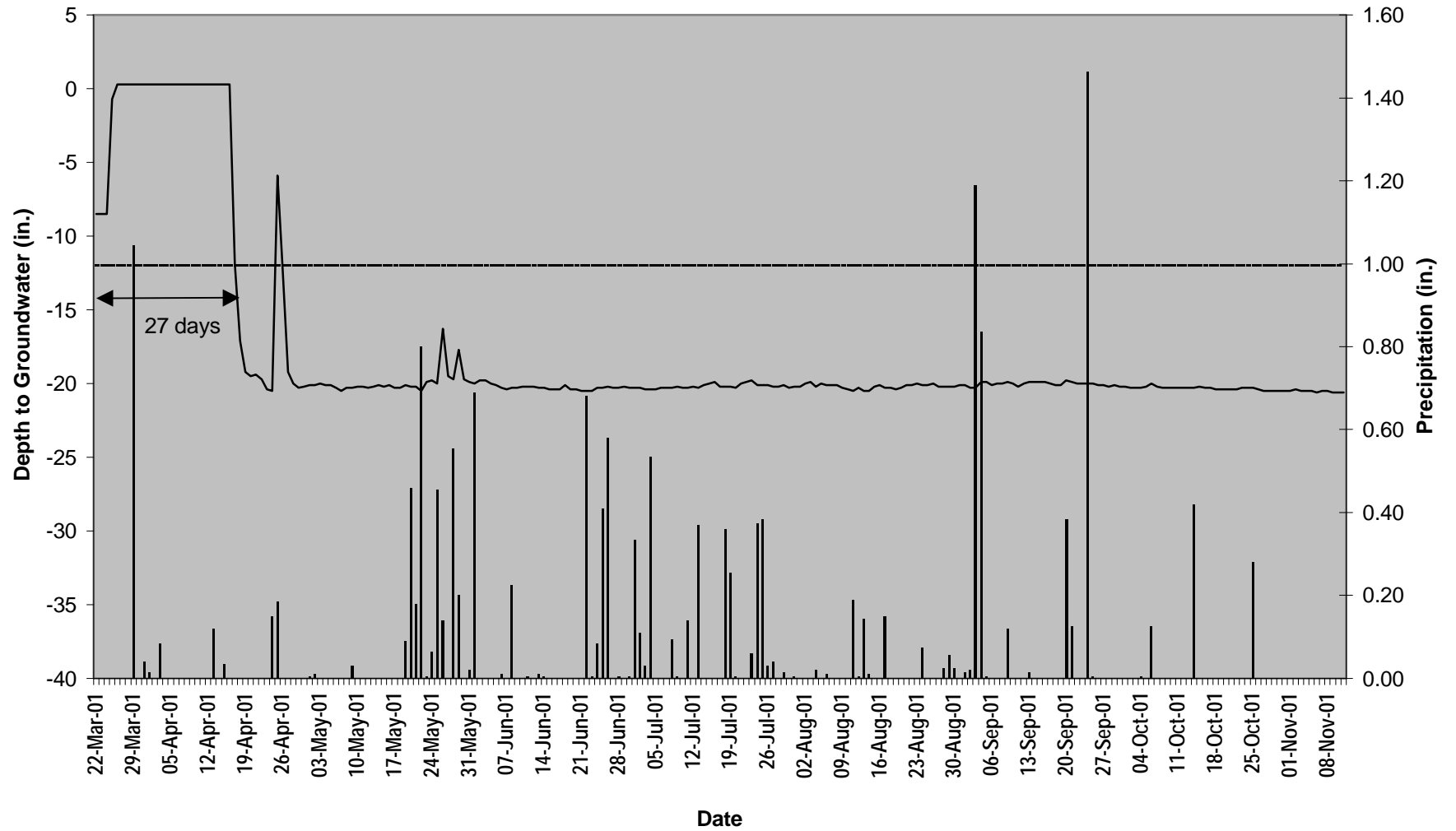


■ Average Rainfall    — S1EC96B LCW-15    - - - - Required Depth

