ANNUAL REPORT FOR 2004

Key Branch Mitigation Site
Anson County
WBS Element 34398.4.1
TIP No. R-2239WM

Office of Natural Environment & Roadside Environmental Unit
North Carolina Department of Transportation
December 2004

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SUMMARY

The Key Branch Mitigation Site is located in Anson County and was constructed in 2003. The site must meet jurisdictional success criteria for both wetland hydrology and vegetation for five consecutive years or until the site is deemed successful. The following report details the monitoring activities during the 2004-growing season. The 2004 data represents results from the first year of hydrologic and vegetation monitoring.

Site hydrology is monitored with twenty-one groundwater gauges, three surface water gauges, and one onsite rain gauge. Eight vegetation-monitoring plots were established to monitor the 70.2 acres planted in trees on the site.

For the first year of monitoring, nine of the fourteen groundwater-gauges met the success criteria for jurisdictional hydrology (saturation within 12" of the surface for greater than 12.5% of the growing season). One gauge reported saturation in the 5 - 8% range, while four gauges reported saturation between 8 – 12.5%. All four-groundwater gauges located in the wetland reference area had difficulty meeting the jurisdictional hydrology, however all three groundwater gauges in the stream reference area met the success criteria. The two, onsite surface water gauges (SG-1, SG-2) experienced periodic inundation and demonstrated overbank flooding during the growing season. The stream reference surface water gauge (SG-3) demonstrated periodic inundation influenced by backwater conditions.

The 2004 vegetation monitoring of the site revealed an average tree density of 295 trees per acre. This average is below the minimum success criteria of 320 trees per acre. The site was replanted and live staked by the Roadside Environmental Unit in February 2005.

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

Located in Anson County, the Key Branch Mitigation Site encompasses approximately 118 acres. It is situated between Lower White Store Road (SR 1252) and Mineral Springs Church Road (SR 1240) (Figure 1).

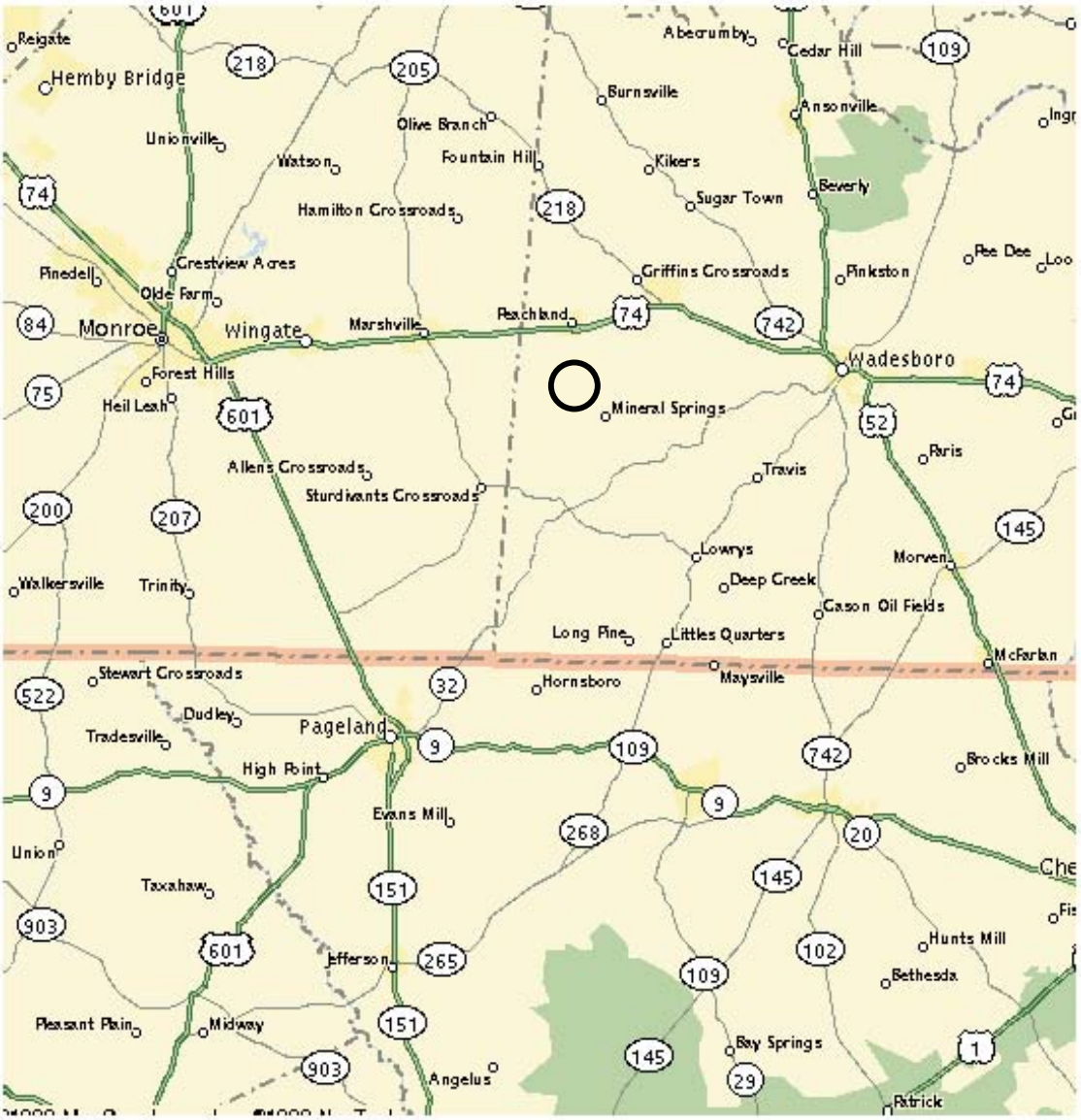
1.2 PURPOSE

In order to demonstrate successful mitigation, the site must be monitored for a minimum of five years or until success criteria are achieved. Success criteria are based on federal guidelines for wetland mitigation. Criteria for hydrologic conditions and vegetation survival are included in these documents. The following report describes the results of the hydrologic and vegetation monitoring during the 2004-growing season at the Key Branch Mitigation Site.

1.3 PROJECT HISTORY

February 2004	Site Planted
March-November 2004	Hydrology Monitoring (1 yr.)
July 2004	Vegetation Monitoring (1 yr.)

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 state 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 Anson County begins March 23 and ends November 15 (238 days). These dates correspond to a 50% probability that air temperatures will not drop below 28°F or lower after March 22 and before November 15.[1] Minimum wetland hydrology is required for at least 12.5% of this growing season; for Anson County, 12.5% equals 30 consecutive days. Local climate must represent average conditions for the area.

2.2 HYDROLOGIC DESCRIPTION

Fourteen groundwater gauges, two surface water gauges, and one rain gauge were installed in March/April 2004 at the Key Branch Mitigation Site (Figure 2). Also, four groundwater gauges were installed at the Key Branch Wetland Reference Site. Three groundwater gauges and one surface water gauge were installed in March/April 2004 at the Key Branch Stream Reference Site (Figure 2A). The groundwater gauges are set to record daily water levels, while the surface water gauges are set to record at 3-hour intervals. The 2004-year is the first full growing season that the hydrology has been monitored.

[1] Natural Resources Conservation Service, Soil Survey of Anson County, North Carolina.

