

ANNUAL REPORT FOR 2001



Little Sugar Creek Mitigation Site

Mecklenburg County

Project No. 8.U670122

TIP No. R-211 DA



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

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Summary

The Little Sugar Creek Mitigation Site, located in Mecklenburg County, is in its fifth year of monitoring. Approximately 21 acres in size, the site was to serve as mitigation for the R-211DA section of the Charlotte Outer Loop. The site was originally constructed in the winter of 1996-97; it must demonstrate jurisdictional success, in regards to hydrology and vegetation for a minimum of three years. The Little Sugar Creek site is monitored for both wetland hydrology and vegetation survival.

Prior to the 2001, individuals from the Department re-evaluate the problem areas on this mitigation site. Two possible problems were identified during this field visit. One involved flow that was exiting the site at the steel sheeting near the center of the site, while the other involved flow that was exiting through the rip-raped emergency spillway on the northern end of the site. The Department took the actions to repair these problems before the beginning of the growing season. The weir was raised about 8 inches in the ditch where the sheet piles are located. Additionally, clay was added to the face of the rip-rap at the emergency spillway. These repairs were installed to hold the flow that was being lost at these two areas of the site.

The NCDOT has requested the modification of the success criteria from the permit success criteria, "saturated within 10 inches of the surface, ponded or flooded for at least 26 consecutive days of the growing season," to the Federal guideline for success, saturation within 12 inches of the surface 12.5% (29 days) of the growing season. (See Appendix D for letter to US Army Corps of Engineers.) Since the permit modification has not been accepted to date, both success criteria are reported. One gauge met the permit success criteria. None of the gauges met the Federal guideline for success; however, six of the nine groundwater gauges met hydrology within 12 inches of the ground surface 8% of the year. The site experienced a dry growing season in 2001, which may

Vegetation survival rate at the site is high. The average tree density for bottomland hardwood species is 612 trees per acre after four years. Planted shrub species have survived at 317 trees per acre, and plantings are becoming very well established in the bottom and side slopes of the channels.

Alternatives are being assessed to address the lack of saturation on site. Further investigations will be initiated over the winter to evaluate the remaining water control structures for possible loss of flow. Any modifications would be installed before the start of the 2002 growing season, in an effort to increase the length of time that stormwater remains on the site.

In addition per the request of the US Army Corps of Engineers, the Department has made a request to The Wetland Restoration Program (WRP) to the outstanding mitigation needs for the R-211DA Charlotte Outer Loop. (See Appendix C for letter to WRP.) While the request was made to cover outstanding mitigation needs on the

roadway project, the Department intends to explore all options at this mitigation site, in an effort to make as much of the site a success as possible.

Introduction

1.1 PROJECT DESCRIPTION

The Little Sugar Creek Mitigation Site is located in Mecklenburg County. The site, which encompasses approximately 21 acres, is situated at the intersection of Highway 51 and Leitner Drive (Figure 1). It was designed as mitigation for a portion of the Charlotte Outer Loop project that extends from NC 51 to Rea Road (TIP No. R-211 DA, USACE Action ID 199200013).

The project provides for the restoration/creation of bottomland forest, shrub-scrub wetland, and emergent marsh. The site was originally constructed in the winter 1996-97; NCDOT performed supplemental planting work in 1998. The site is in its first year of hydrologic and vegetation monitoring following the site modification prior to the 2001 growing season.

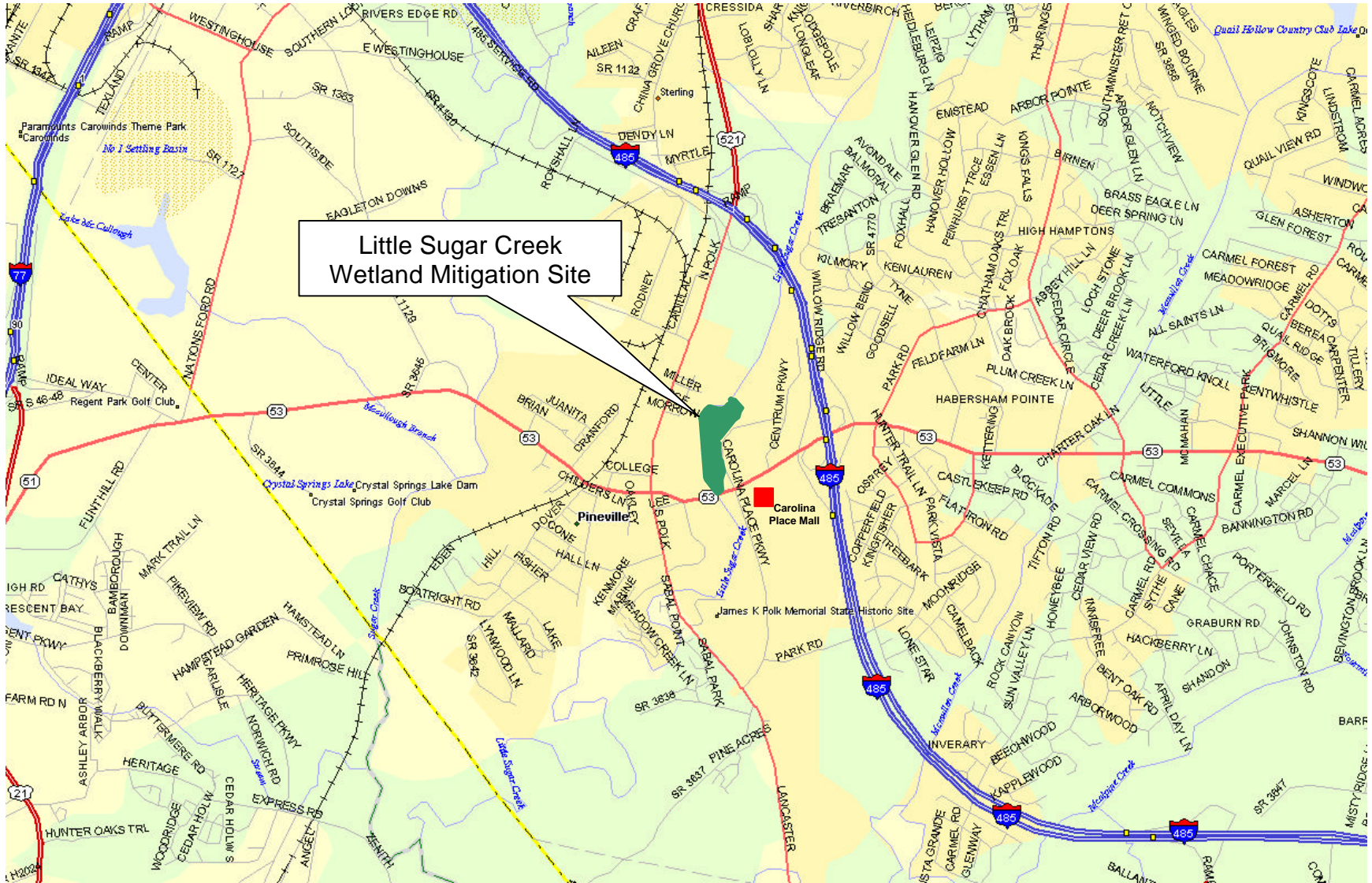
1.2 PURPOSE

In order to demonstrate successful mitigation, Little Sugar Creek is monitored for both hydrology and vegetation. The following report describes the results of the hydrologic and vegetative monitoring during 2001 at the Little Sugar Creek Mitigation Site. Included in this report are the hydrologic and vegetation monitoring results, as well as an analysis of local climate conditions throughout the growing season, and site photographs.

1.3 PROJECT HISTORY

March 1997	Site planted
March-November 1997	Hydrologic Monitoring (1 yr.)
September 1997	Vegetation Monitoring (1 yr.)
March 1998	Shrub Area Replanted
March-November 1998	Hydrologic Monitoring (2 yr.)
September 1998	Vegetation Monitoring (2 yr.)
March-November 1999	Hydrologic Monitoring (3 yr.)
September 1999	Vegetation Monitoring (3 yr.)
March-November 2000	Hydrologic Monitoring (4 yr.)
September 2000	Vegetation Monitoring (4 yr.)
March-November 2001	Hydrologic Monitoring (1yr.)
June 2001	Vegetation Monitoring (1yr.)

Figure 1. Site Location Map



1.4 DEBIT LEDGER

Table 1. Little Sugar Creek Mitigation Site Debit Ledger

Site Habitat	Mitigation Plan			TIP Debit
	Acres at Start	Acres Remaining	% Remaining	R-211DA
BLH, Scrub Shrub, FWM	16.1	0	0.00	16.1

BLH: Bottomland Hardwood FWM: Freshwater Marsh

2.0 Hydrology

2.1 SUCCESS CRITERIA

Federal guidelines for wetland mitigation state 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 for hydrologic success. The permit conditions for this mitigation site, however, state that the 1987 Wetland Manual criterion for hydrology must be exceeded: "saturated within 10 inches of the surface, ponded or flooded for at least 26 consecutive days of the growing season." A permit modification has been requested to change the success criteria from the permit to the Federal guideline. Since a determination has not been received, both success criteria are reported. Neither the federal requirement nor the permit condition for hydrology has been met.

The growing season in Mecklenburg County begins March 22 and ends November 11. These dates correspond to a 50% probability that air temperatures will drop to 28° or lower after March 22 and before November 11.¹ Thus the growing season is 235 days; minimum wetland hydrology requires 12.5% of this season, or 29 days, under average climatic conditions.

2.2 HYDROLOGIC DESCRIPTION

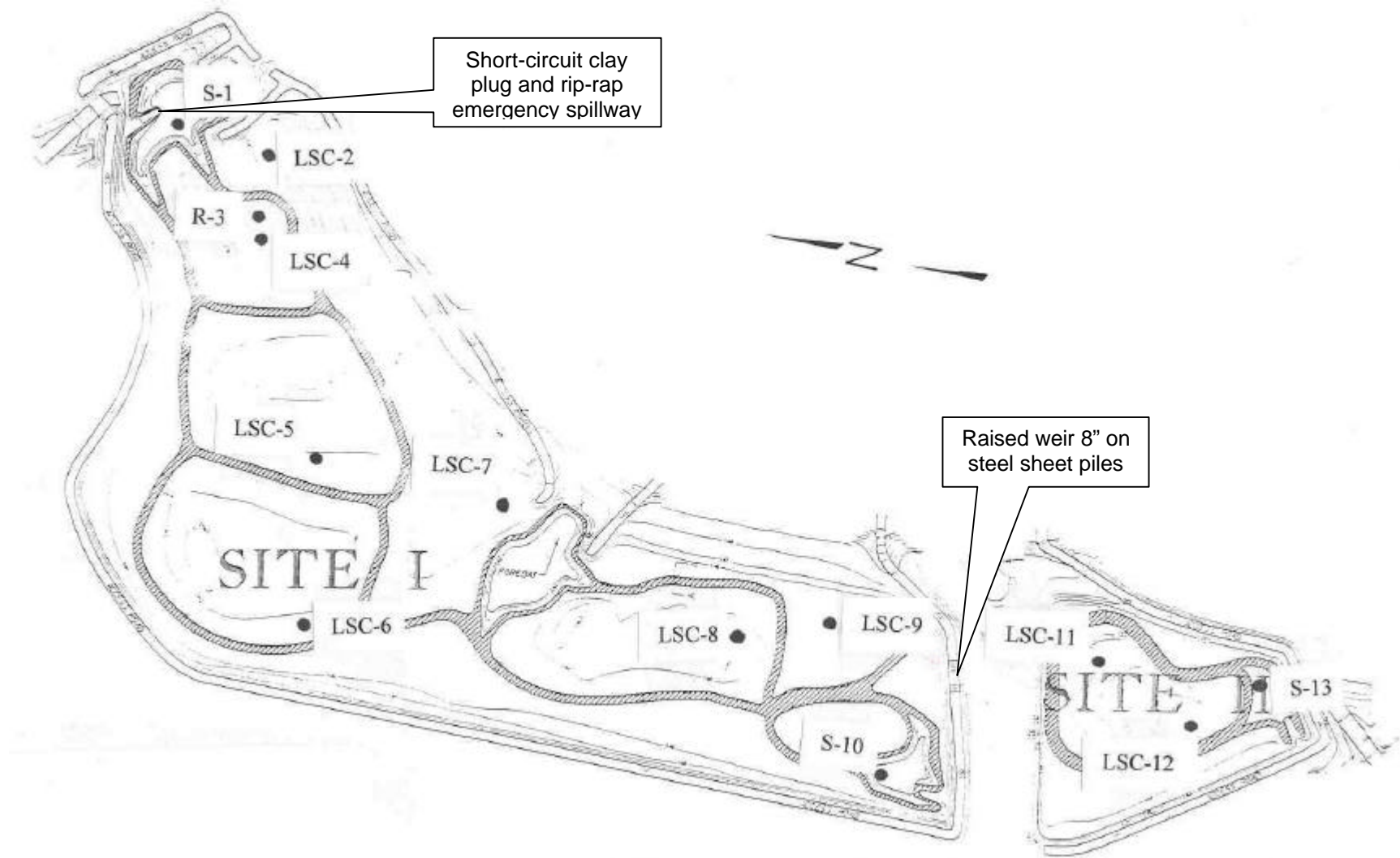
Nine groundwater gauges, one rain gauge, and three surface water gauges were installed in 1997 (Figure 2). The automatic monitoring gauges record daily readings of the groundwater depth. The year 2001 is the first season for hydrologic monitoring following the site modification in 2001.

The sluice gates, which were closed in July 1999 to trap water on the site, remained closed in 2000. In an attempt to further augment the site hydrology, the weir was raised about 8 inches in the ditch where the sheet piles are located and clay was added to the face of the rip-rap at the emergency spillway in 2001. See Figure 2.

Runoff from the surrounding area is the primary hydrologic input to the Little Sugar Creek site. A stormwater pipe, running underneath Leitner Drive, releases water collected from adjacent shopping centers near gauge 9. The monitoring gauges on the site are to show the effects of the stormwater collected in the channels as well as the effects of specific rainfall events on the groundwater table.

¹ Soil Conservation Service, Soil Survey of Mecklenburg County, North Carolina, p. 61.

Figure 2. Gauge Location and Site Modification Map



2.3 RESULTS OF HYDROLOGIC MONITORING

2.3.1 Site Data

To determine if the site met the permit conditions, “saturation within 10 inches of the surface, ponded or flooded for at least 26 consecutive days of the growing season,” the maximum number of consecutive days that the groundwater was within ten inches of the surface was determined for each gauge. The results are presented in Table 2.

To determine if the site met the Federal guidelines, saturation within 12 inches of the surface for at least 12.5% of the growing season, 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 3.