# Long Creek LCW-16

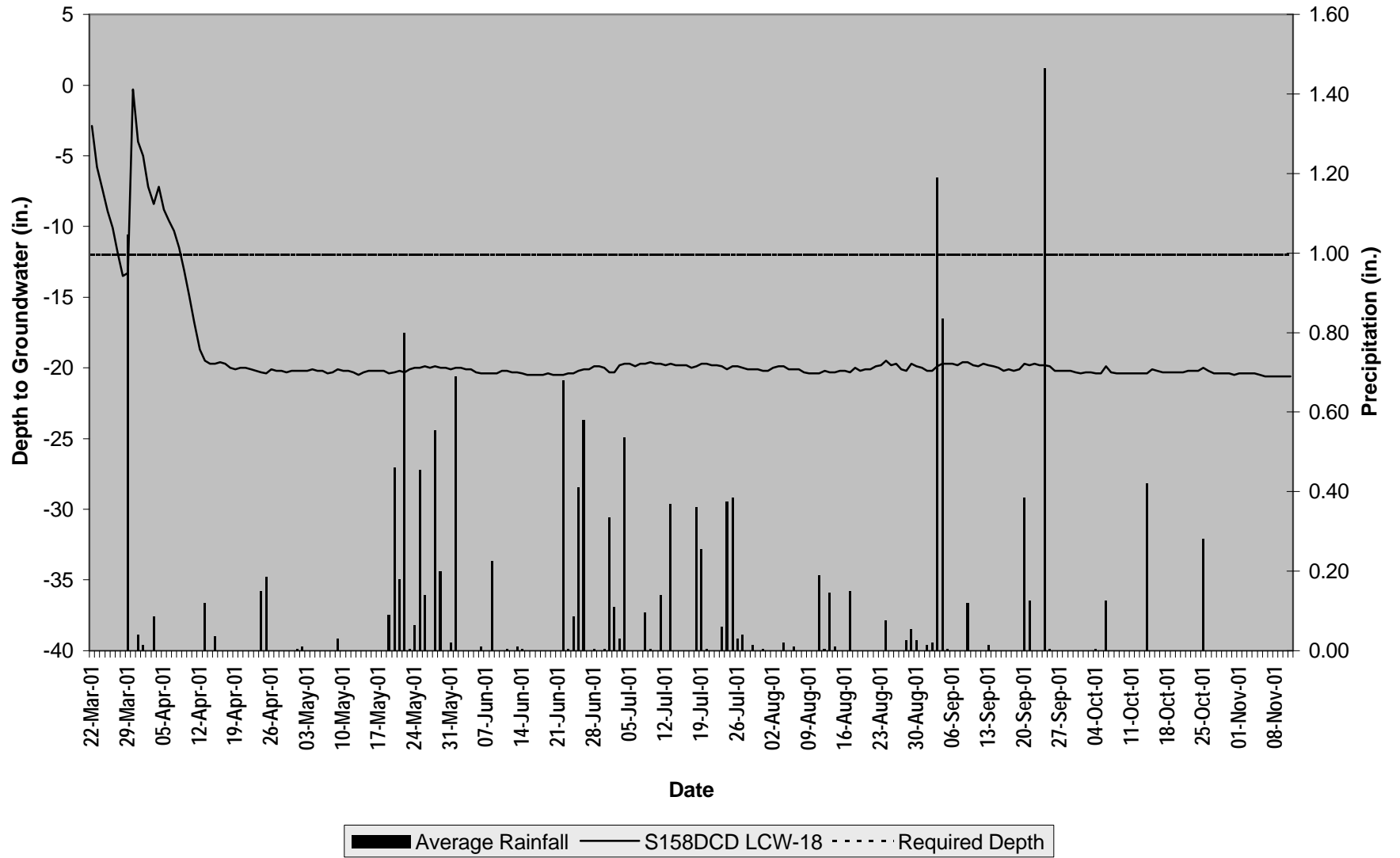


# Long Creek LCW-17

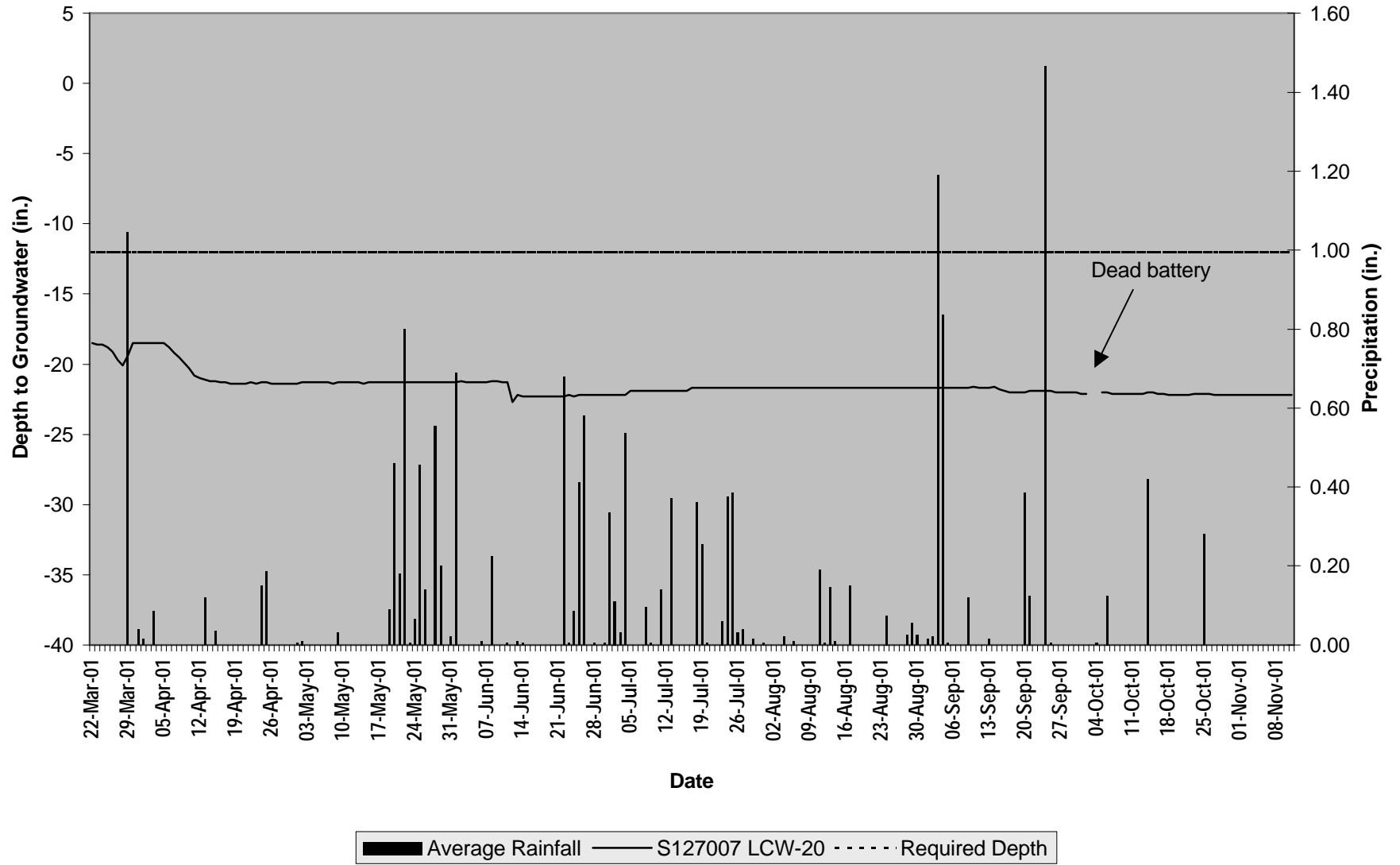