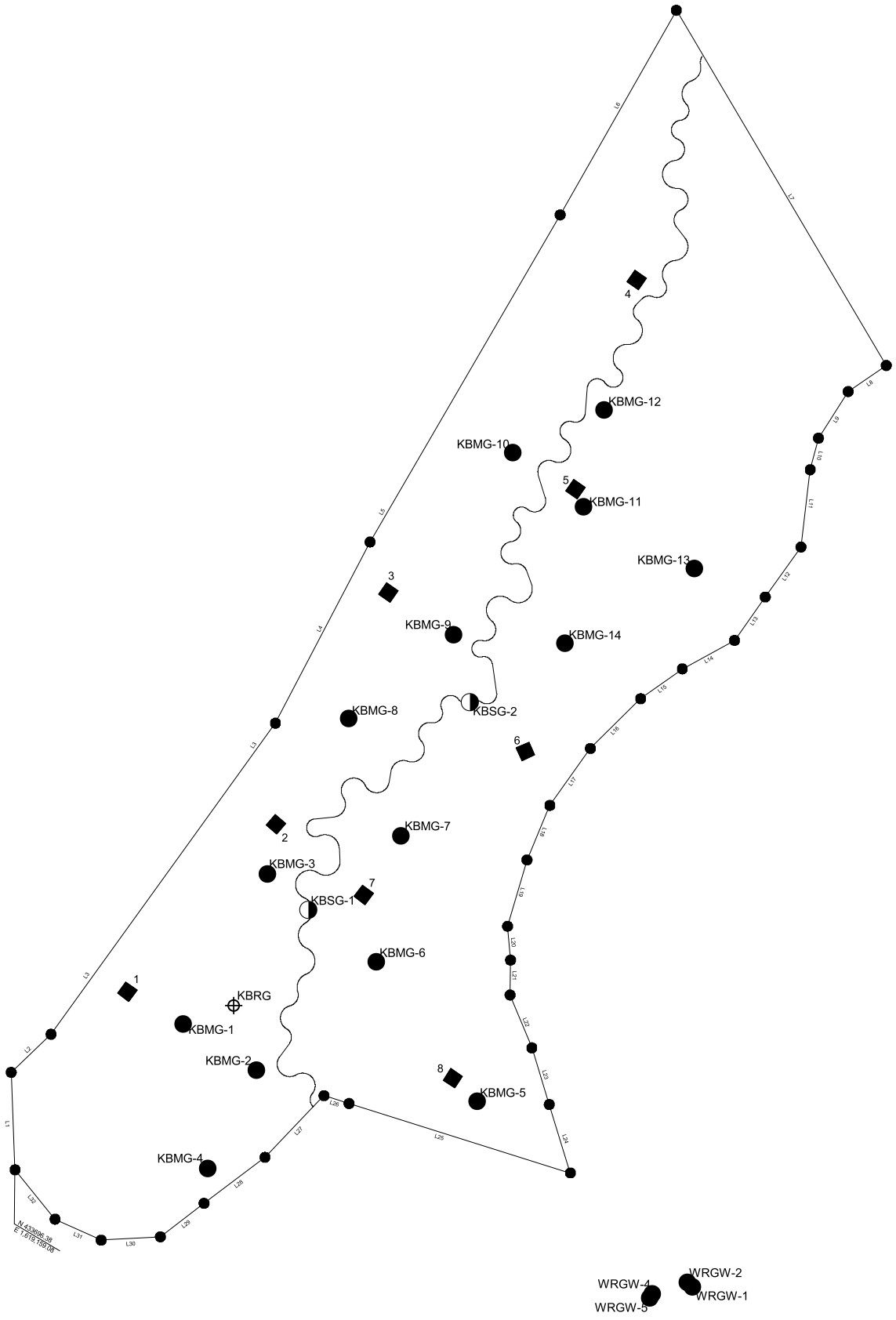


Figure 2. Gauge Location Map

- Groundwater Gauge
- Surface Water Gauge
- Rain Gauge

Not to Scale

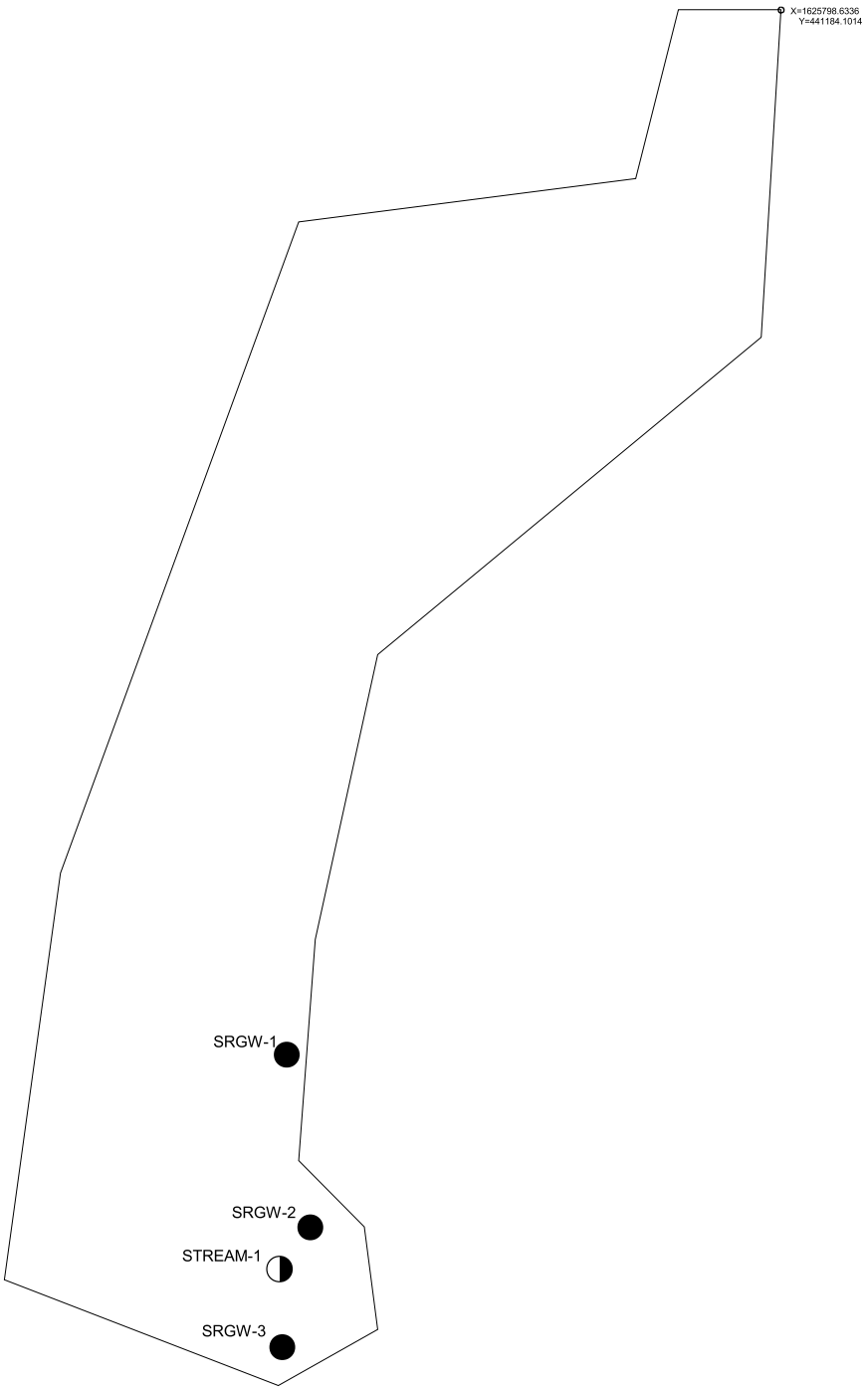


Figure 2A. Stream Reference Gauge Location Map

● Groundwater Gauge

◑ Surface Water Gauge

Not to Scale

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 238-day growing season. The results are presented in Table 1.

Appendix A contains charts of the water depth for each groundwater and surface gauge. 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. The maximum number of consecutive days is noted on each graph.

The hydrologic monitoring results of the groundwater gauges are provided in Figure 3 and Figure 3A.

2.3.2 Climatic Data

Figure 4 is a comparison of 2003 and 2004 monthly rainfall to historical precipitation for the area. This comparison indicates whether 2004 was “average” in terms of climate conditions by comparing the rainfall to that of historical rainfall (data collected between 1973 and 2004). The NC State Climate Office provided all historical data.

For the 2004-year June, July, August and September experienced above average rainfall. The months of November (03’), January, March, April, and October recorded below average rainfall for the site. December (03’), February, May, and November experienced average rainfall. Overall, 2004 experienced an average rainfall year (with a drier than average spring and wetter than average summer and early fall).