Appendix A contains a plot of the groundwater and surface water depth for each groundwater and surface gauge, respectively. The individual precipitation events, shown on the monitoring gauge graphs as bars, represent data collected from the on-site rain gauge or from a Charlotte weather station (provided by the NC State Climate Office). If the gauge shows saturation for 5% or greater of the growing season, the maximum number of consecutive days is noted on each graph. The rain gauge on the site was replaced with a more accurate measuring device prior to the beginning of the 2000 monitoring season.

The surface water gauges have indicated consistent surface water in the channels throughout the growing season. None of the groundwater gauges registered success for a consecutive 12.5% of the growing season, although 6 of the 9 gauges registered above 8% of the growing season.

Table 2. Hydrologic Monitoring: Little Sugar Creek Mitigation Site
Permit Success Criteria

Monitoring Gauge	< 26 days	26 days	Actual # of days	Success Dates
LSC-2	✓		21	Mar 22 – Apr 11
LSC-4	✓		20	Mar 22 – Apr 26
LSC-5	✓		21	Mar 22 – Apr 17
LSC-6	✓		10	Mar 22 – Apr 10
LSC-7	✓		8	Mar 30 – Apr 8
LSC-8		✓	27	Mar 30 – Apr 6
LSC-9	✓		23	Mar 22 – Apr 11
LSC-11	✓		21	Mar 22 – Apr 11
LSC-12	✓		5	Mar 22 – Apr 13

Table 3. Hydrologic Monitoring: Little Sugar Creek Mitigation Site
Federal Guidelines Success Criteria

Monitoring Gauge	< 5%	5-8%	8-12.5%	> 12.5%	Actual %	Dates of Success
LSC-2			✓		10.21	Mar 22 – Apr 14
LSC-4			✓		8.94	Mar 22 – Apr 11
LSC-5			✓		9.36	Mar 22 – Apr 12
LSC-6		✓			5.11	Mar 30 – Apr 10
LSC-7	✓				3.83	Mar 30 – Apr 7
LSC-8			✓		11.91	Mar 22 – Apr 18
LSC-9			✓		10.21	Mar 22 – Apr 14
LSC-11			✓		9.79	Mar 22 – Apr 13
LSC-12	✓				2.12	Mar 22 – Mar 26

It should be noted that three of the groundwater gauges (W2, W5, and W7) lost data during a short portion of the growing season due to battery failure. Gauge 12 lost data from March 28 through June 6 due to a series of battery failures.

2.3.2 Climatic Data

Figure 3 is a comparison of 2000 and 2001 monthly rainfall to historical precipitation for the area. This comparison indicates if 2001 was “average” in terms of climate conditions by comparing the rainfall to that of historical rainfall (data collected between 1948 and 2000). Historic data was provided by the NC State Climate Office.

March was the only month to receive above average rainfall. January, February, April, August, and October experienced below average rainfall. Based on the data collected from the onsite rain gauge, the site received below average rainfall during 2001.

2.4 CONCLUSIONS

The Little Sugar Creek site’s hydrologic success improved from 2000; however, neither success criteria was met.

Figure 3. Monitoring Gauge Hydrologic Results

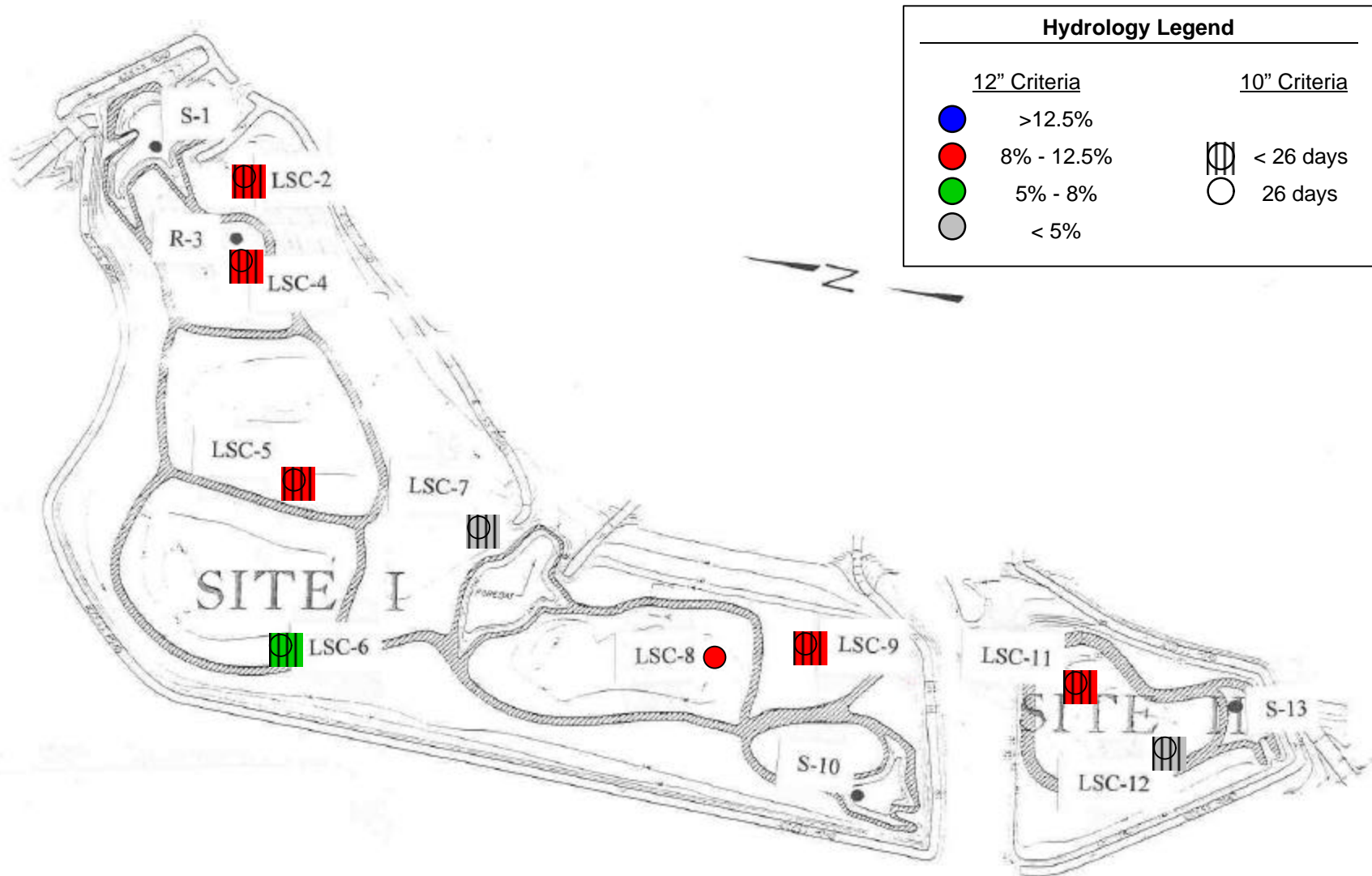
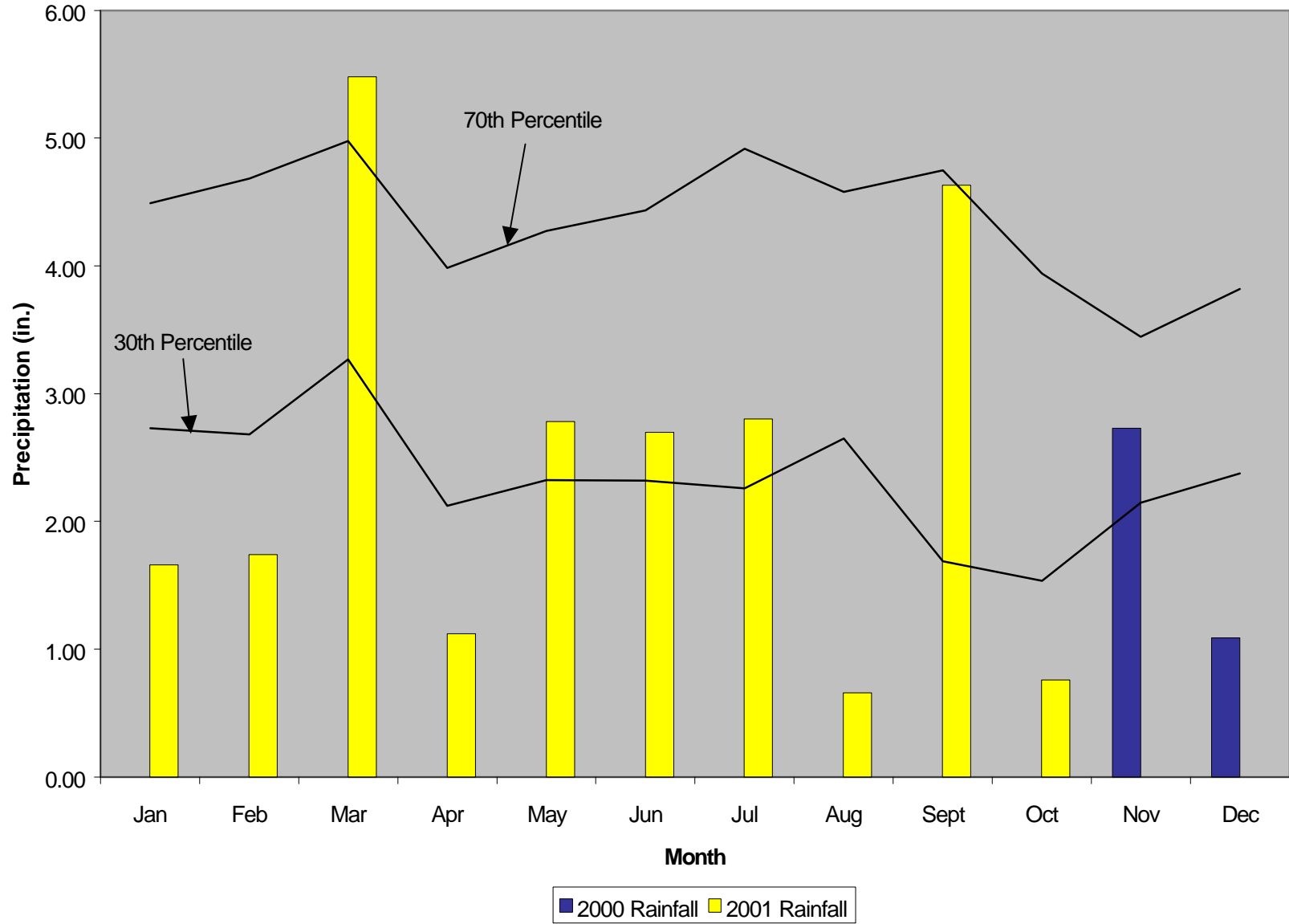


Figure 4. Little Sugar Creek 30-70 Graph, Charlotte, NC



3.0 Vegetation: Little Sugar Creek Mitigation Site (Year 5 Monitoring)

3.1 SUCCESS CRITERIA

Success Criteria states that there must be a minimum mean density of 320 characteristic trees species/acre surviving for at least three years in the bottomland forest area of the site. Characteristic tree species are those species planted along with natural recruitment of sweetgum, red maple, and loblolly pine. Loblolly pine cannot comprise more than 10% of the 320 trees per acre. No quantitative sampling requirements were developed for the herbaceous and shrub assemblages as part of the vegetation success criteria per the August 1995 mitigation plan.

3.2 DESCRIPTION OF SPECIES

The following shrub species were re-planted in the Wetland Shrub Restoration Area:

Cornus amomum, Silky Dogwood
Leucothoe axillaris, Dog Hobble
Rhododendron arborescens, Smooth Azalea
Sambucus canadensis, Elderberry
Viburnum nudum, Possum Haw
Aesculus sylvatica, Painted Buckeye
Lindera benzoin, Spicebush

The following herbaceous species were planted in the Channel Areas:

Juncus effusus, Soft Rush
Scirpus validus, Bulrush

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

Quercus michauxii, Swamp Chestnut Oak
Quercus falcata var. *pagodaefolia*, Cherrybark Oak
Quercus phellos, Willow Oak
Fraxinus pennsylvanica, Green Ash
Betula nigra, River Birch
Quercus lyrata, Overcup Oak
Quercus nigra, Water Oak

3.3 RESULTS OF VEGETATION MONITORING

Table 4. Vegetation Monitoring Statistics, by plot

Plot # (Type)	Silky Dogwood	Dog Hobble	Painted Buckeye	Green Ash	Water Oak	Cherrybark Oak	Overcup Oak	Swp Chestnut Oak	River Birch	Willow Oak	Total	Total (at planting)	Density (Tree/Acre)
1(Shrub)	13		1								14	30	317
2(BLH)				10		2		8	2	3	25	30	567
3(BLH)				13		3		4	1	8	29	30	657
AVERAGE TREE (BLH) DENSITY													612

Site Notes: Other species noted: wild garlic, *Juncus* sp., Queen-Anne's-lace, various grasses, foxtail, switchgrass, fennel, sycamore, locust, smartweed, volunteer green ash, *Aster* sp., and cottonwood. Elderberry noted in plot 1. Silky dogwood is noted in plot 3. Ditches are full of *Juncus* sp. Very little beaver activity noted as compared to 2000.

3.4 CONCLUSIONS

Approximately 9.8 acres of this site was planted in bottomland hardwoods in March 1997. There were two vegetation monitoring plots established in the bottomland hardwood area, Plot #2 and #3. The 2001 vegetation monitoring revealed an average density of 612 trees per acre, well above the 320 tree/acre minimum requirement. Approximately 3.2 acres of this site was planted with shrub species. The 2001 vegetation monitoring of Plot #1 revealed an average density of 317 trees per acre. The remaining 3.7 acres was planted with herbaceous plant material. From visual observation, (see photos) this herbaceous plant material has become established in the bottom and side slopes of the channels on the site.

4.0 Overall Conclusions/Recommendations

In the bottomland hardwood area, the 2001 vegetation monitoring revealed an average density of 612 trees per acre, well above the 320 tree/acre minimum requirement. In the shrub area, the 2001 vegetation monitoring revealed an average density of 317 trees per acre. The herbaceous plant material has become established in the site's channels.

The site modifications made prior to the 2001 growing season appear to have improved the site's hydrologic success. However, the rainfall for 2001 appears to be below average making it difficult to determine if modifications are sufficient.