■ Average Rainfall    — S158C72 LCW-17    - - - - Required Depth

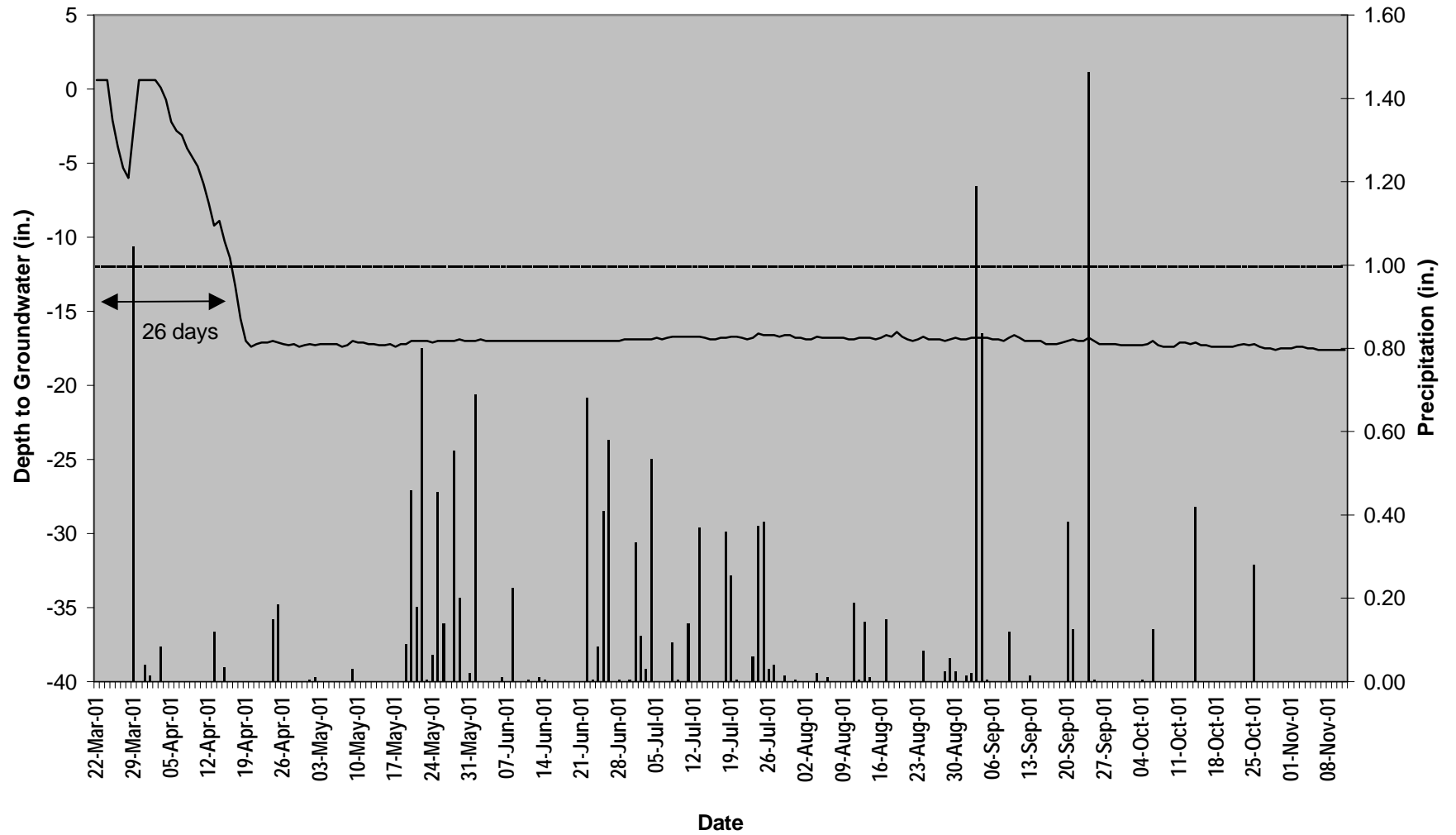