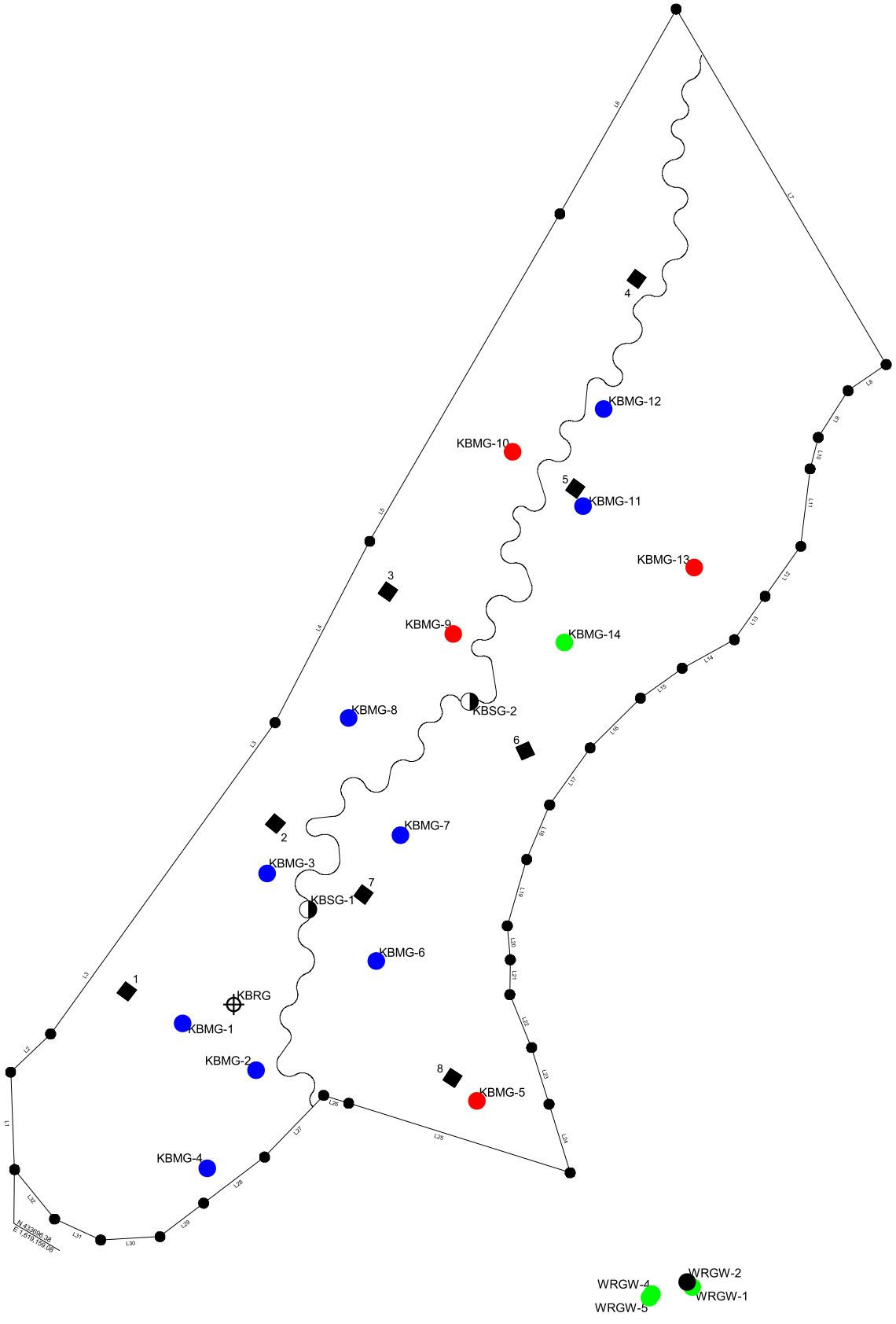


Figure 3. 2004 Hydrologic Monitoring Results

- ● < 5 %
- ● 5 - 8 %
- ● 8 - 12.5 %
- ● > 12.5 %

◑ Surface Water Gauge

⊕ Rain Gauge

Not to Scale

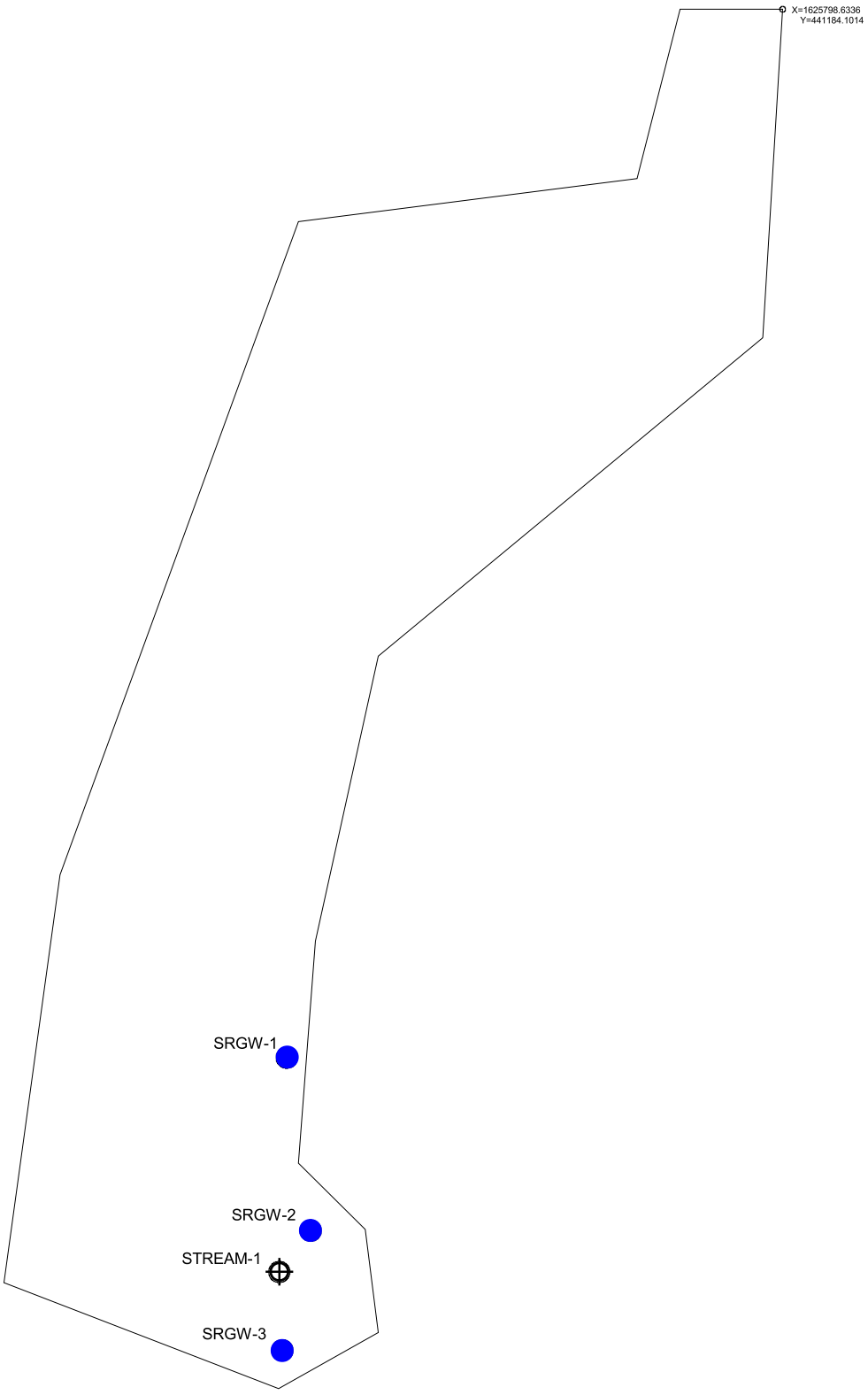


Figure 3A. 2004 Stream Reference Monitoring Results

- < 5 %
- 5 - 8 %
- 8 - 12.5 %
- > 12.5 %

- Surface Water Gauge
- Rain Gauge

Not to Scale

Figure 4: 30-70 Percentile Graph

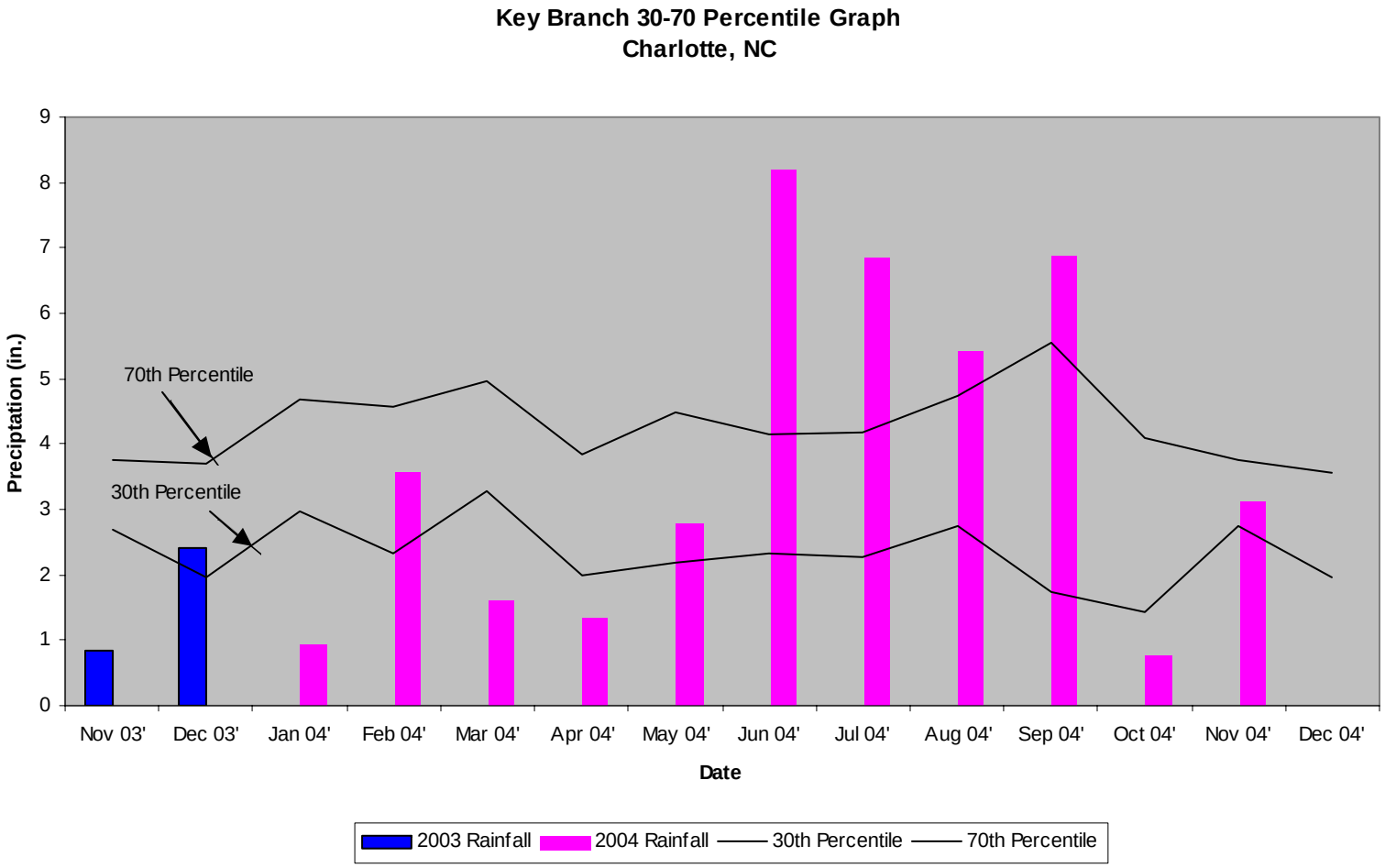


Table 1. 2004 Hydrologic Monitoring Results – Groundwater Gauges

Monitoring Gauge	<5%	5-8%	8-12.5%	>12.5%	Actual %	Dates of Success
KBMG-1				×	22.3	Aug 30-Oct 21
KBMG -2				×	22.3	Aug 30-Oct 21
KBMG -3				×	32.8	Aug 30-Nov 15
KBMG -4				×	20.2	Sept 24-Nov 11
KBMG -5			×		10.5	Aug 30-Sept 23
KBMG -6				×	32.8	Aug 30-Nov 15
KBMG -7				×	22.3	Sept 24-Nov 15
KBMG -8				×	32.8	Aug 30-Nov 15
KBMG -9			×		9.2	Sept 28-Oct 18
KBMG -10			×		10.9	Aug 30-Sept 24
KBMG -11				×	14.3	Sept 23-Oct 26
KBMG -12				×	32.8	Aug 30-Nov 15
KBMG -13			×		10.5	Sept 28-Oct 22
KBMG -14		×			7.6	Sept 28-Oct 15
Wetland Reference Site						
WRGW-1		×			5.5	
WRGW-2	×				4.6	
WRGW-4		×			5.5	
WRGW-5		×			5.9	
Stream Reference Site						
SRGW-1				×	32.8	March 20-May 19 Aug 30-Nov 15
SRGW-2				×	39.5	March 15-May 31 June 24-July 23 Aug 14-Nov 15
SRGW-4				×	39.9	March 20-June 5 June 22-Aug 10 Aug 13-Nov 15

2.4 CONCLUSION

Nine of the fourteen groundwater-gauges met the success criteria for jurisdictional hydrology (saturation within 12" of the surface for greater than 12.5% of the growing season). One gauge reported saturation in the 5 - 8% range, while four gauges reported saturation between 8 – 12.5%. All four of the groundwater-gauges located in the wetland reference area had difficulty meeting the jurisdictional hydrology, however all three groundwater gauges in the stream reference area met the success criteria. The two onsite, surface water gauges (SG-1, SG-2) experienced periodic inundation and demonstrated overbank flooding during the growing season. The stream reference surface water gauge (SG-3) demonstrated periodic inundation influenced by backwater conditions.

EEP will begin monitoring the hydrology at the Key Branch Mitigation Site for the 2005 monitoring year.

3.0 VEGETATION: KEY BRANCH MITIGATION SITE (YEAR 1 MONITORING)

3.1 SUCCESS CRITERIA

The success criteria state that at least 320 stems per acre must survive after the completion of the third growing season. The required survival criterion will decrease by 10% per year after the third year of vegetation monitoring (i.e., for an expected 290 stems per acre for year 4, and 260 stems per acre for year 5.)

3.2 DESCRIPTION OF SPECIES

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

Fraxinus pennsylvanica, Green Ash

Quercus lyrata, Overcup Oak

Betula nigra, River Birch

Quercus michauxii, Swamp Chestnut Oak

Quercus nigra, Water Oak

Quercus phellos, Willow Oak

3.3 RESULTS OF VEGETATION MONITORING

Table 2. Vegetation Monitoring Statistics

Plot #	Green Ash	Overcup Oak	River Birch	Swamp Chestnut Oak	Water Oak	Willow Oak	Total (1 year)	Total (at planting)	Density (Trees/Acre)
1	1	2	4	5			12	26	314
2	2	11	2	2	2	4	23	43	364
3	22	5	5			1	33	37	606
4	3		6				9	32	191
5		1	4	4			9	39	157
6	7	9				6	22	44	340
7	5	2	1	3		7	18	43	285
8		1	2	3			6	39	105
	Total Density Average								**295**

Site Notes: Other species noted: trumpet creeper, switch grass, smartweed, volunteer gum, rye grain, and morning glory. Intensive deer activity was noted. The site was dry at the time of monitoring.

3.4 CONCLUSIONS

Of the 118 acres on this site, approximately 70.2 acres involved tree planting. There were eight vegetation-monitoring plots established throughout the planting areas. The 2004 vegetation monitoring of the site revealed an average tree density of 295 trees per acre. This average is below the minimum success criteria of 320 trees per acre. The site was replanted and live staked by the Roadside Environmental Unit in February 2005.

4.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS

For the first year of monitoring, nine of the fourteen groundwater-gauges met the success criteria for jurisdictional hydrology (saturation within 12" of the surface for greater than 12.5% of the growing season). One gauge reported saturation in the 5 - 8% range, while four gauges reported saturation between 8 – 12.5%. All four-groundwater gauges located in the wetland reference area had difficulty meeting the jurisdictional hydrology, however all three groundwater gauges in the stream reference area met the success criteria. The two onsite, surface water gauges (SG-1, SG-2) experienced periodic inundation and demonstrated overbank flooding during the growing season. The stream reference surface water gauge (SG-3) demonstrated periodic inundation influenced by backwater conditions.

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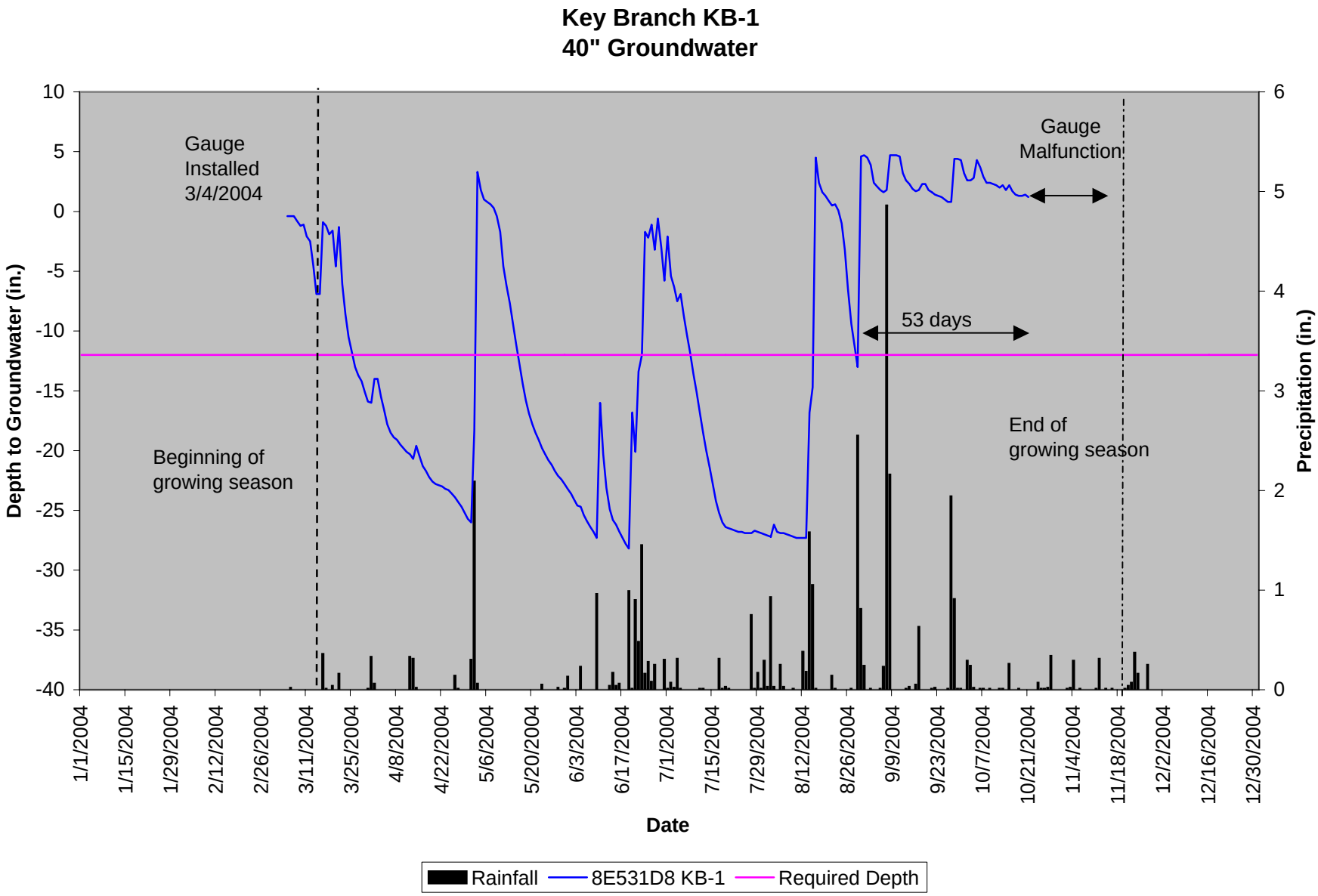
Per the letter from the Ecosystem Enhancement Program (EEP) to NCDOT dated August 25, 2004, the EEP has accepted the transfer of all off-site mitigation projects. The EEP will be responsible for fulfilling the remaining monitoring requirements and future remediation for this project.