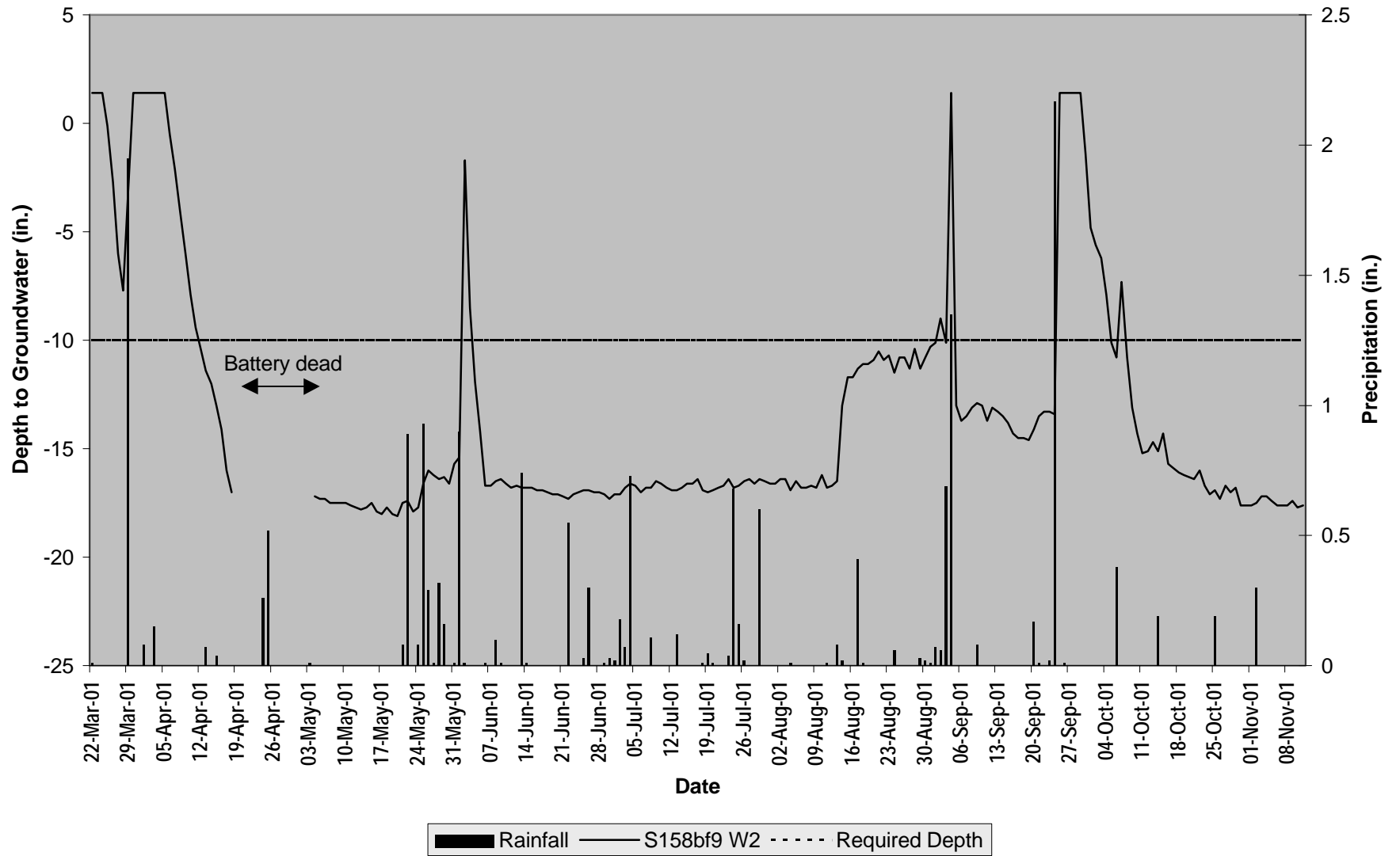
NCDOT has the following recommendations:

- Continue monitoring the site to determine if the increase in weir height was sufficient modification such that the site meets during an average year of rainfall. Also the Department intends to re-evaluate all of the water control structure on this site to determine if there is flow that is leaving the site prematurely.
- A request has been made to The Wetland Restoration Program (WRP) find additional Bottomland Hardwood Mitigation areas to cover mitigation needs for the R-211DA section of Charlotte outer loop. Once an agreement is in place with WRP, all necessary documentation will be forwarded to the resource agencies.

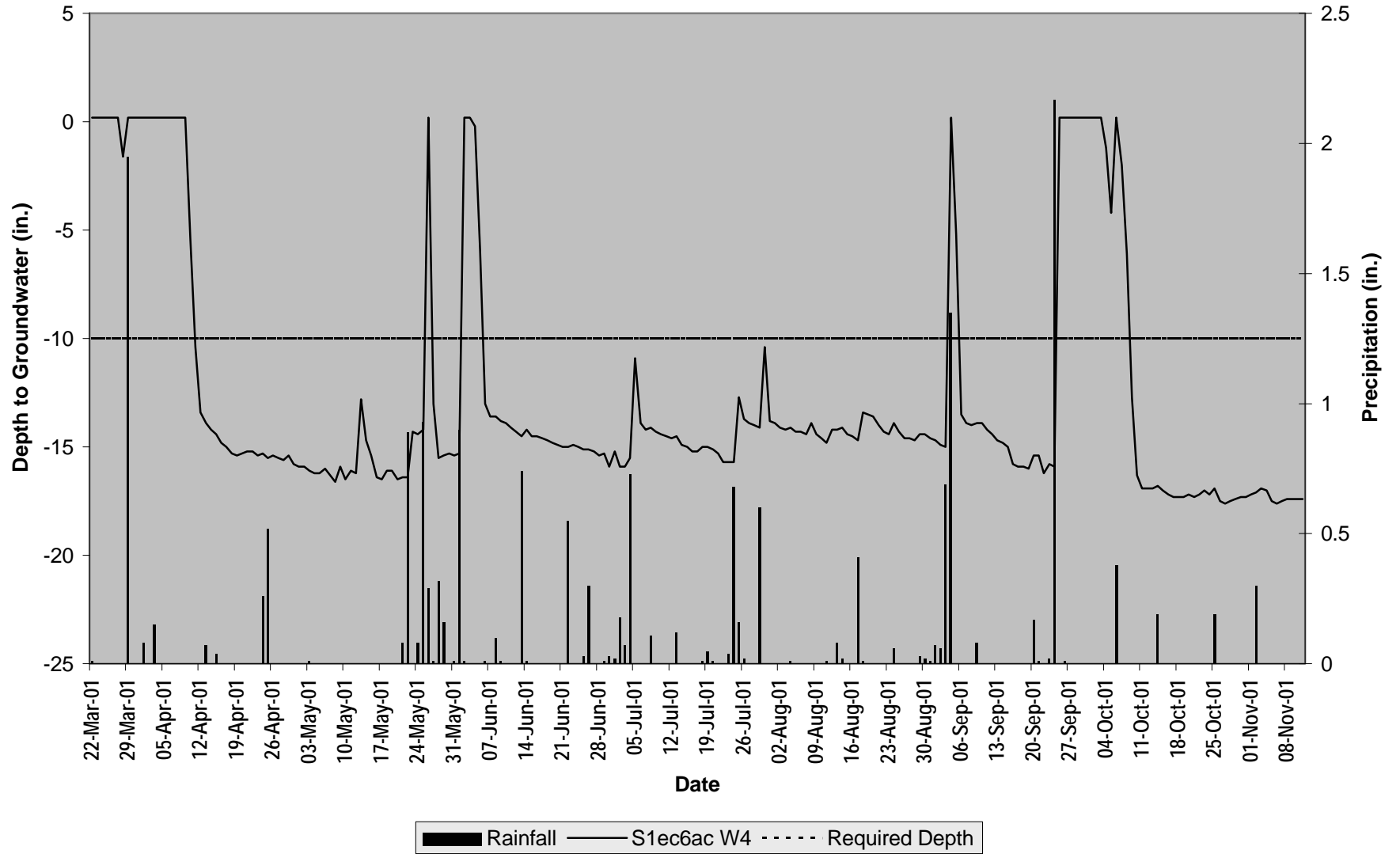
APPENDIX A

DEPTH TO GROUNDWATER PLOTS

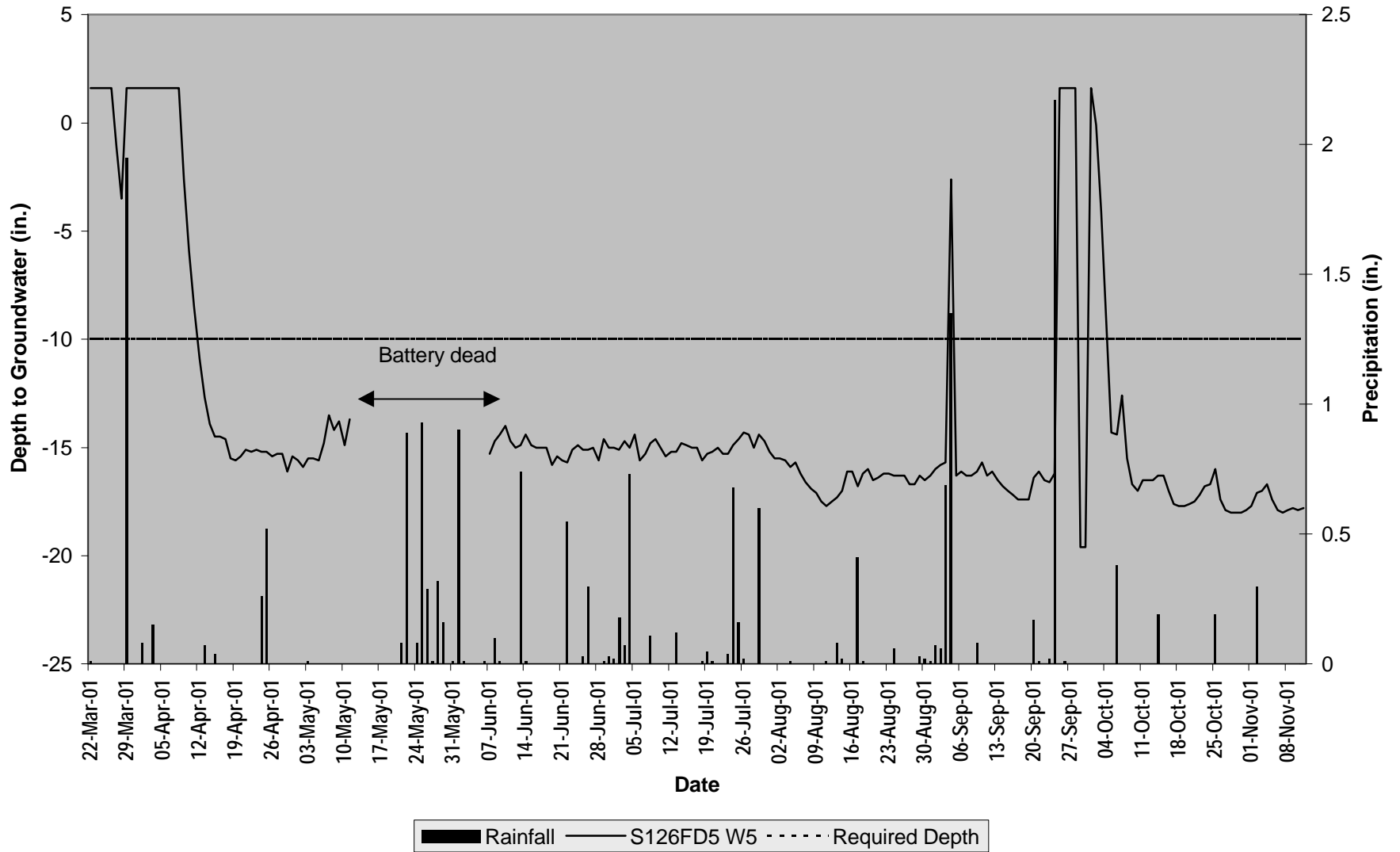
Little Sugar Creek W2 10" Success Criteria



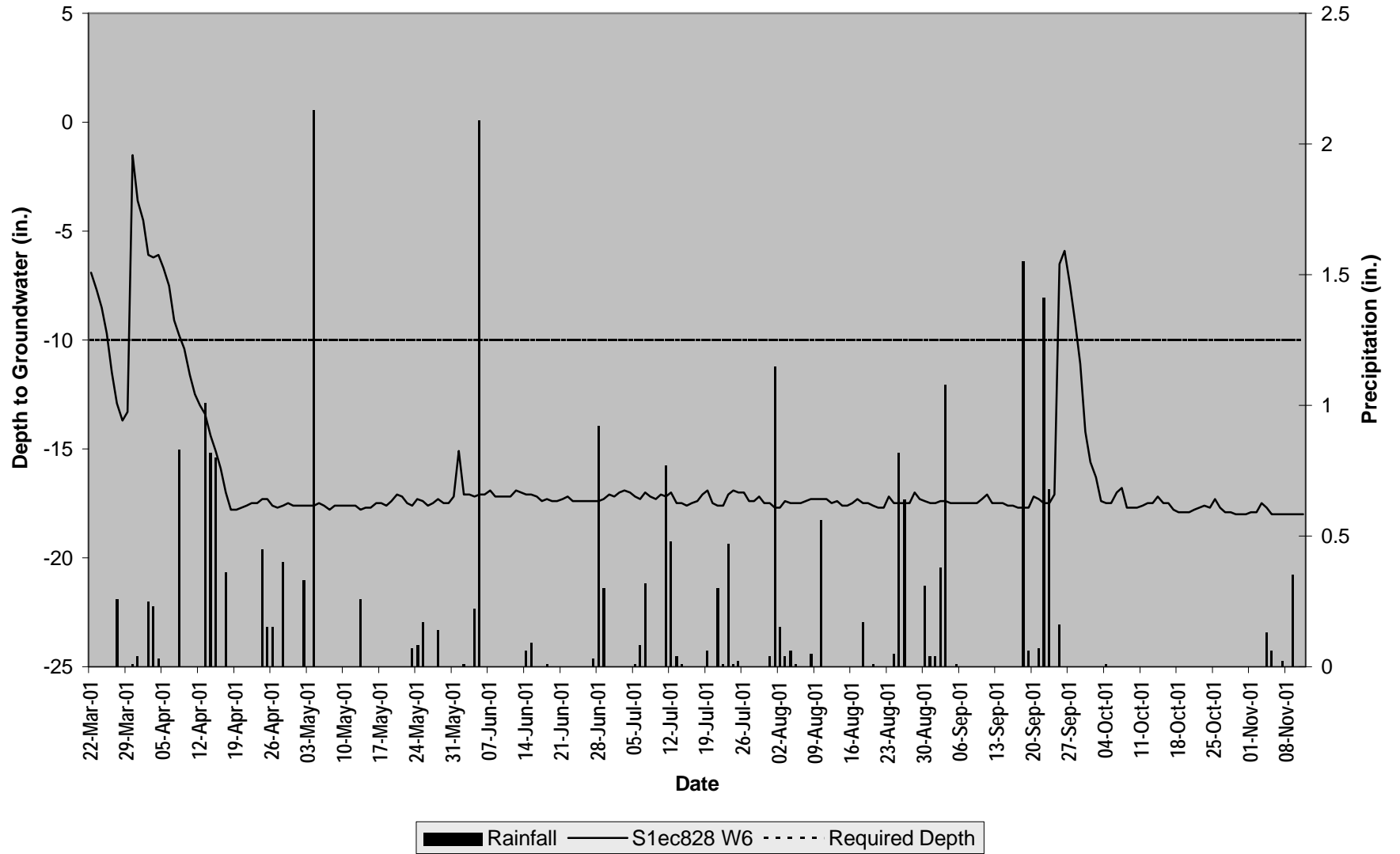
Little Sugar Creek W4 10" Success Criteria