# Long Creek LCW-18



# Long Creek LCW-20

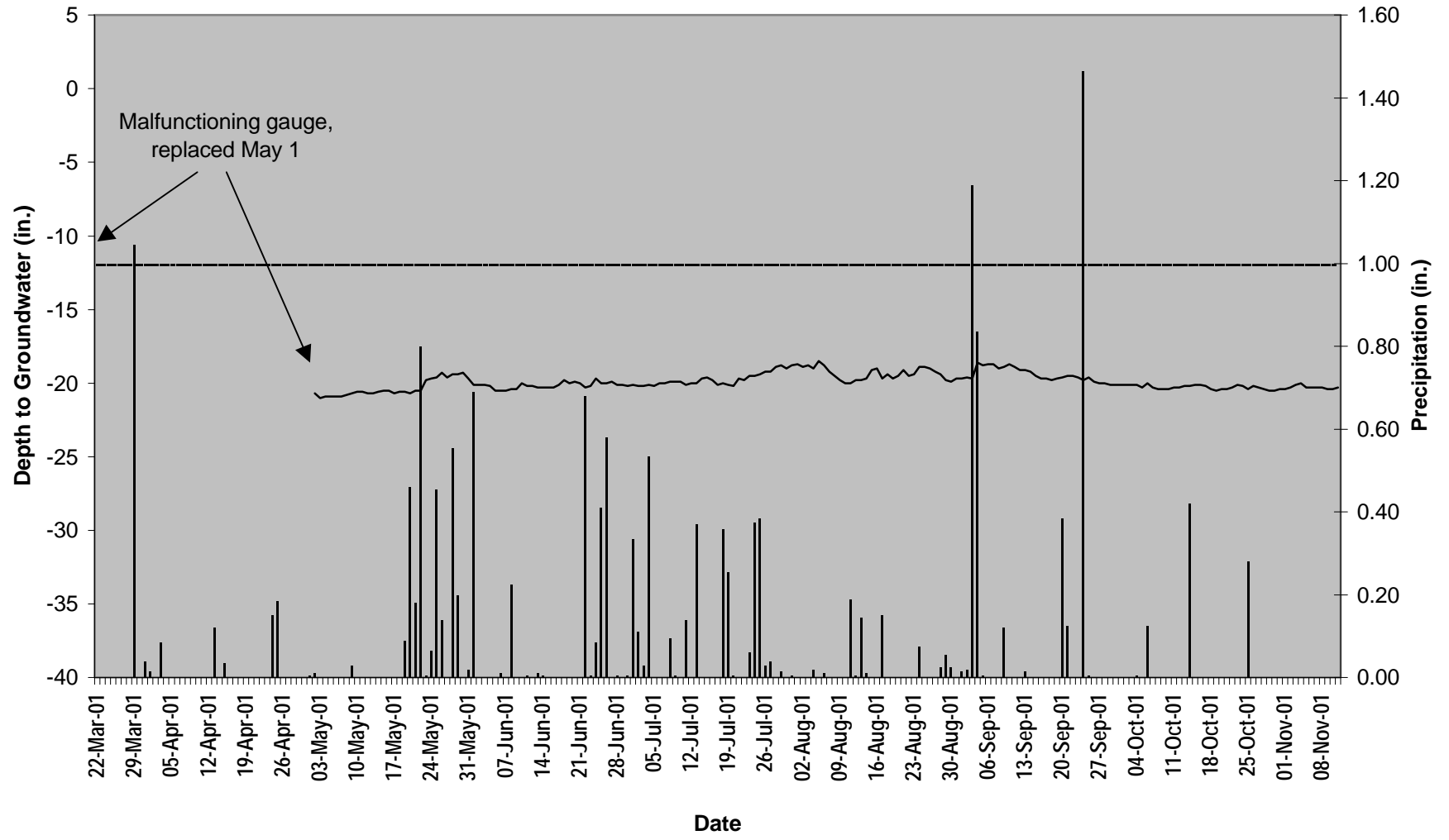


# Long Creek