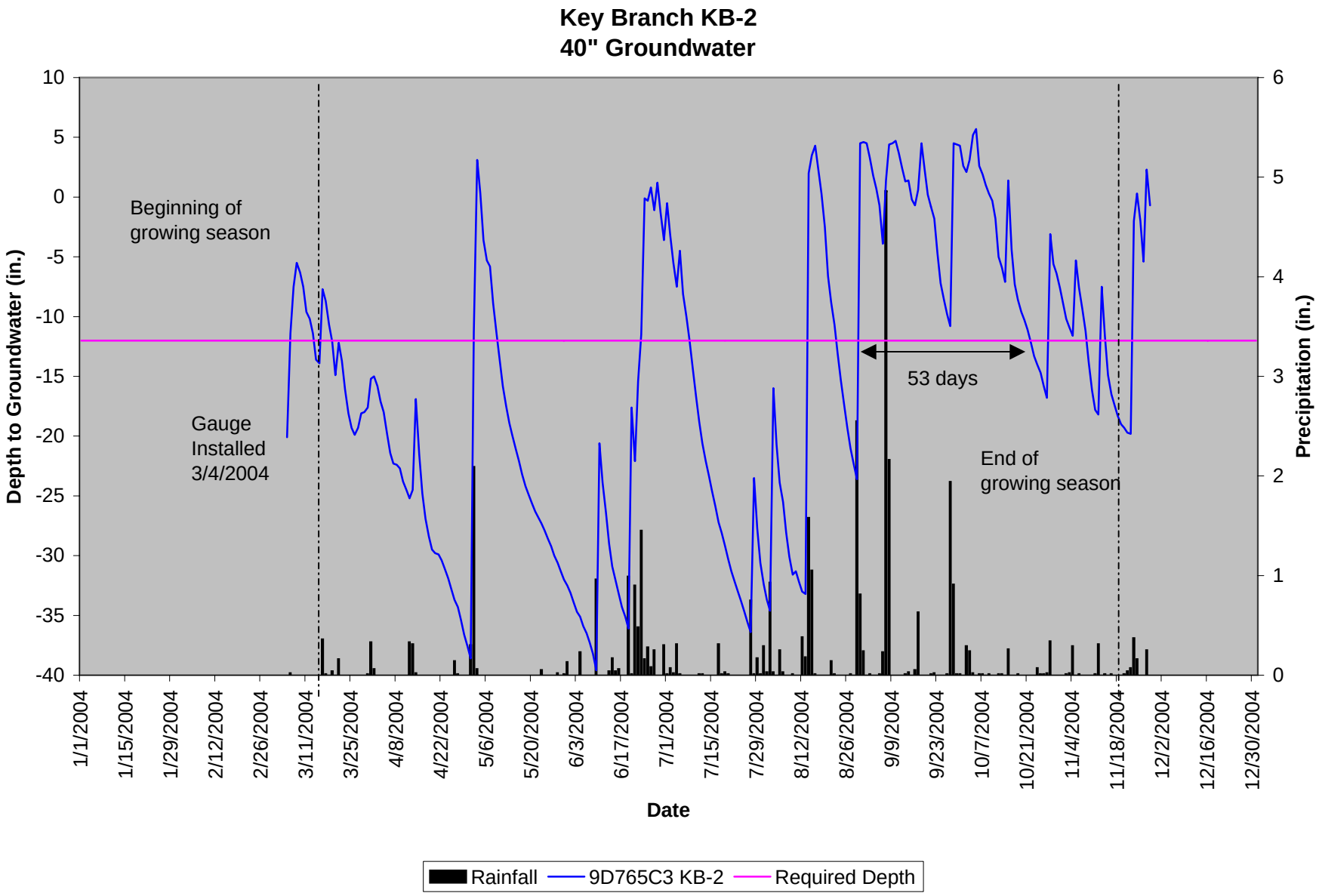
APPENDIX A

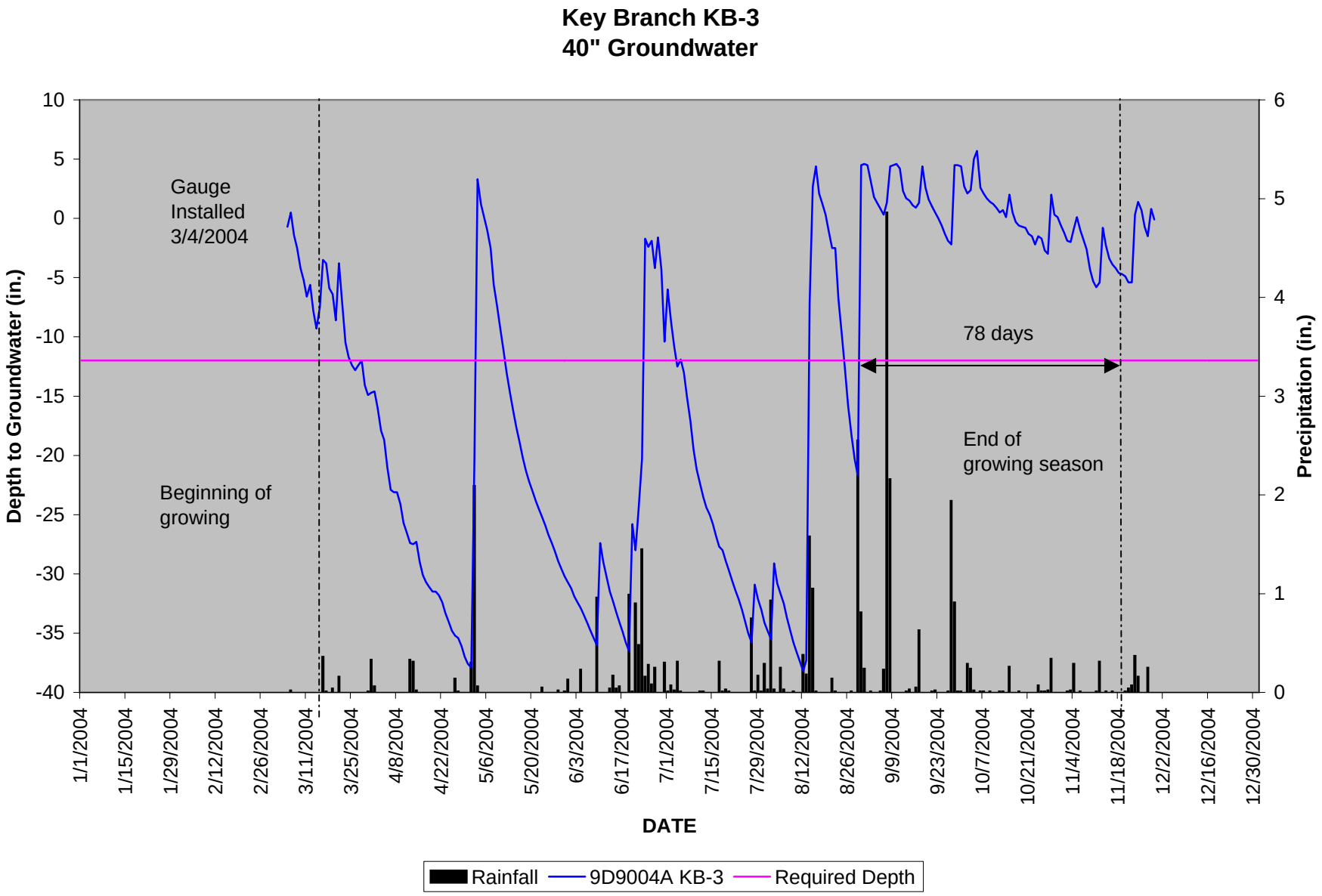
GAUGE DATA GRAPHS

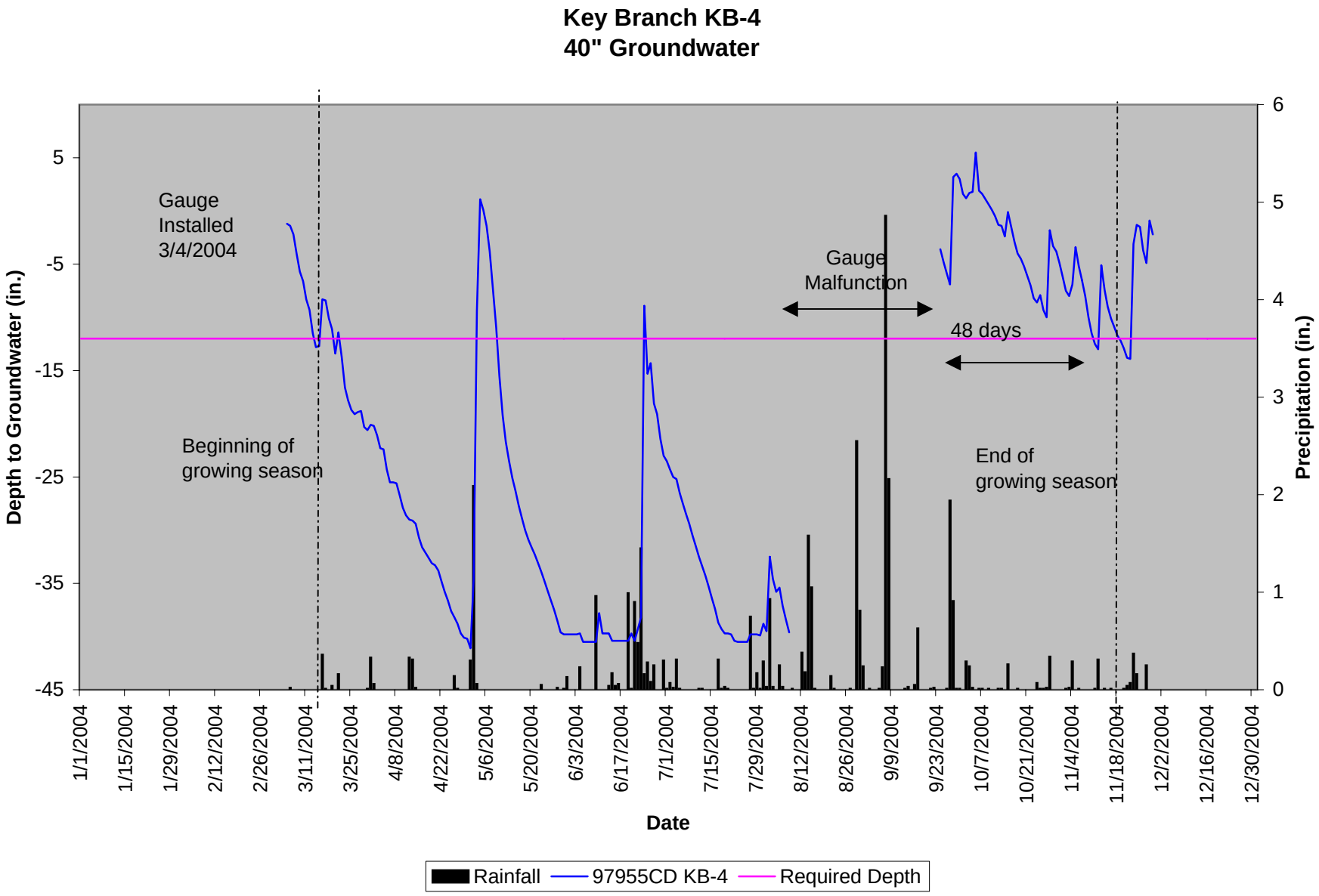
GROUNDWATER GAUGE GRAPHS

KEY BRANCH


Key Branch KB-1
40" Groundwater
Gauge Installed 3/4/2004
Gauge Malfunction
53 days
Beginning of growing season
End of growing season
Depth to Groundwater (in.)
Precipitation (in.)
Date
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Rainfall
8E531D8 KB-1
Required Depth


Key Branch KB-2
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
Beginning of growing season
Gauge Installed 3/4/2004
53 days
End of growing season
Date
Rainfall
9D765C3 KB-2
Required Depth


Key Branch KB-3
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
DATE
Gauge Installed 3/4/2004
Beginning of growing
78 days
End of growing season
Rainfall
9D9004A KB-3
Required Depth
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004