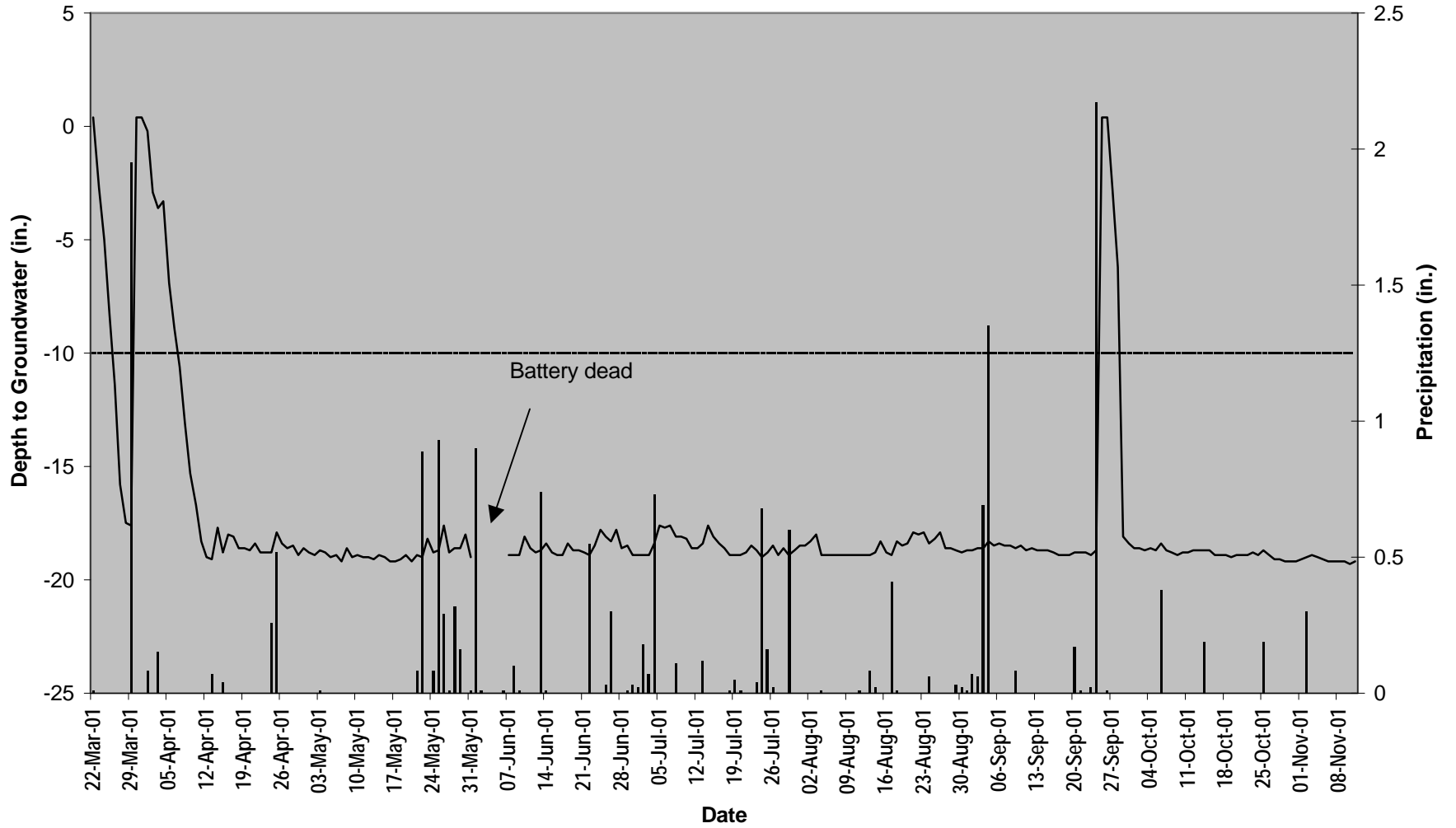
Little Sugar Creek W5 10" Success Criteria



Little Sugar Creek W6 10" Success Criteria

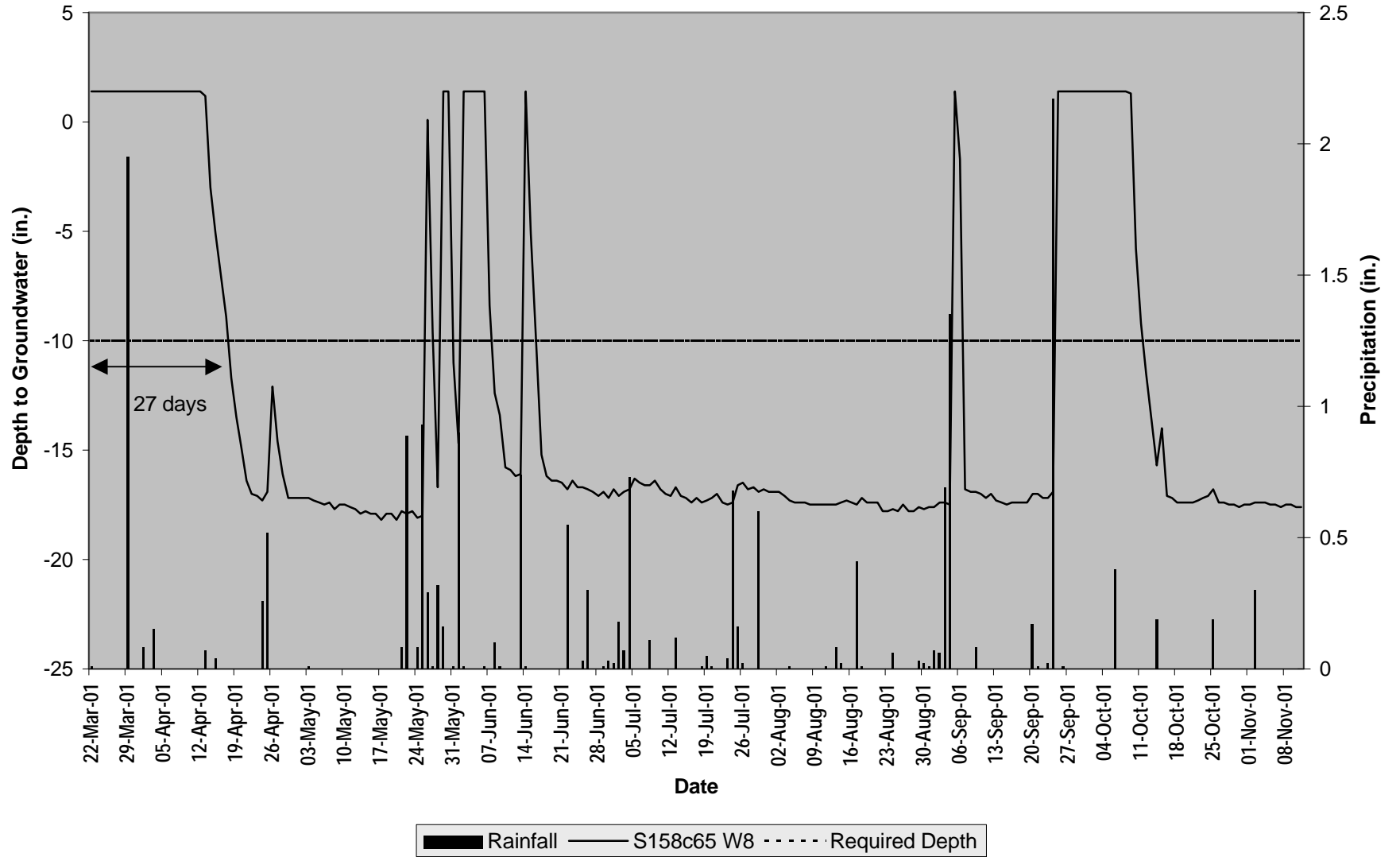


Little Sugar Creek W7 10" Success Criteria

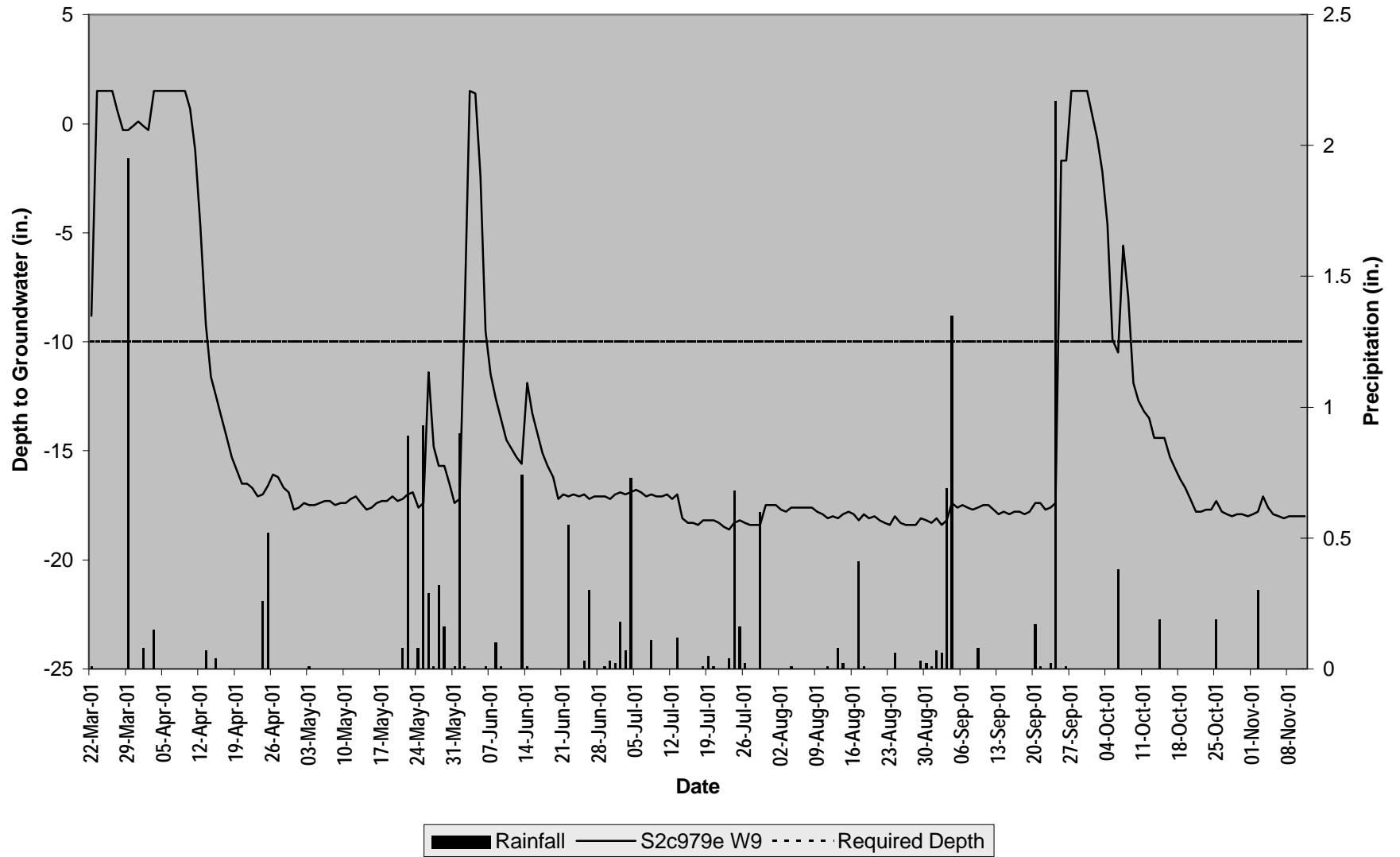


■ Rainfall — S1ec886 W7 - - - - Required Depth

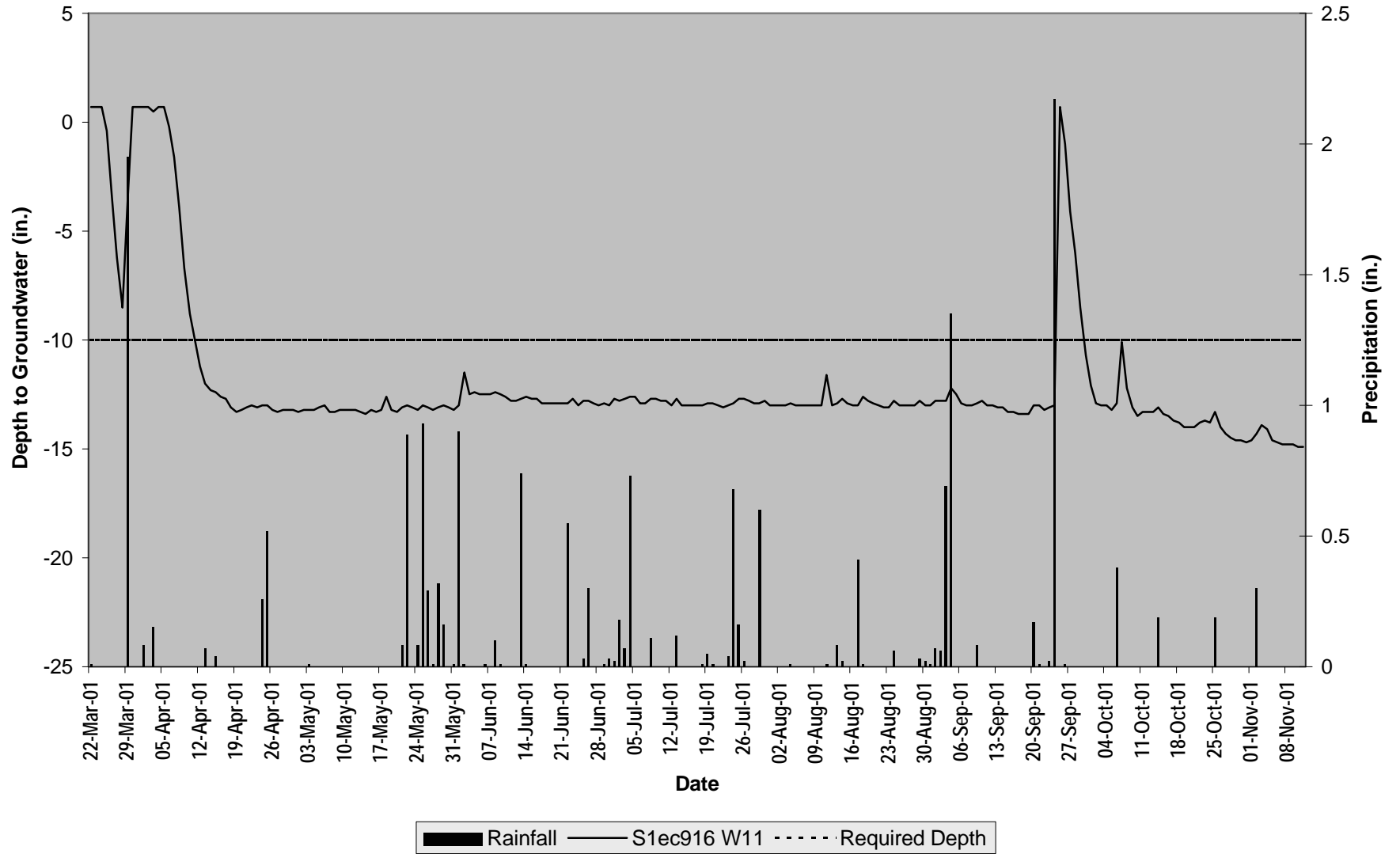
Little Sugar Creek W8 10" Success Criteria