LCW-22



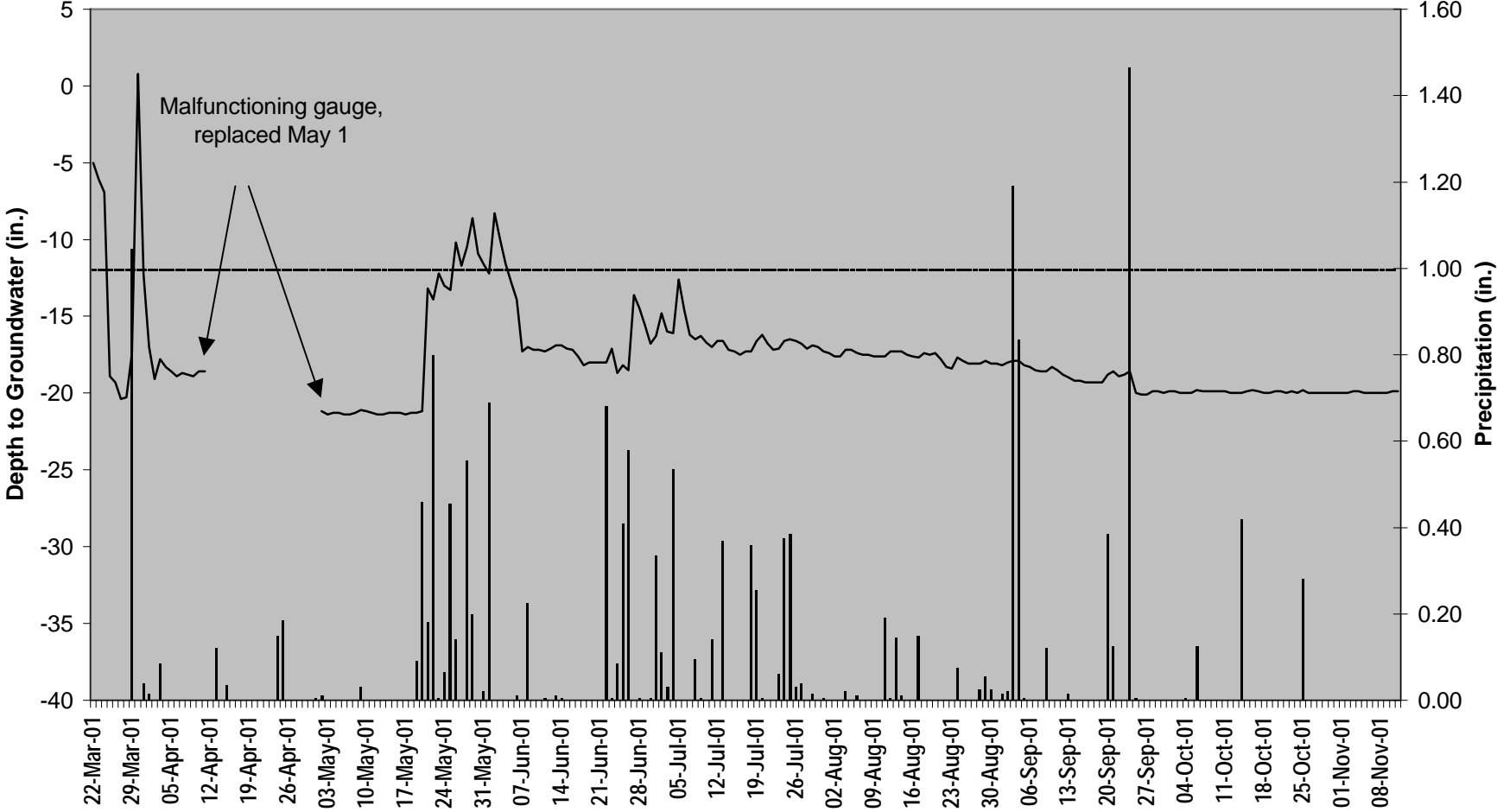
■ Average Rainfall    — S1EC9B7 LCW-22    - - - - Required Depth