Key Branch KB-4
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
Gauge Installed 3/4/2004
Gauge Malfunction
48 days
Beginning of growing season
End of growing season
5
-5
-15
-25
-35
-45
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
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6/17/2004
7/1/2004
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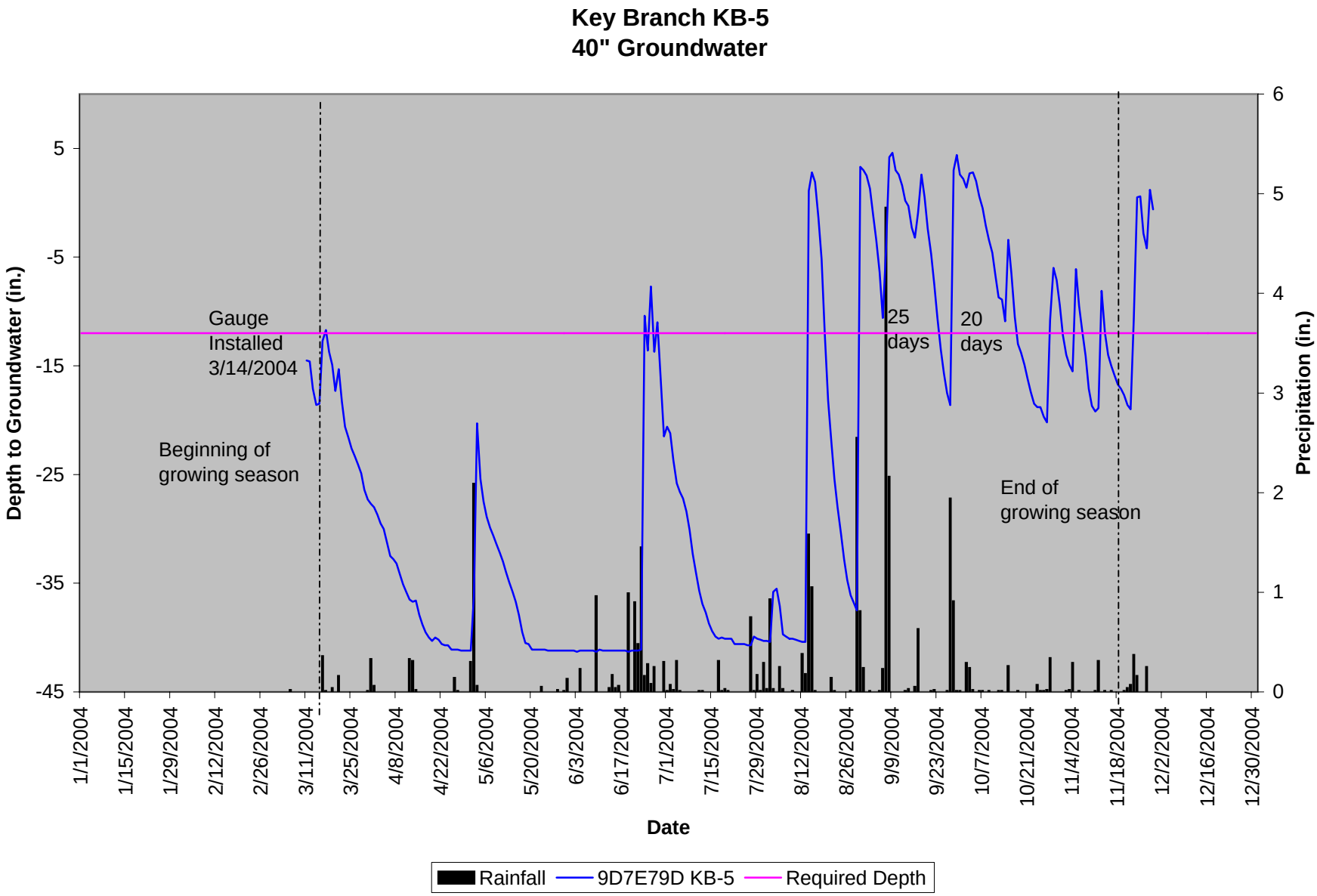
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Date
Rainfall
97955CD KB-4
Required Depth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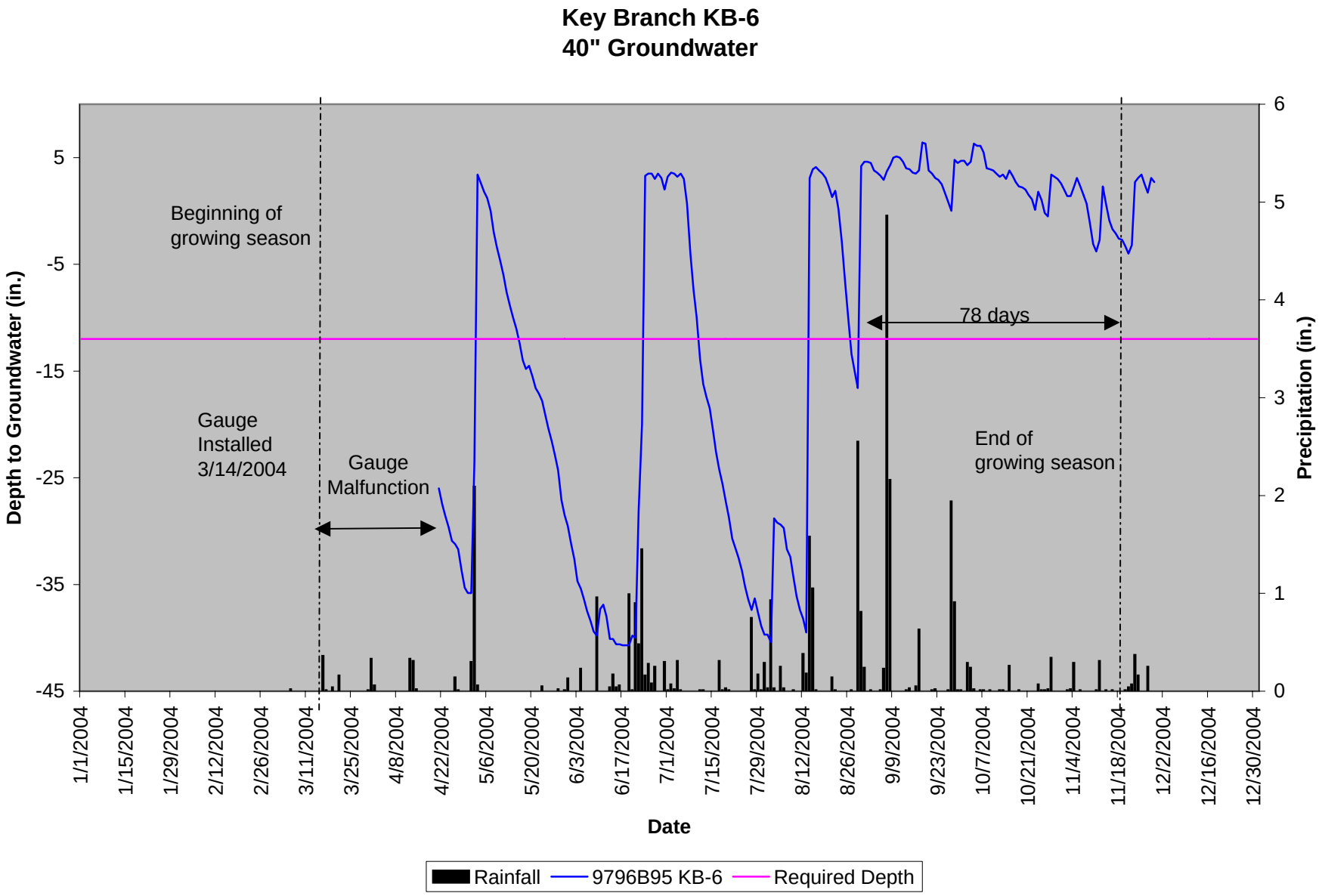
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
5
-5
-15
-25
-35
-45
6
5
4
3
2
1
0
Gauge
Installed
3/14/2004
Beginning of
growing season
25
days
20
days
End of
growing season
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Date
Rainfall
9D7E79D KB-5
Required Depth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40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
Beginning of growing season
Gauge Installed 3/14/2004
Gauge Malfunction
78 days
End of growing season
5
-5
-15
-25
-35
-45
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
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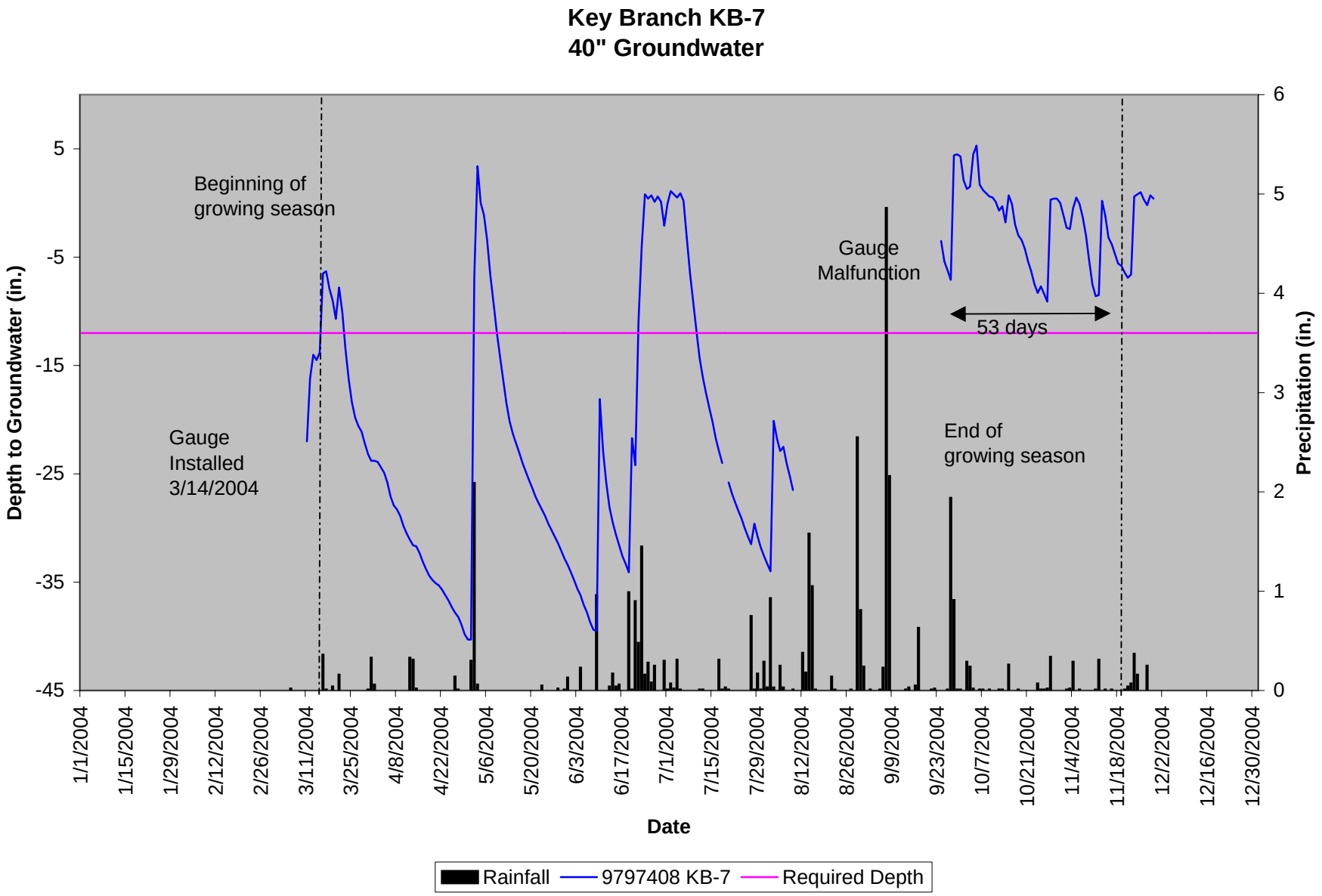
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Date
Rainfall
9796B95 KB-6
Required Depth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Depth to Groundwater (in.)
Precipitation (in.)
Date
Beginning of growing season
Gauge Installed 3/14/2004
Gauge Malfunction
53 days
End of growing season
5
-5
-15
-25
-35
-45
6
5
4
3
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1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
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9/9/2004
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10/7/2004
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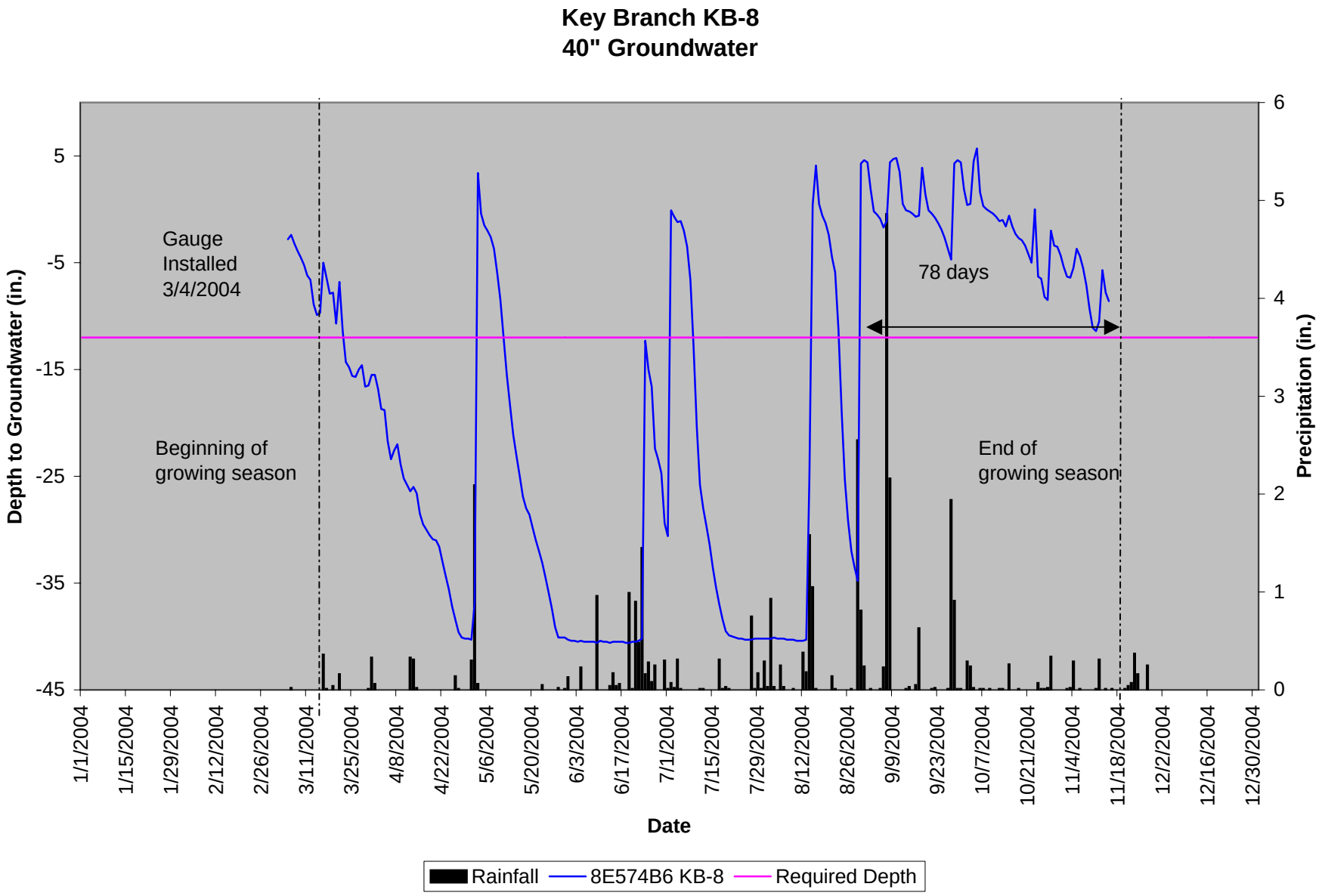
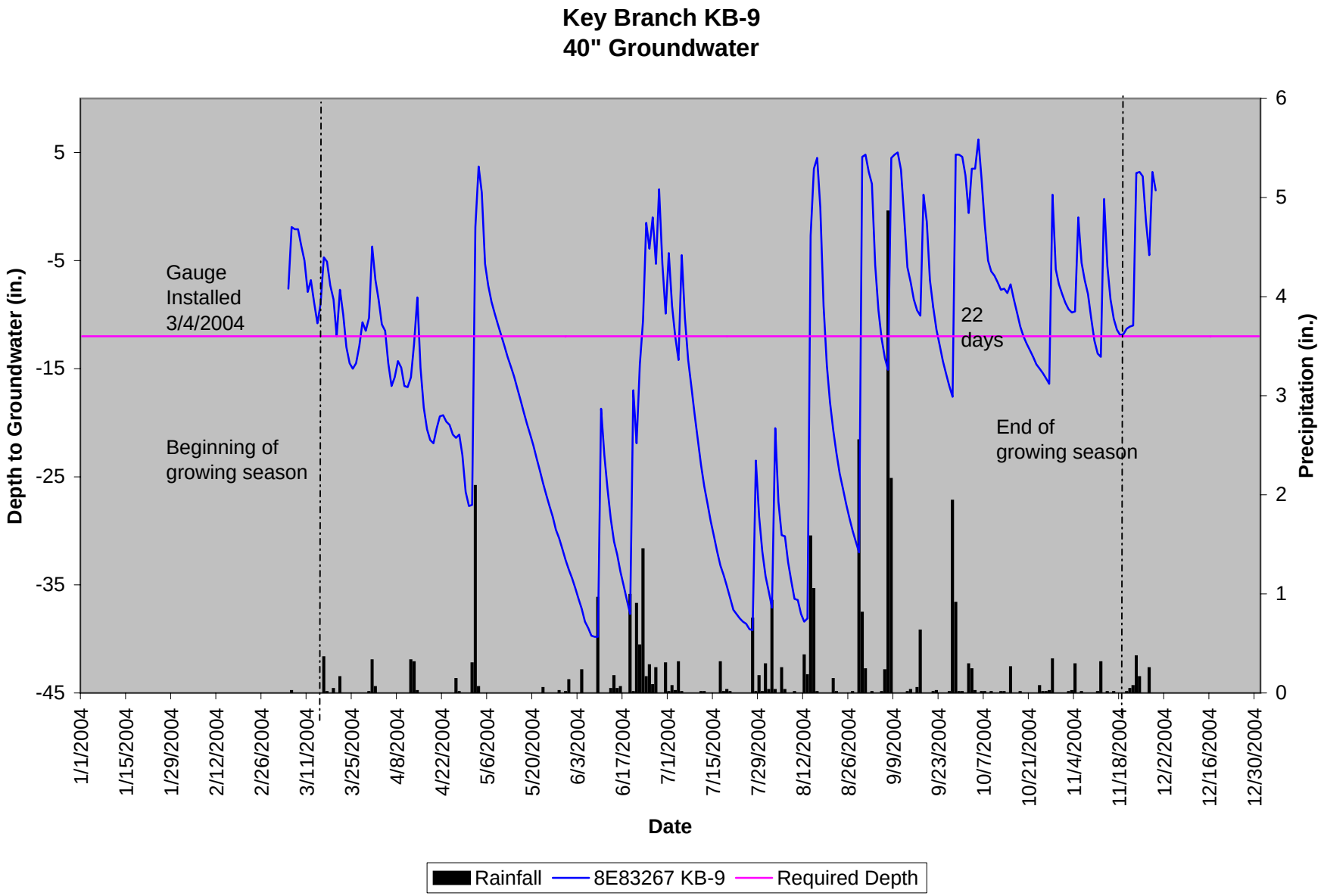
12/16/2004
12/30/2004
Rainfall
9797408 KB-7
Required Depth