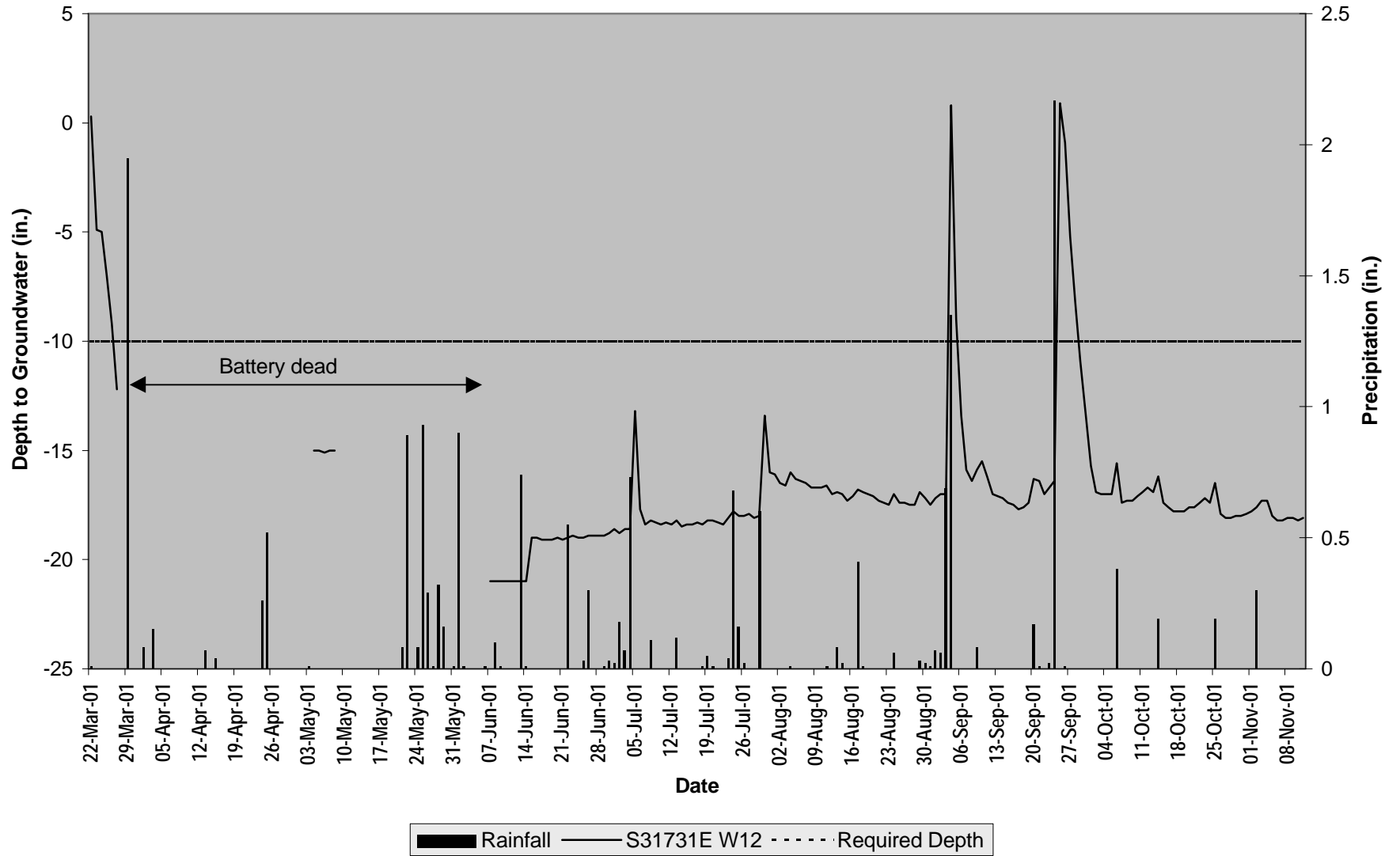
Little Sugar Creek W9 10" Success Criteria



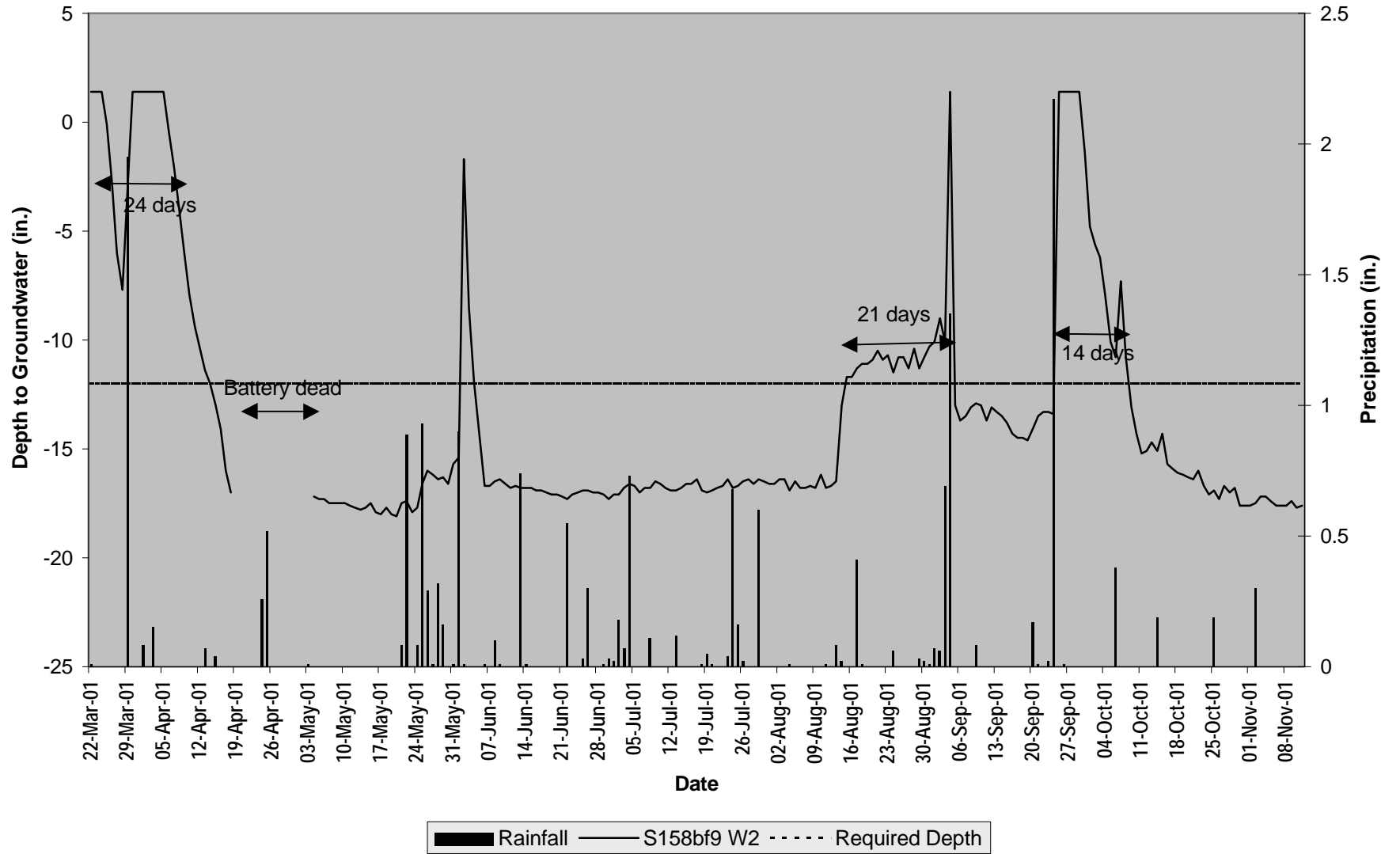
Little Sugar Creek W11 10" Success Criteria



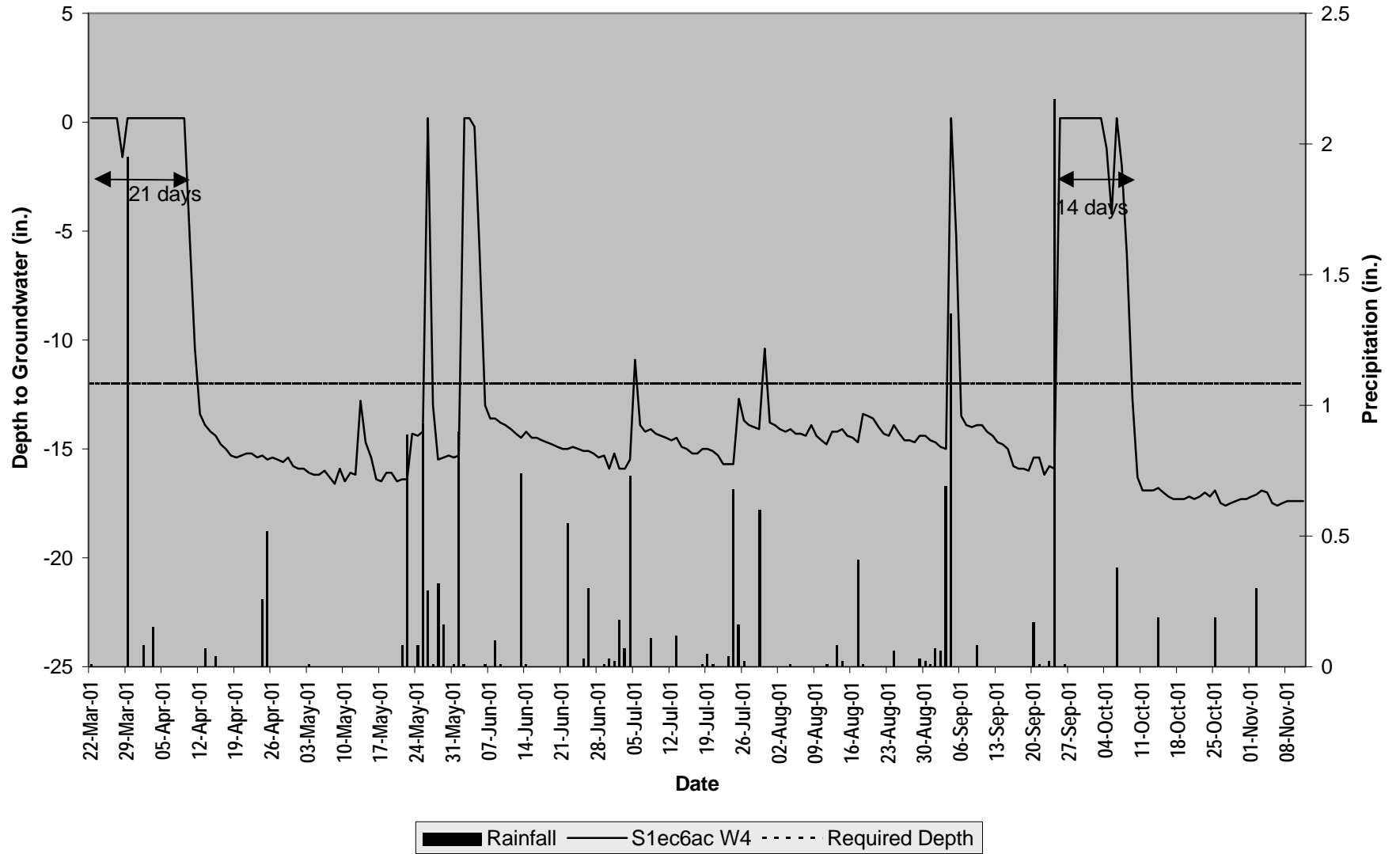
Little Sugar Creek W12 10" Success Criteria