# Long Creek LCW-23



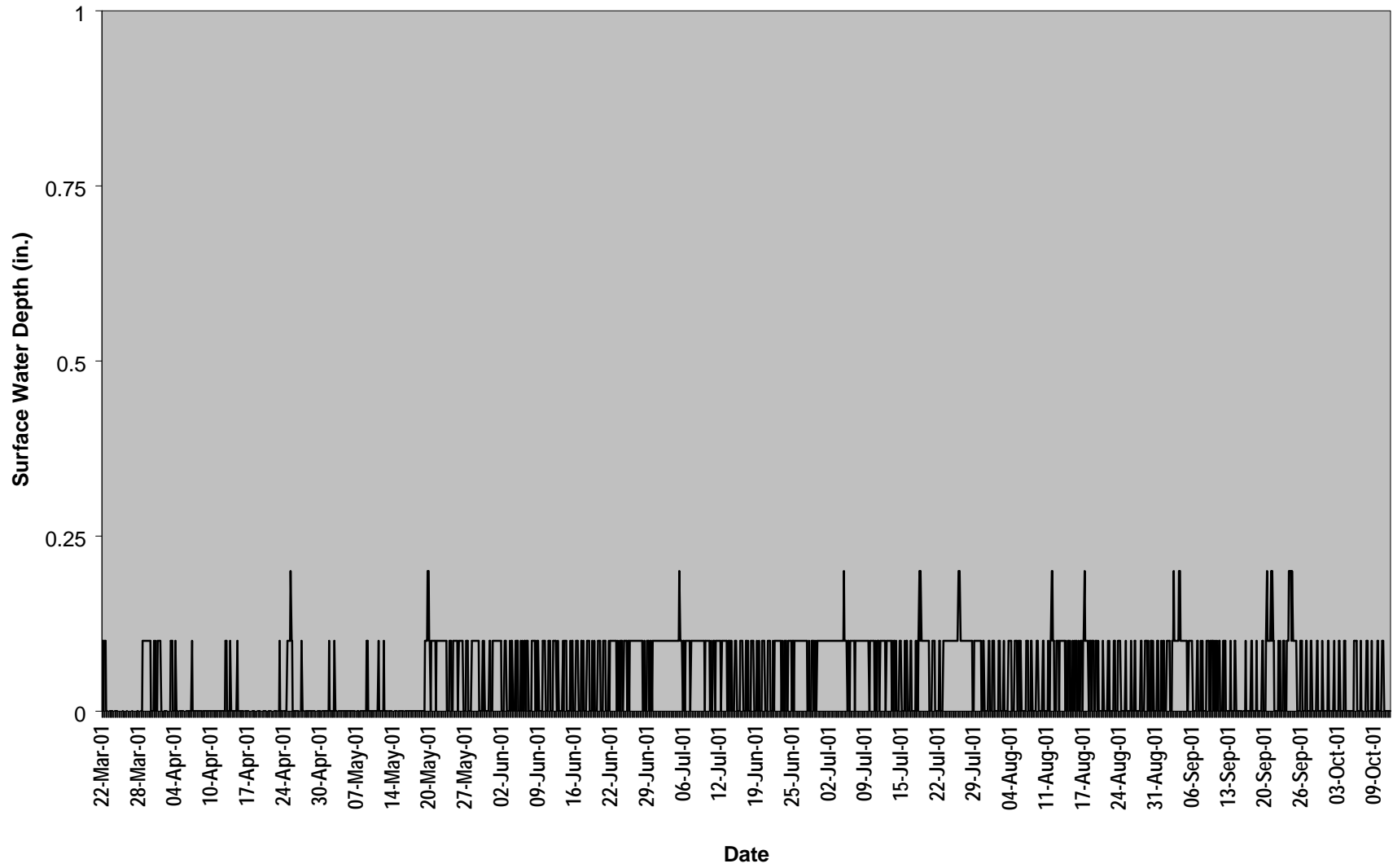
■ Average Rainfall    — S1270D2 LCW-23    - - - - Required Depth