Key Branch KB-8
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
5
-5
-15
-25
-35
-45
6
5
4
3
2
1
0
Gauge
Installed
3/4/2004
78 days
Beginning of
growing season
End of
growing season
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Date
Rainfall
8E574B6 KB-8
Required Depth


Key Branch KB-9
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
5
-5
-15
-25
-35
-45
6
5
4
3
2
1
0
Gauge
Installed
3/4/2004
Beginning of
growing season
22
days
End of
growing season
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
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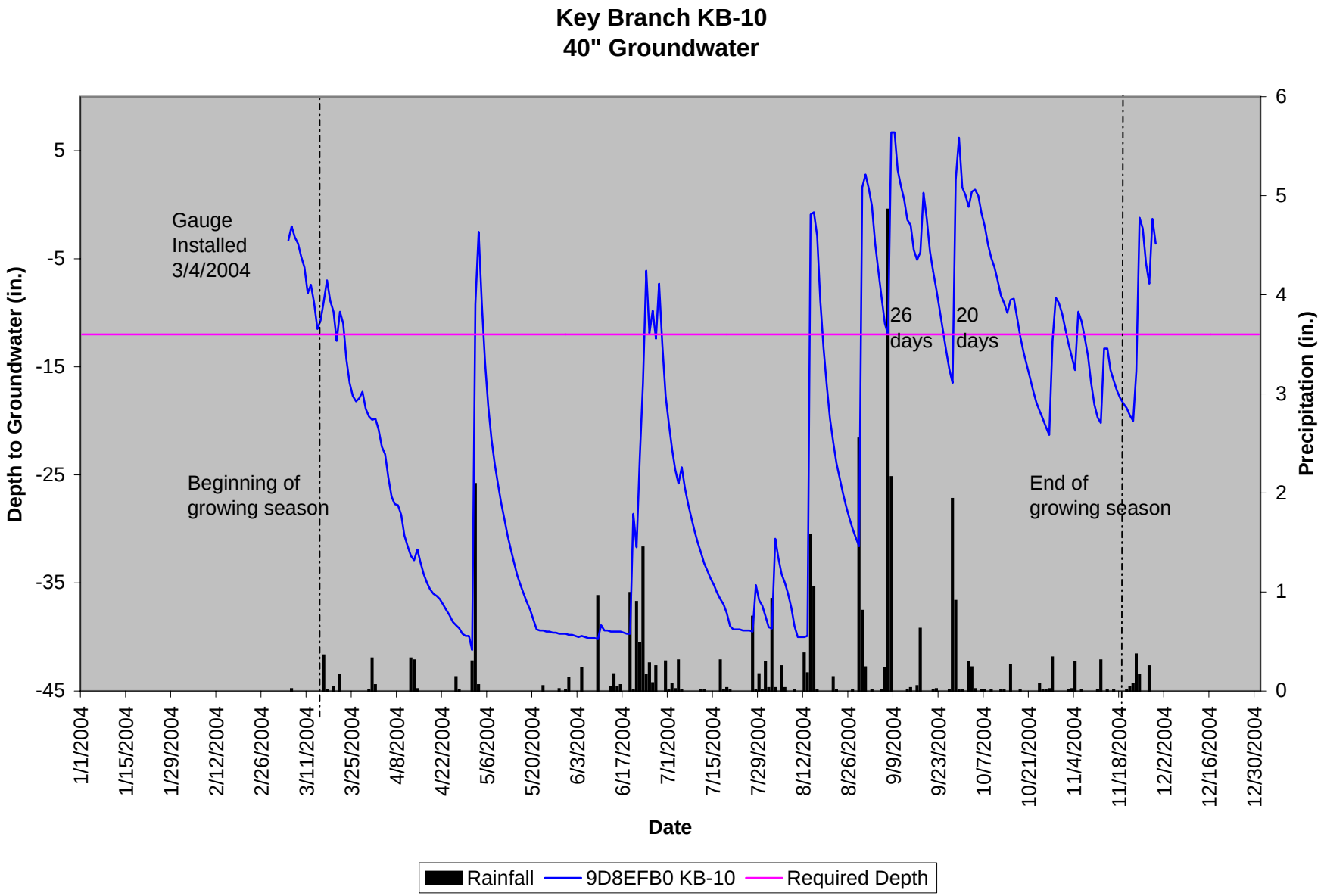
12/16/2004
12/30/2004
Date
Rainfall
8E83267 KB-9
Required Depth