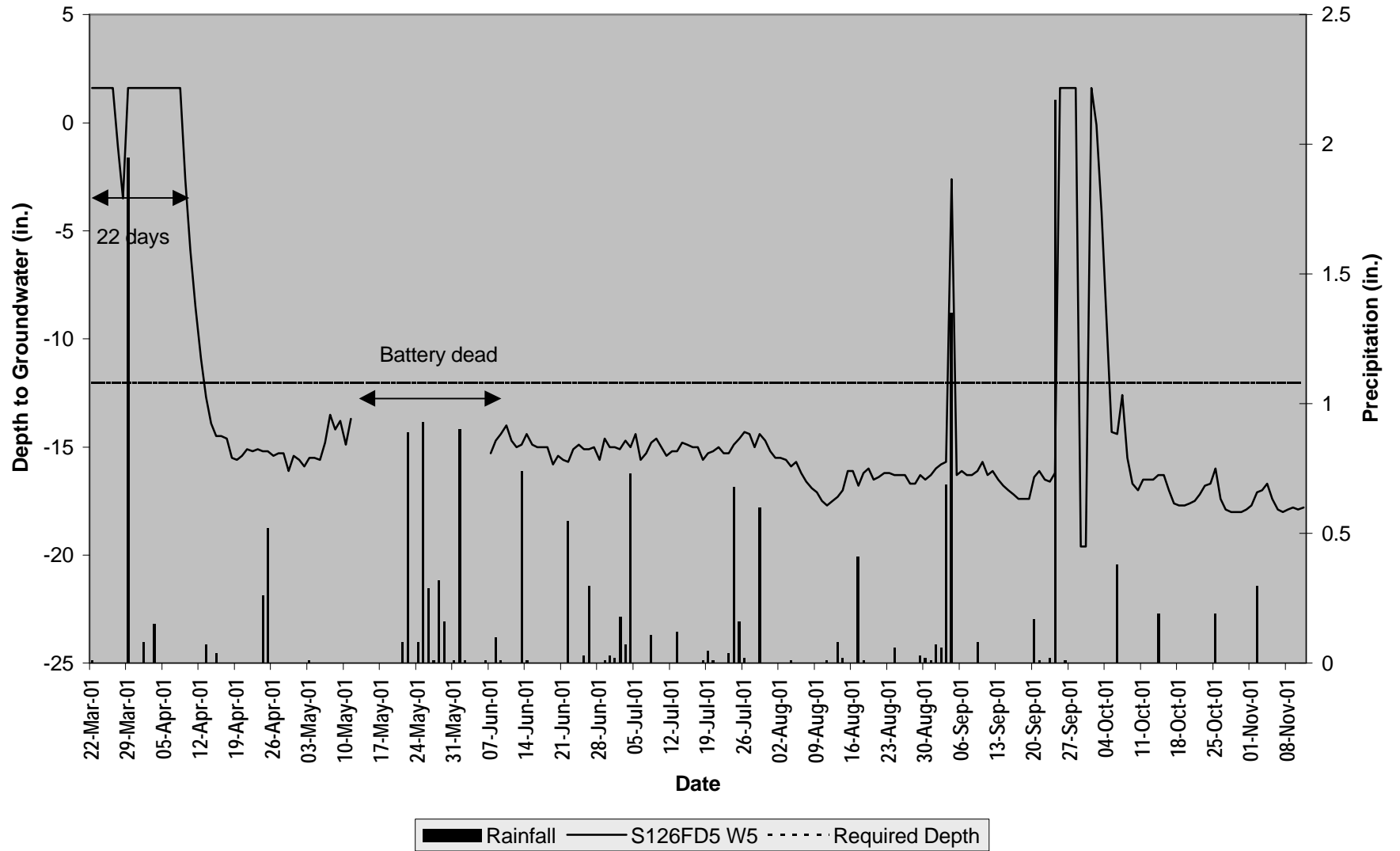
Little Sugar Creek W2 12" Success Criteria



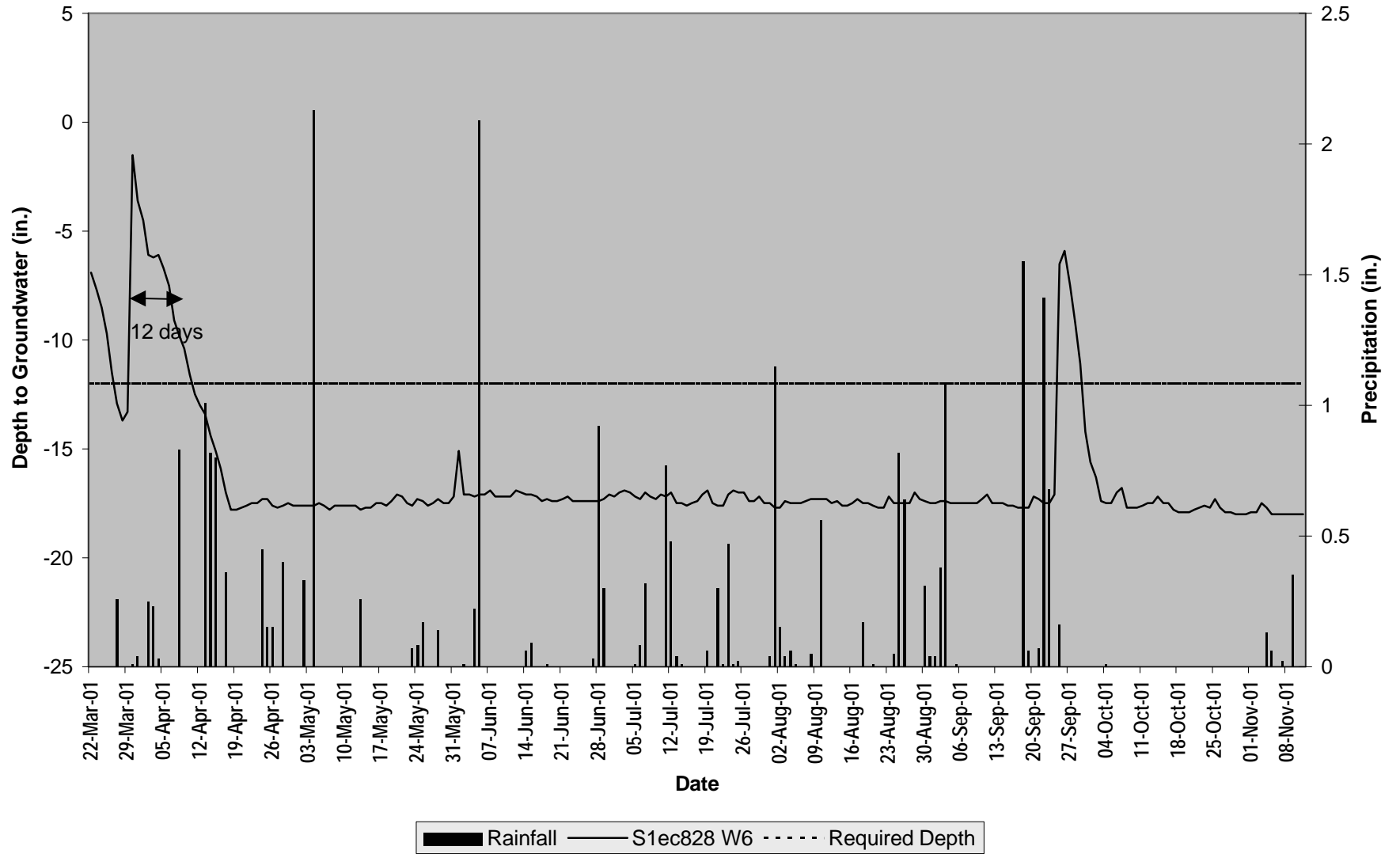
Little Sugar Creek W4 12" Success Criteria



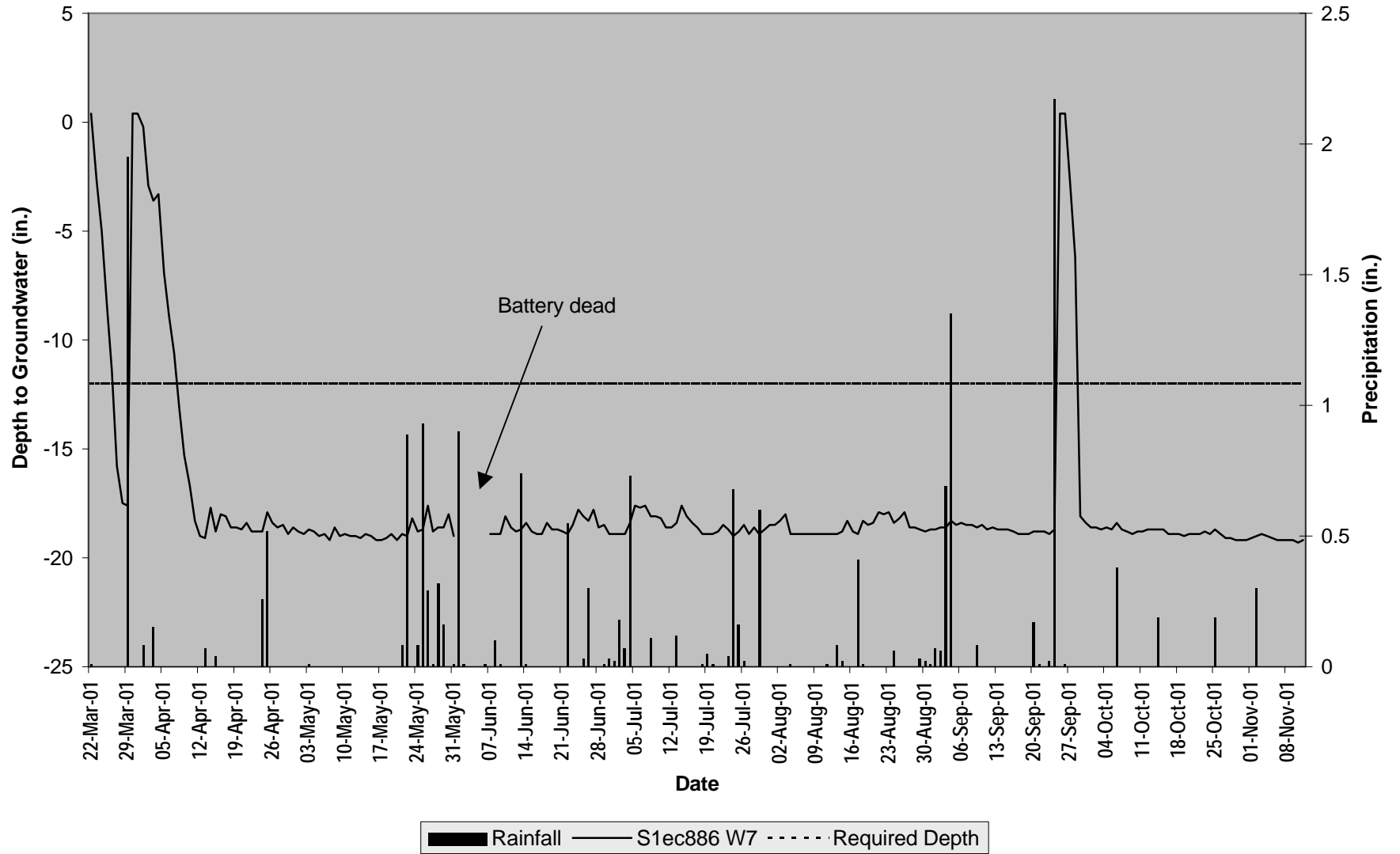
Little Sugar Creek W5 12" Success Criteria



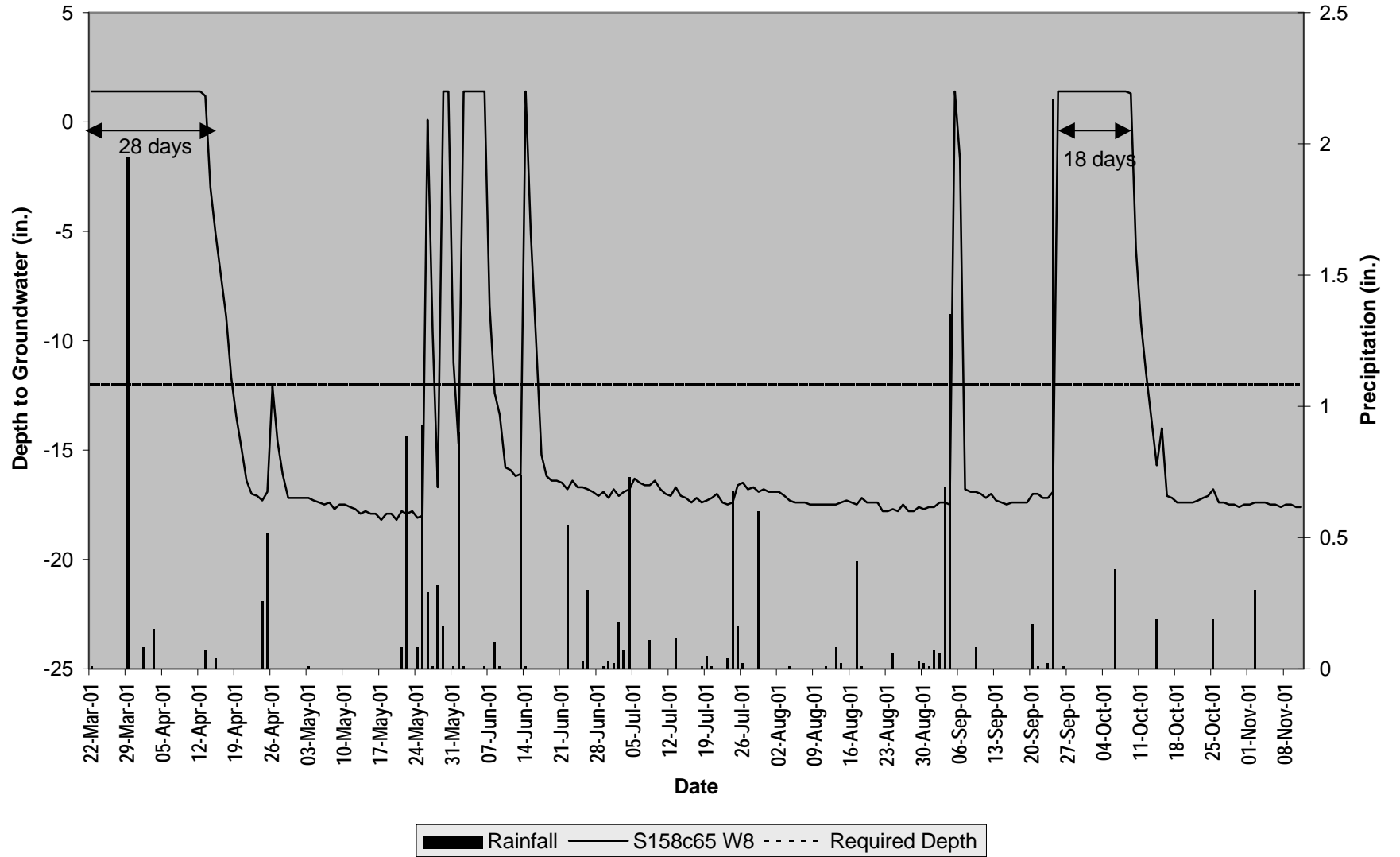
Little Sugar Creek W6 12" Success Criteria