# Long Creek LCW-24

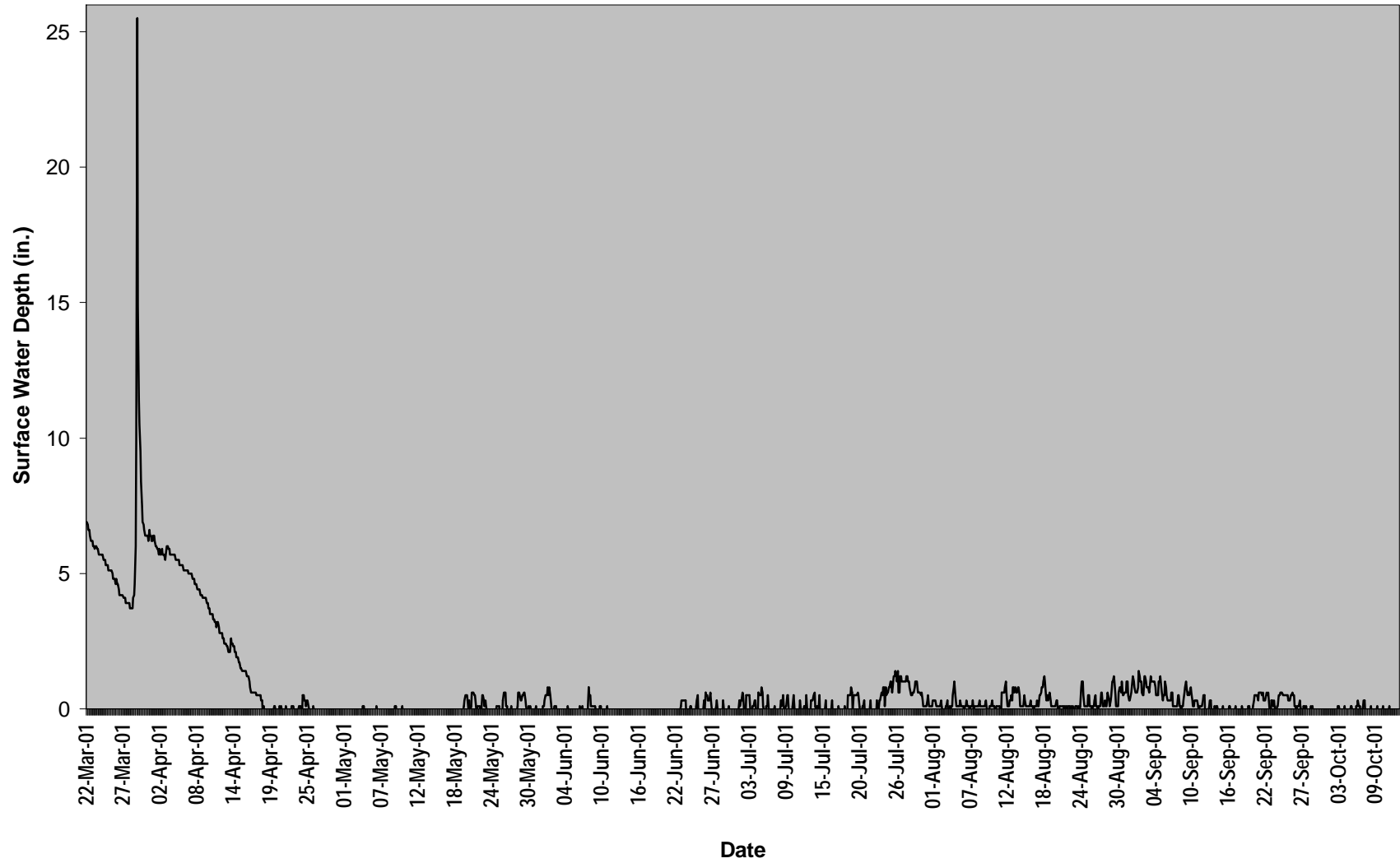


■ Average Rainfall    — S353842 LCW-24    - - - - Required Depth

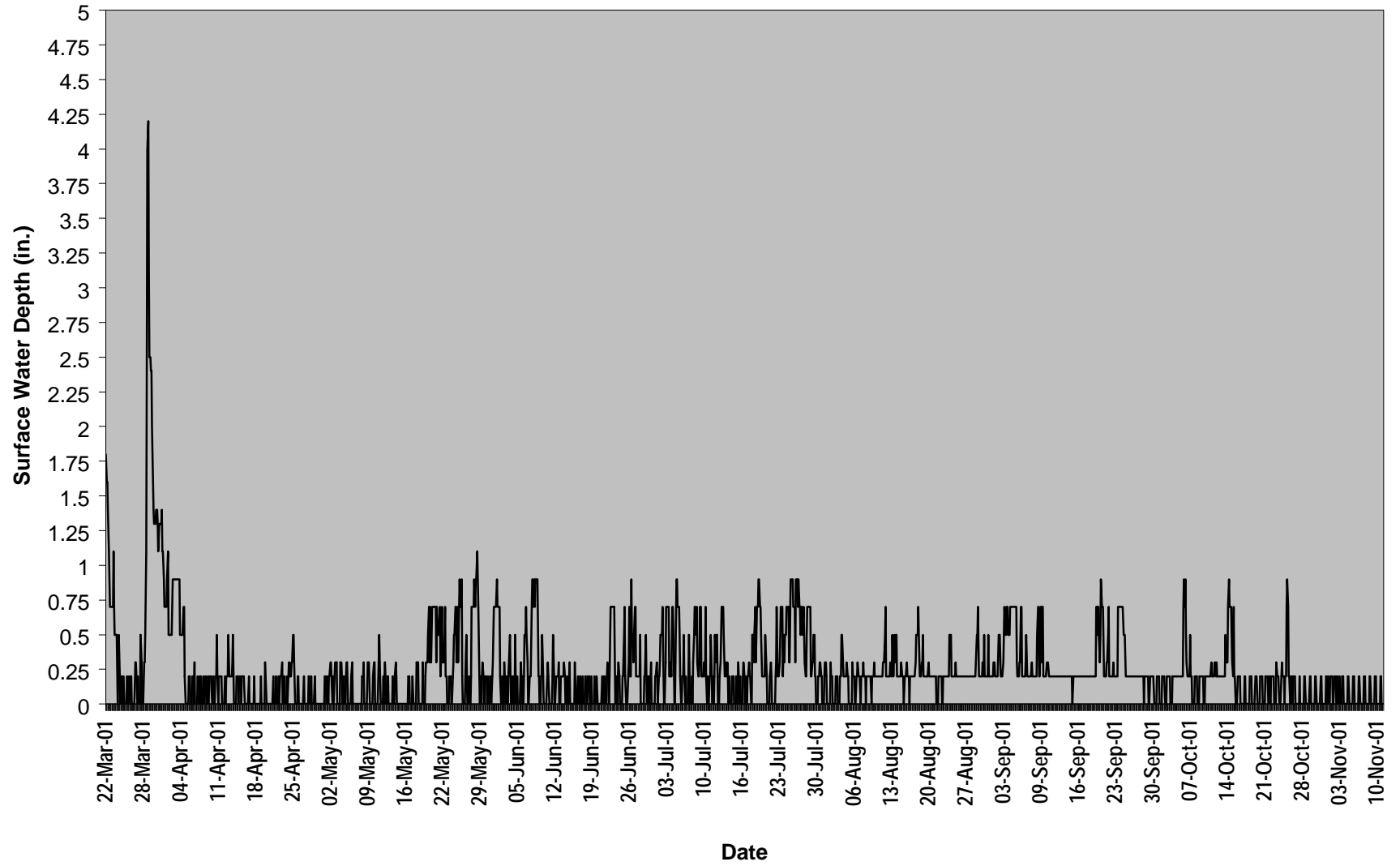
# Long Creek LCS-5