Key Branch KB-10
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
Date
Gauge Installed 3/4/2004
Beginning of growing season
End of growing season
26 days
20 days
5
-5
-15
-25
-35
-45
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
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3/25/2004
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9/9/2004
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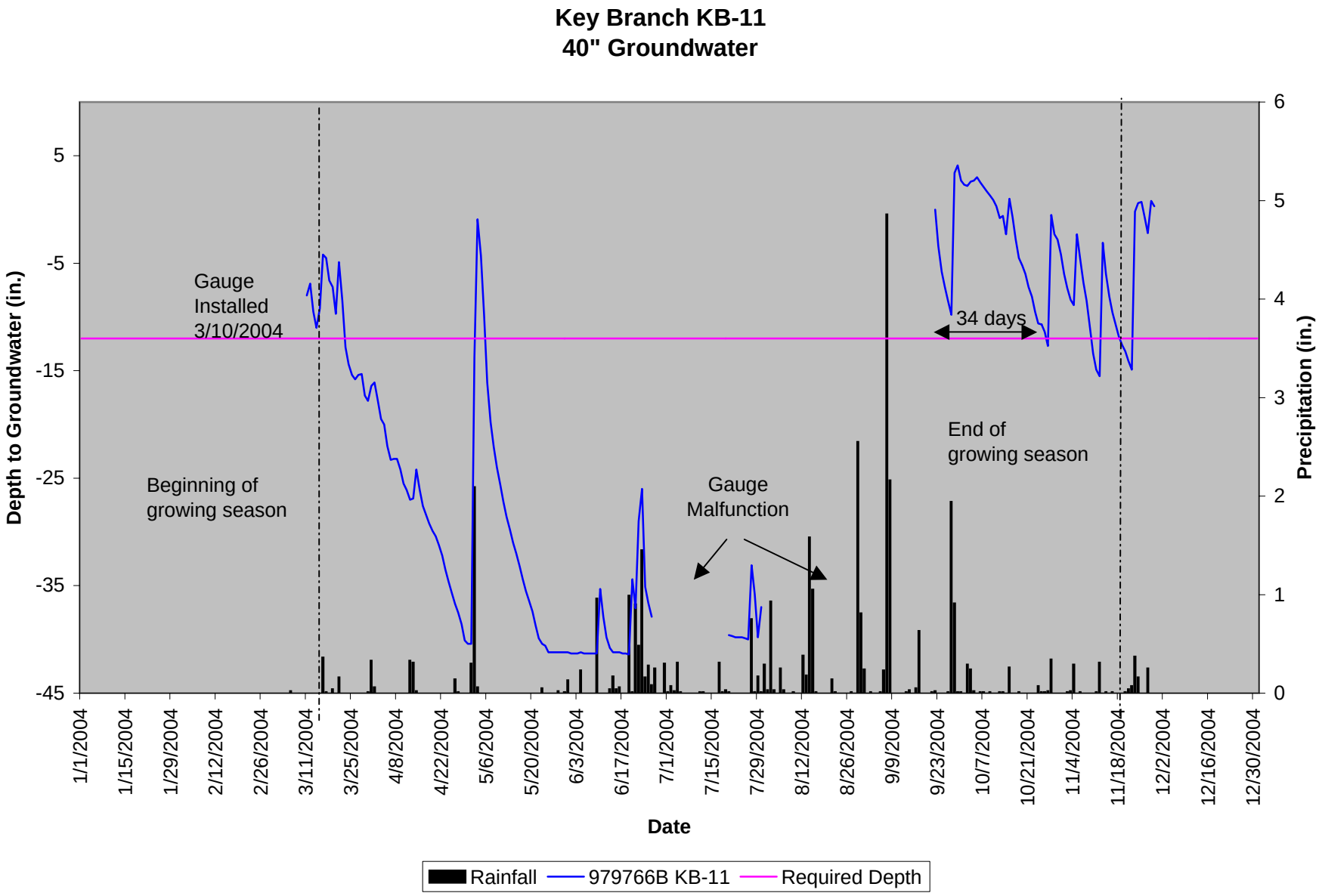
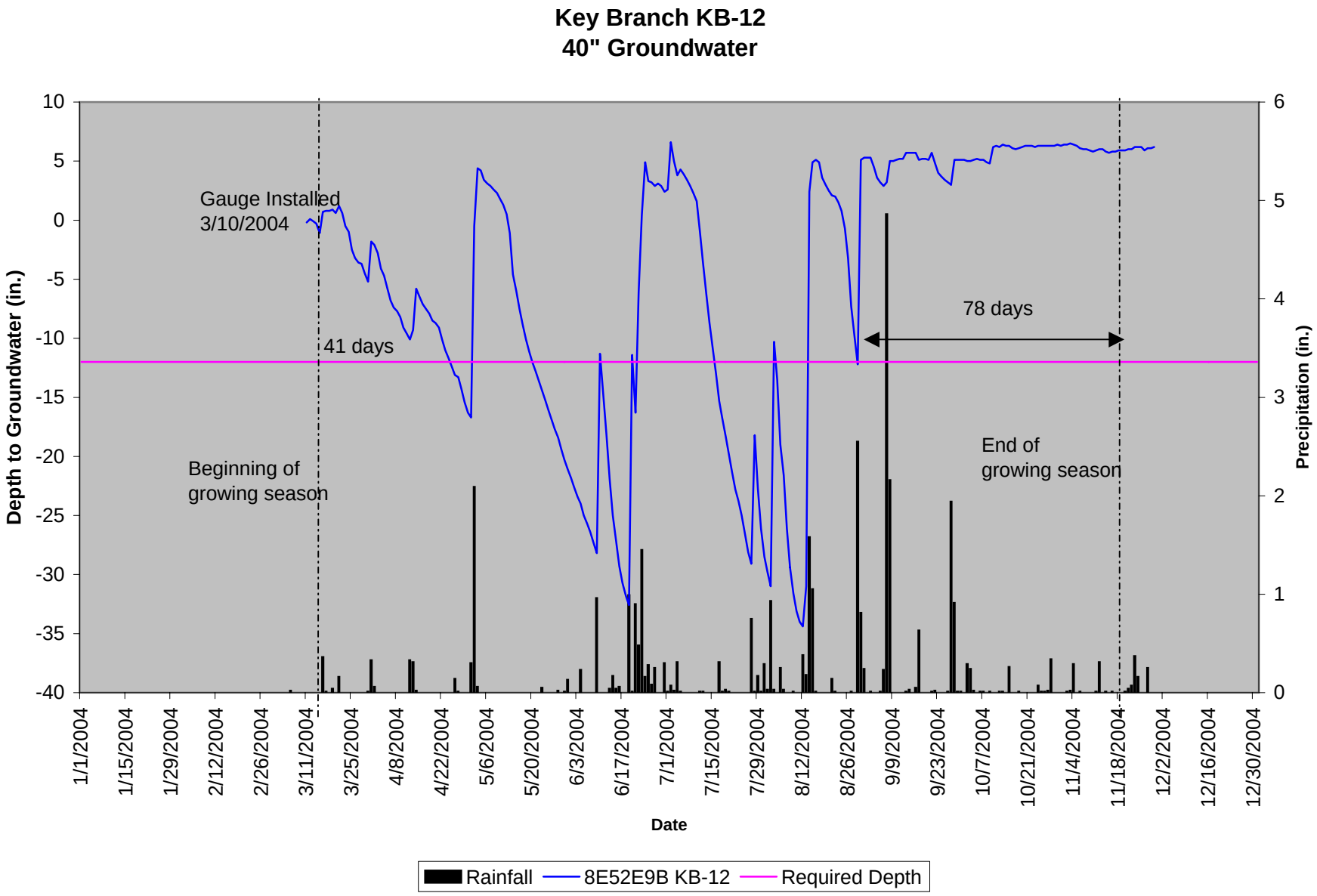
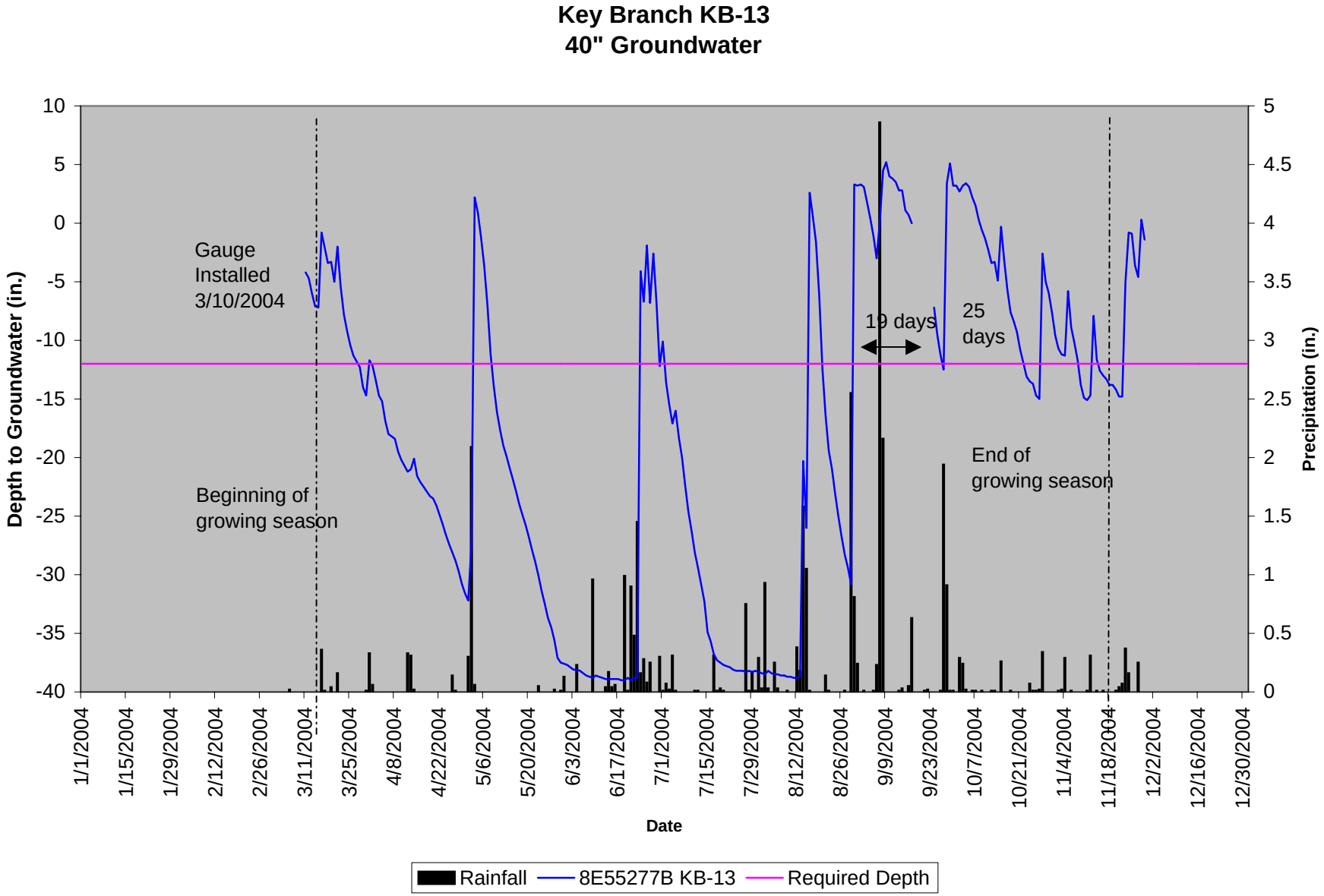
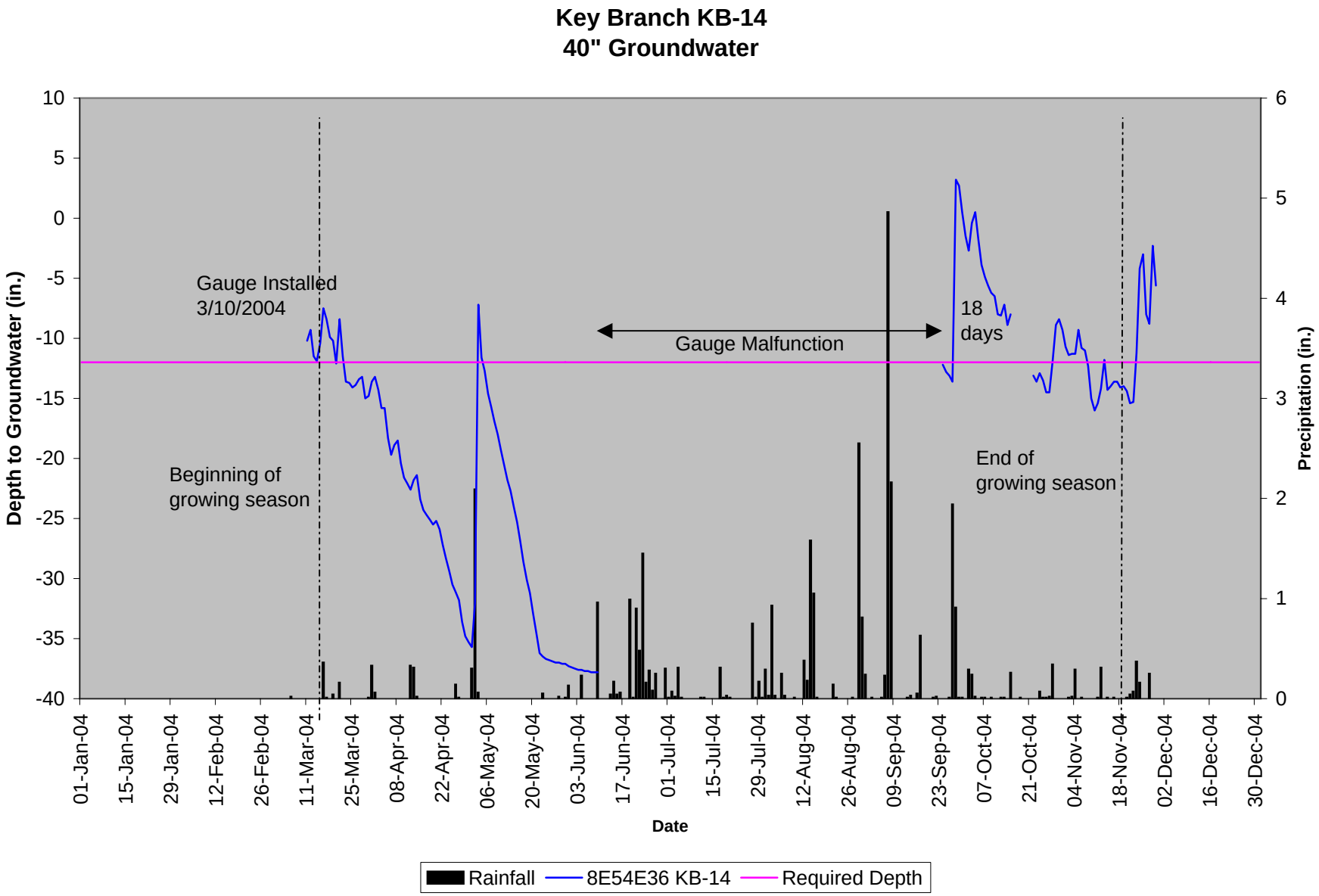
12/16/2004
12/30/2004
Rainfall
9D8EFB0 KB-10
Required Depth


Key Branch KB-11
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
Date
Gauge Installed 3/10/2004
Beginning of growing season
Gauge Malfunction
End of growing season
34 days
5
-5
-15
-25
-35
-45
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Rainfall
979766B KB-11
Required Depth


Key Branch KB-12
40" Groundwater
Gauge Installed
3/10/2004
41 days
78 days
Beginning of
growing season
End of
growing season
Depth to Groundwater (in.)
Precipitation (in.)
Date
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Rainfall
8E52E9B KB-12
Required Depth

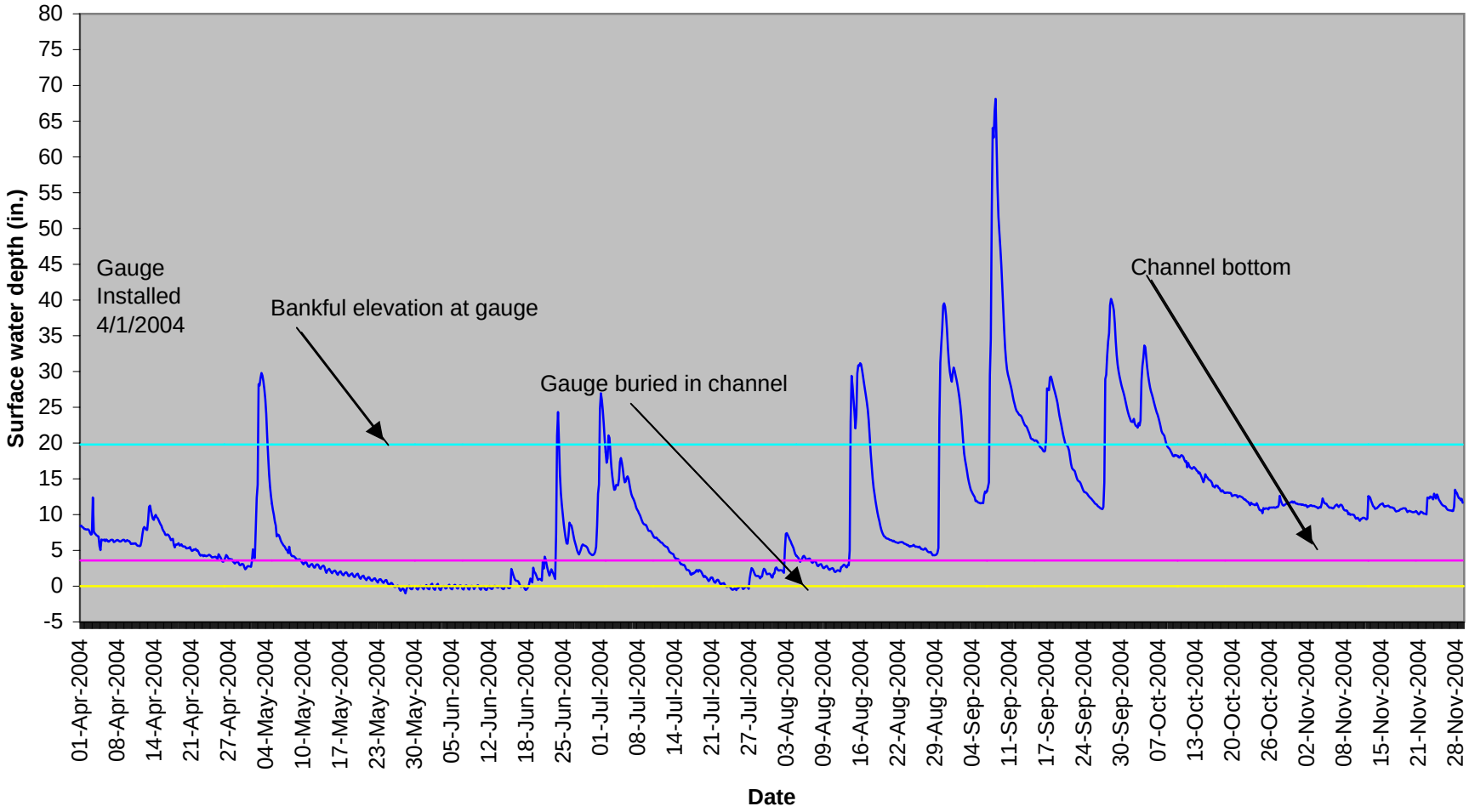

Key Branch KB-13
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
Gauge Installed 3/10/2004
Beginning of growing season
19 days
25 days
End of growing season
Date
Rainfall
8E55277B KB-13
Required Depth