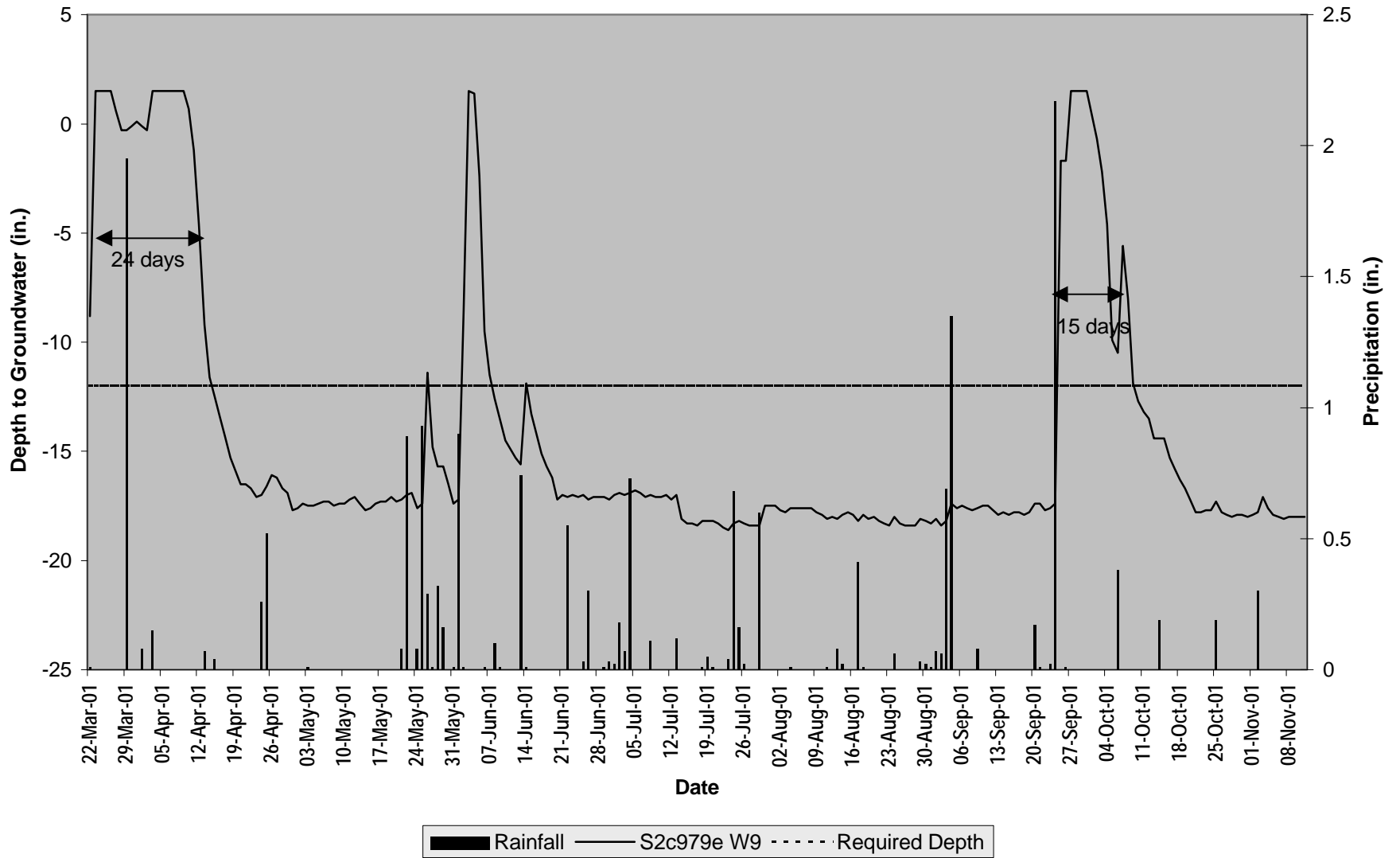
Little Sugar Creek W7 12" Success Criteria



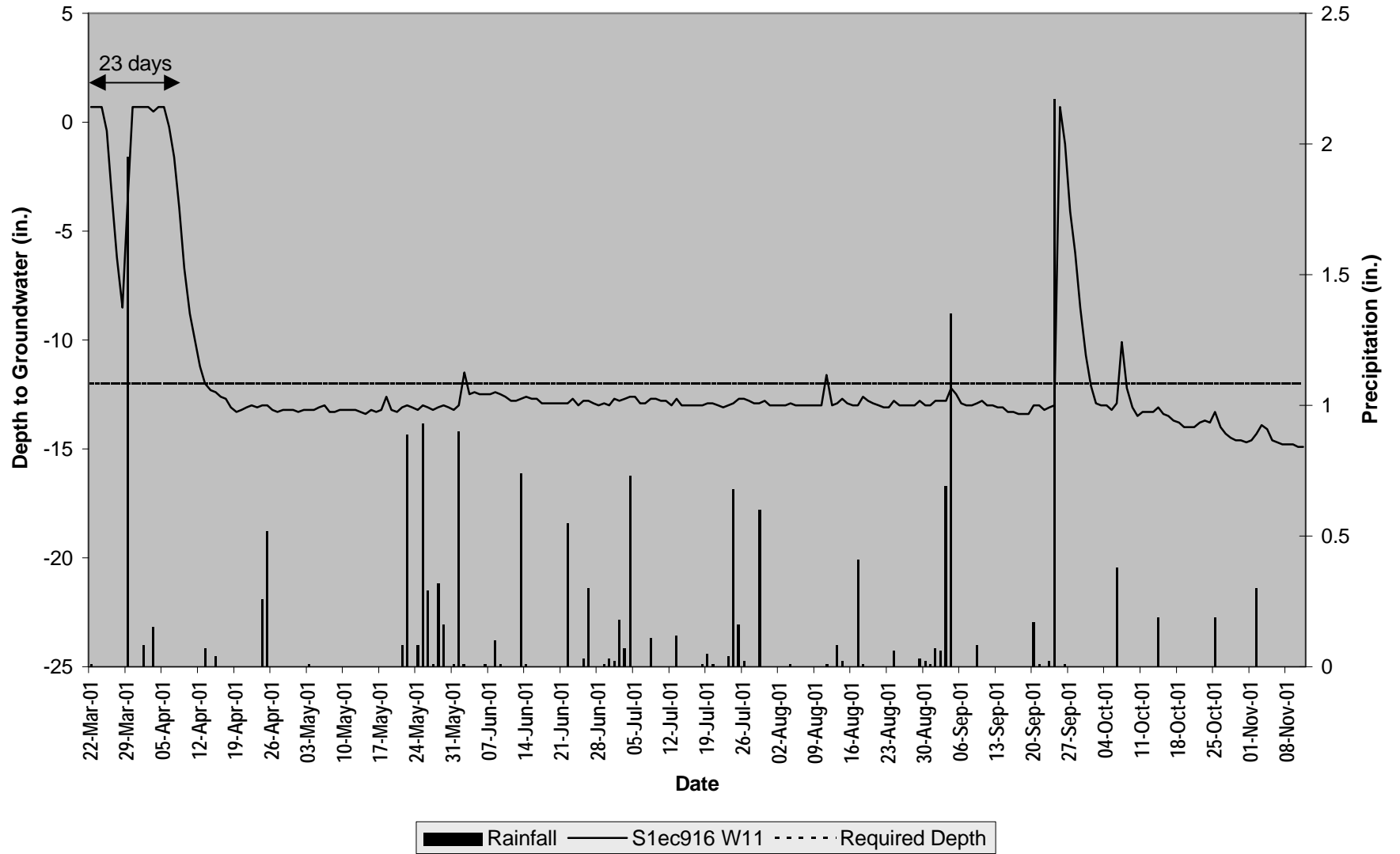
Little Sugar Creek W8 12" Success Criteria



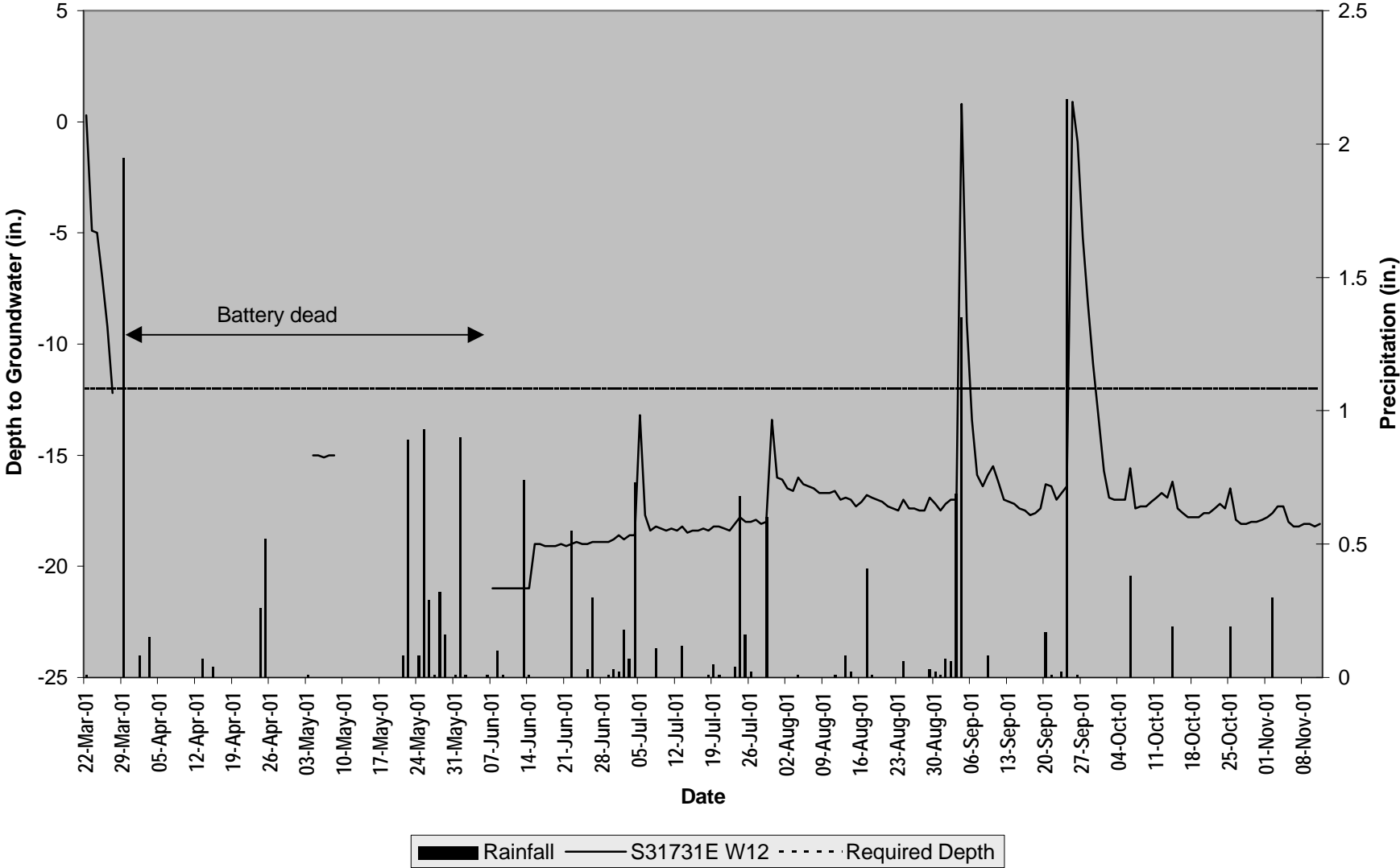
Little Sugar Creek W9 12" Success Criteria



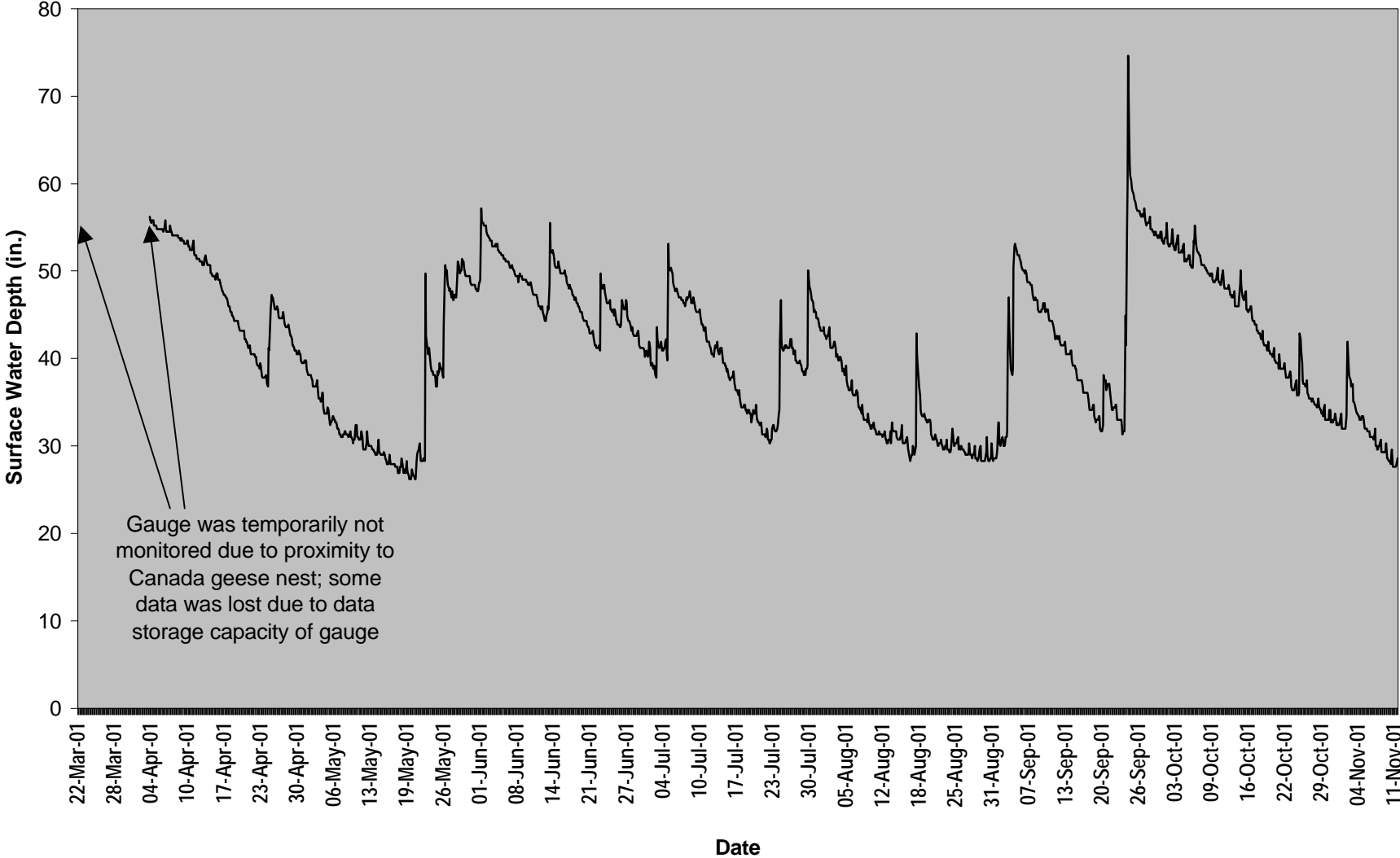
Little Sugar Creek W11 12" Success Criteria