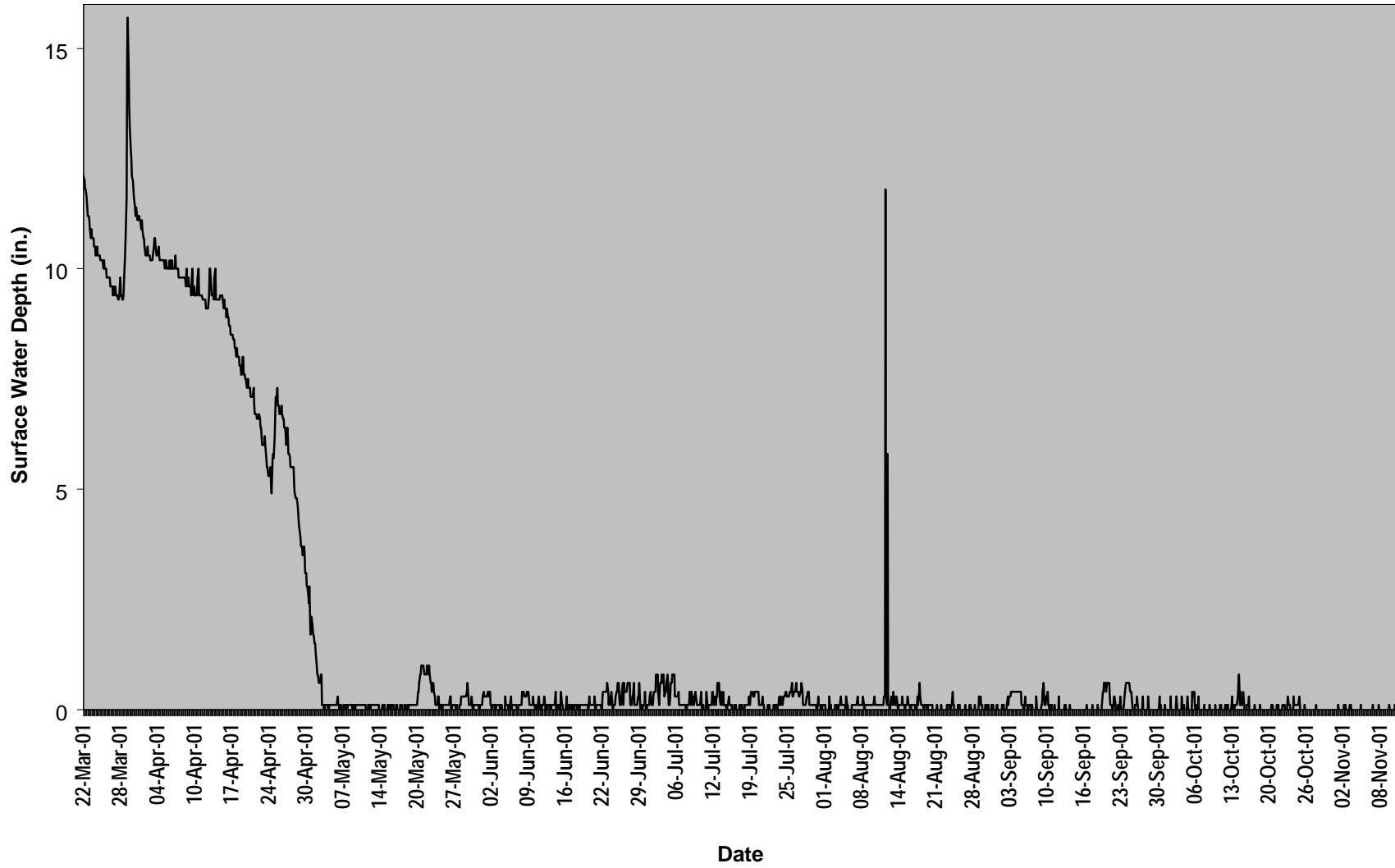
# Long Creek LCS-8



# Long Creek LCS-12



# Long Creek LCS-19



**APPENDIX B**

**SITE PHOTOS**

# LONG CREEK



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