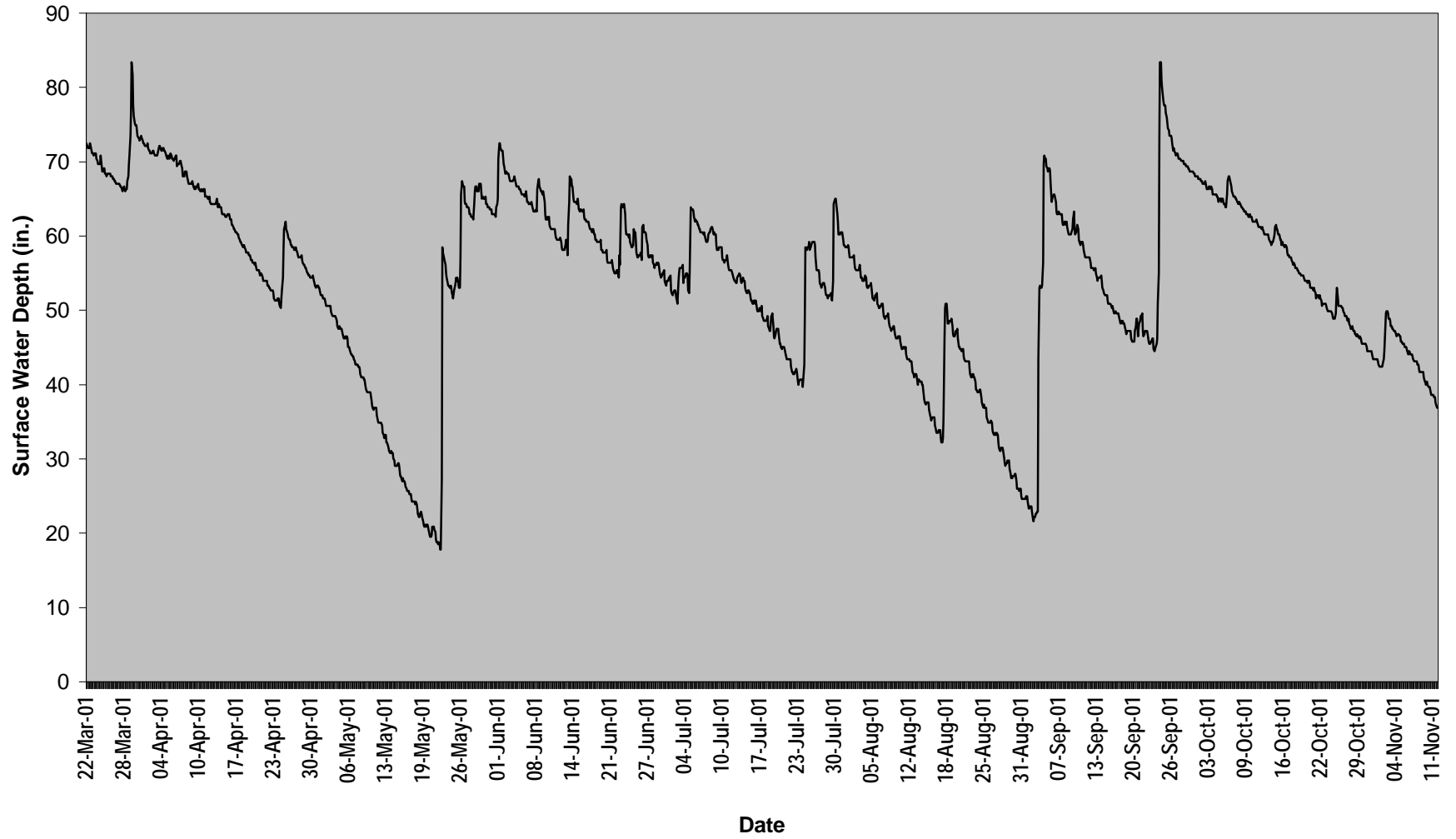
Little Sugar Creek W12
12" Success Criteria



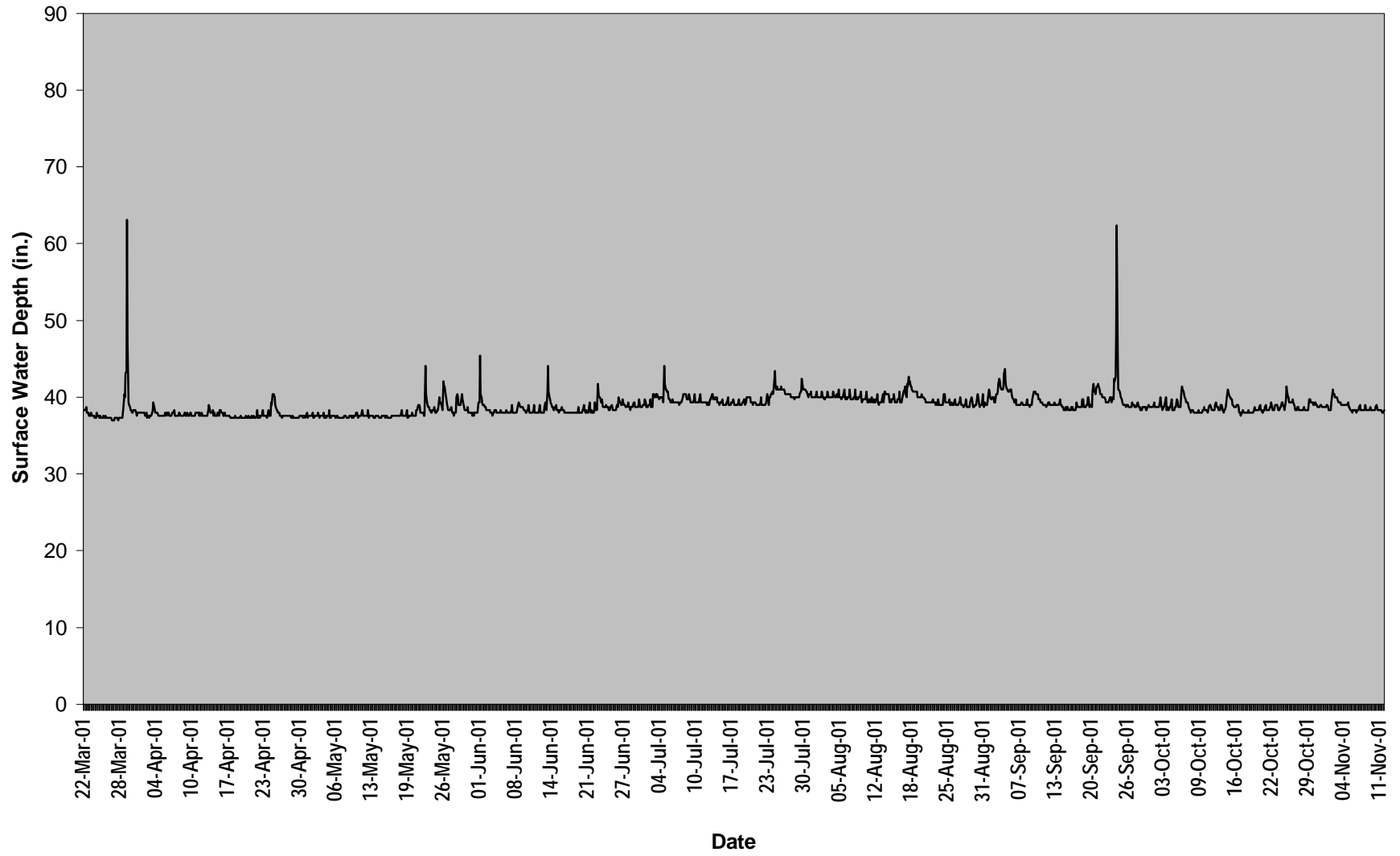
Little Sugar Creek S1



Little Sugar Creek S10



Little Sugar Creek S13



APPENDIX B
SITE PHOTOS

LITTLE SUGAR



Photo 1



Photo 2



Photo 3



Photo 4

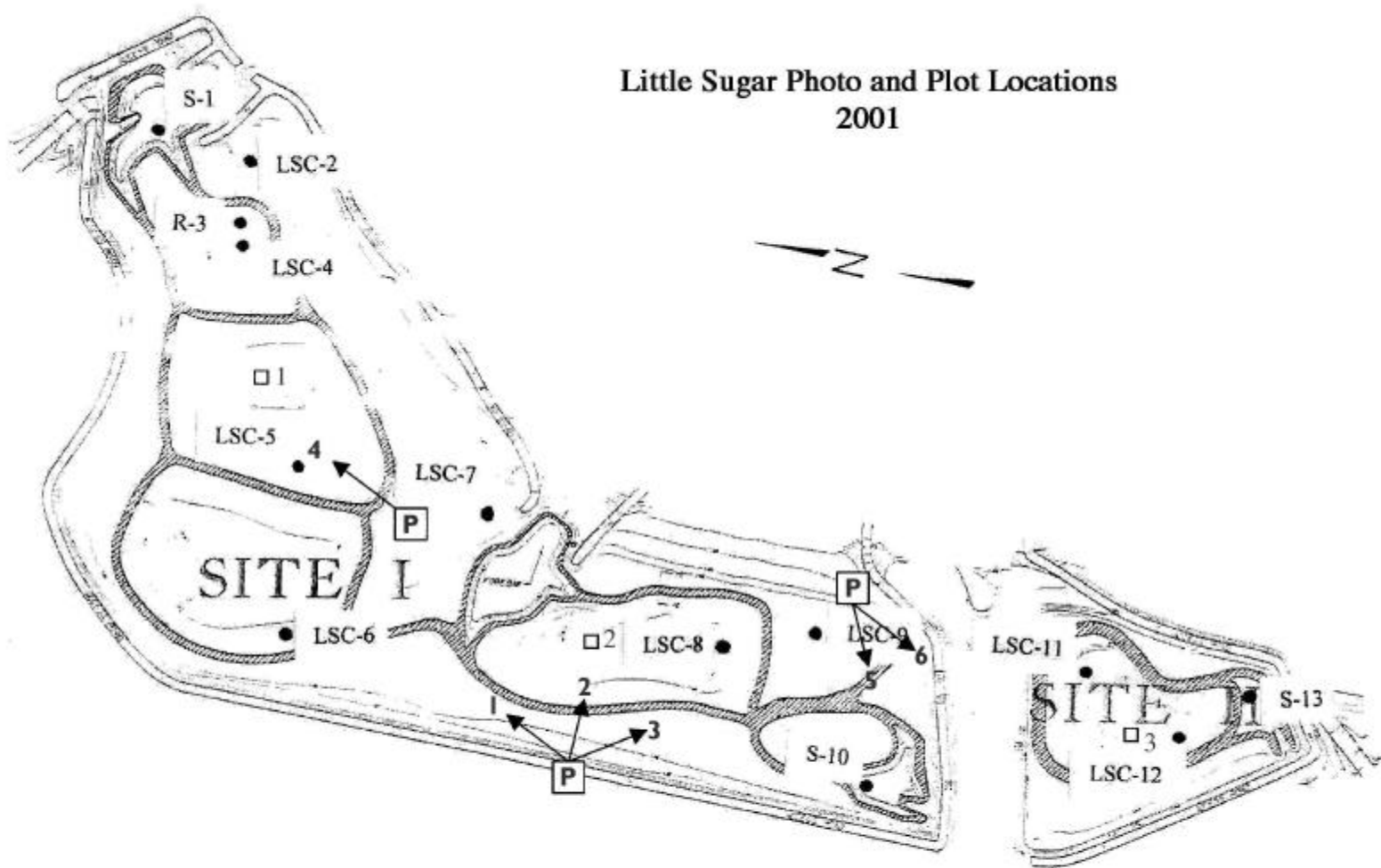


Photo 5



Photo 6

Little Sugar Photo and Plot Locations 2001



P Photo Locations

APPENDIX C

**LETTER TO N.C. WETLAND RESTORATION PROGRAM,
OCTOBER 8, 2001**



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

October 8, 2001

Mr. Ronald E. Ferrell, Program Manager
North Carolina Wetland Restoration Program
NCDENR-DWQ
P.O. Box 29535
Raleigh, NC 27626-0535

Dear Sir:

Subject: REQUEST FOR ACCEPTANCE OF WETLAND MITIGATION for a
completed section of the Charlotte Outer, TIP R-211 DA

At the request of the US Army Corps of Engineers, the North Carolina Department of Transportation (NCDOT) would like to secure outstanding wetland mitigation credits for the above project with the North Carolina Wetlands Restoration Program. The cause for this request is that the one of the sites (Little Sugar Creek) originally secured by NCDOT as mitigation for R-211 DA is not sufficiently meeting hydrologic criteria. The specifics of the request are below.

- Mecklenburg County, Piedmont Province
- Catawba River Basin, Cataloguing Unit: 03050103
- 13.1 acres of restored wetland mitigation is required
- wetland type is non-riparian, bottomland forest

For 13.1 acres at a cost of \$12,000 per acre, NCDOT is proposing to provide payment in the amount of \$157,200 to offset wetland impacts. If you are willing to accept responsibility for compensatory mitigation for this project, please send a letter of confirmation to Mary Frazer at NCDOT, Project Development and Environmental Analysis Branch. If you have any questions or need additional information please call Mary Frazer at (919) 733-1200.

Sincerely,

William D. Gilmore, P.E., Manager
Project Development & Environmental Analysis Branch

cc: Mr. Steve Lund, USACE, Asheville Field Office
Ms. Cynthia Van Der Wiele, NCDENR, Division of Water Quality
Mr. David Franklin, Corps of Engineers, Wilmington Field Office
Mr. N. L. Graf, P.E., FHWA
Mr. John Dorney, NCDENR, Division of Water Quality
Mr. Benton G. Payne, P.E., Division 10 Engineer

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-733-3141
FAX: 919-733-9794

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

APPENDIX D

LETTER TO U.S. ARMY CORPS OF ENGINEERS, DECEMBER 13, 2001



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

December 13, 2001

Mr. Steve Lund
U. S. Army Corps of Engineers
Asheville Regulatory Field Office
151 Patton Avenue, Room 143
Asheville, North Carolina 28801-5006


SUBJECT: Request for Permit Modification for R-211 DA (Charlotte Outer Loop),
Mecklenburg County, Action ID No. 199200013

Dear Mr. Lund:

This is to request a special condition modification for the Charlotte Outer Loop (TIP Project No. R-211 DA). The permit for R-211 DA contains a special condition for the Mallard Creek and Little Sugar Creek Wetland Mitigation Sites requiring wetland hydrology to be "established within 10 inches of the surface, ponded or flooded, for 26 consecutive days of the growing season". Based on the 1987 Wetland Delineation Manual, success criteria for hydrology states that hydrology shall be within 12 inches of the surface. Therefore, NCDOT requests that the special permit condition be changed to require the hydrology to be within 12 inches of the surface.

If you have any questions or desire more information, do not hesitate to contact Heather Montague at (919) 733-1175.

Sincerely,


SR William D. Gilmore, P. E., Manager
Project Development and Environmental Analysis Branch

attachments

Cc: Bruce Ellis, P.W.S., C.L.M.
Heather Montague
Mary Frazer

MAILING ADDRESS:
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