Key Branch KB-14
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
Date
Gauge Installed
3/10/2004
Gauge Malfunction
18
days
Beginning of
growing season
End of
growing season
Rainfall
8E54E36 KB-14
Required Depth

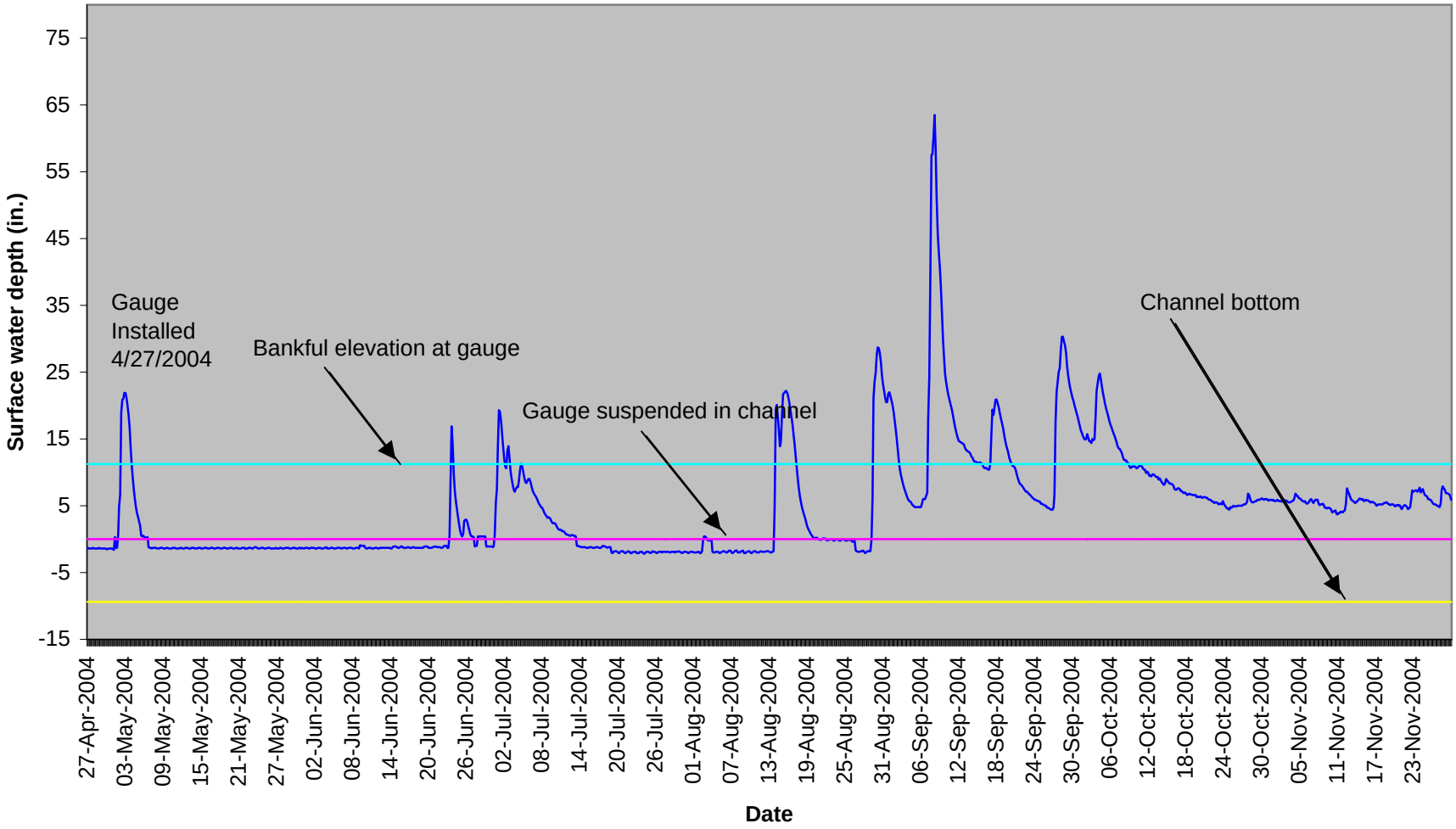
SURFACE WATER GRAPHS

KEY BRANCH STREAM SITE

Key Branch Site SG-1
84" Surface Gauge

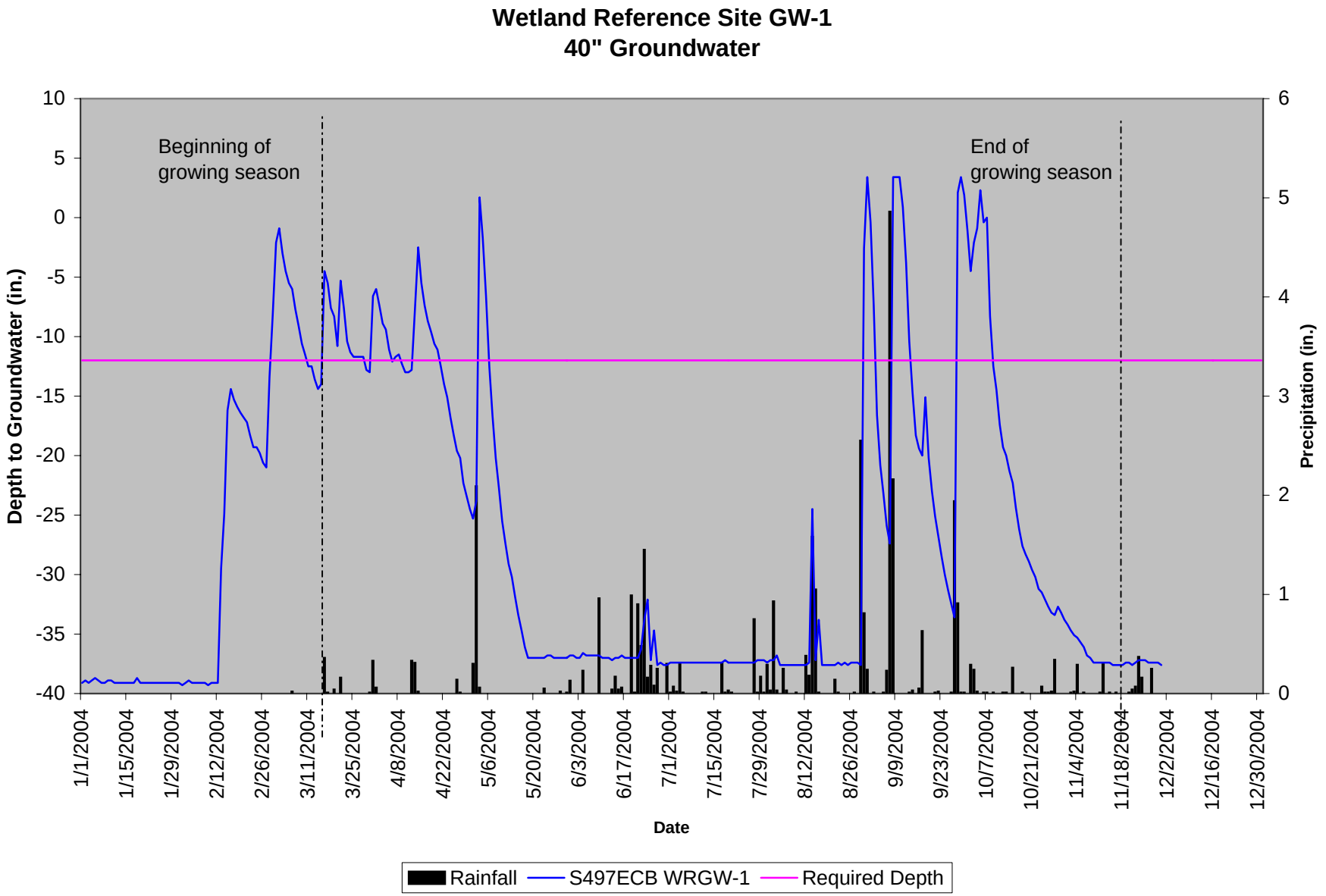


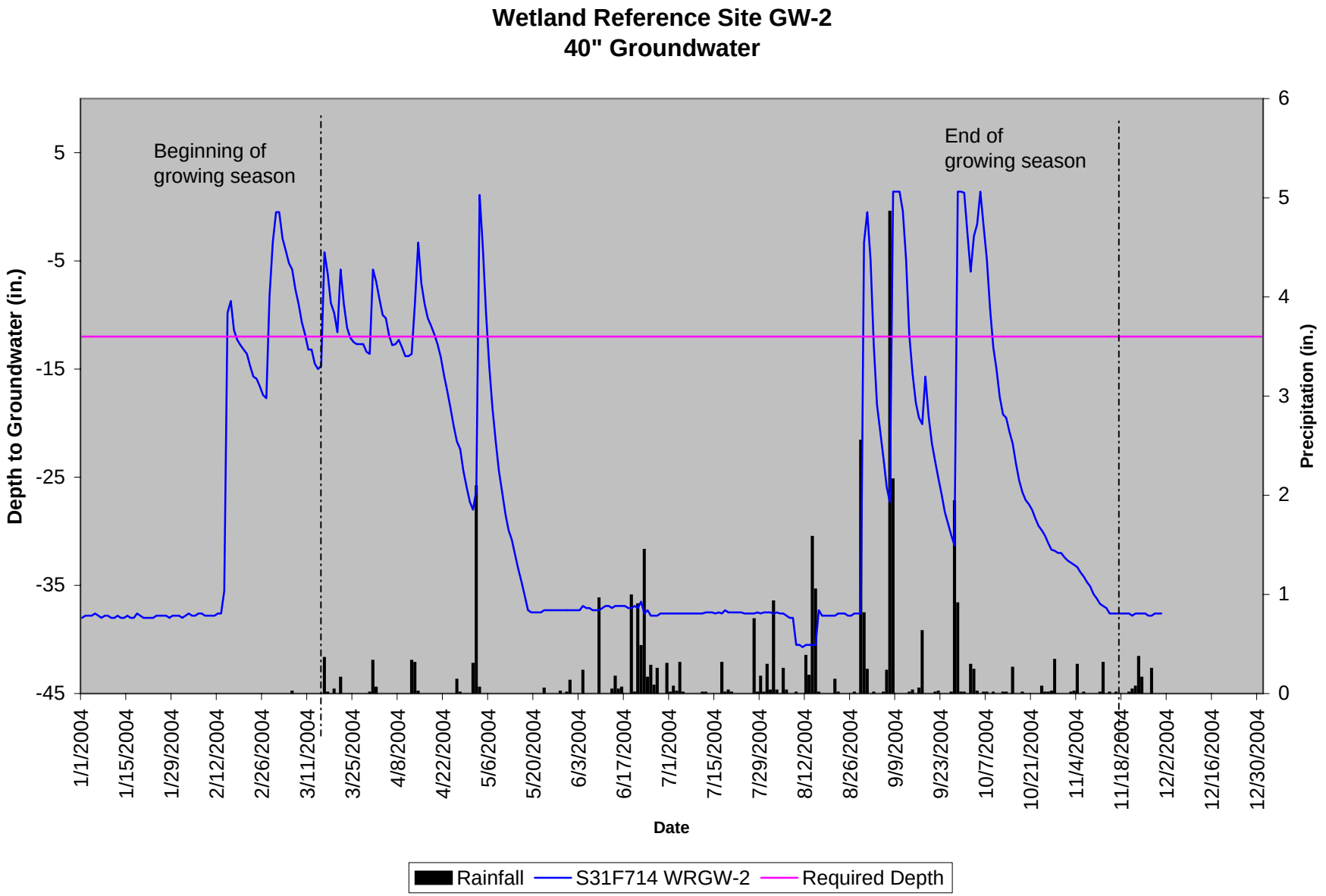
Key Branch Site SG-2
80" Surface Gauge

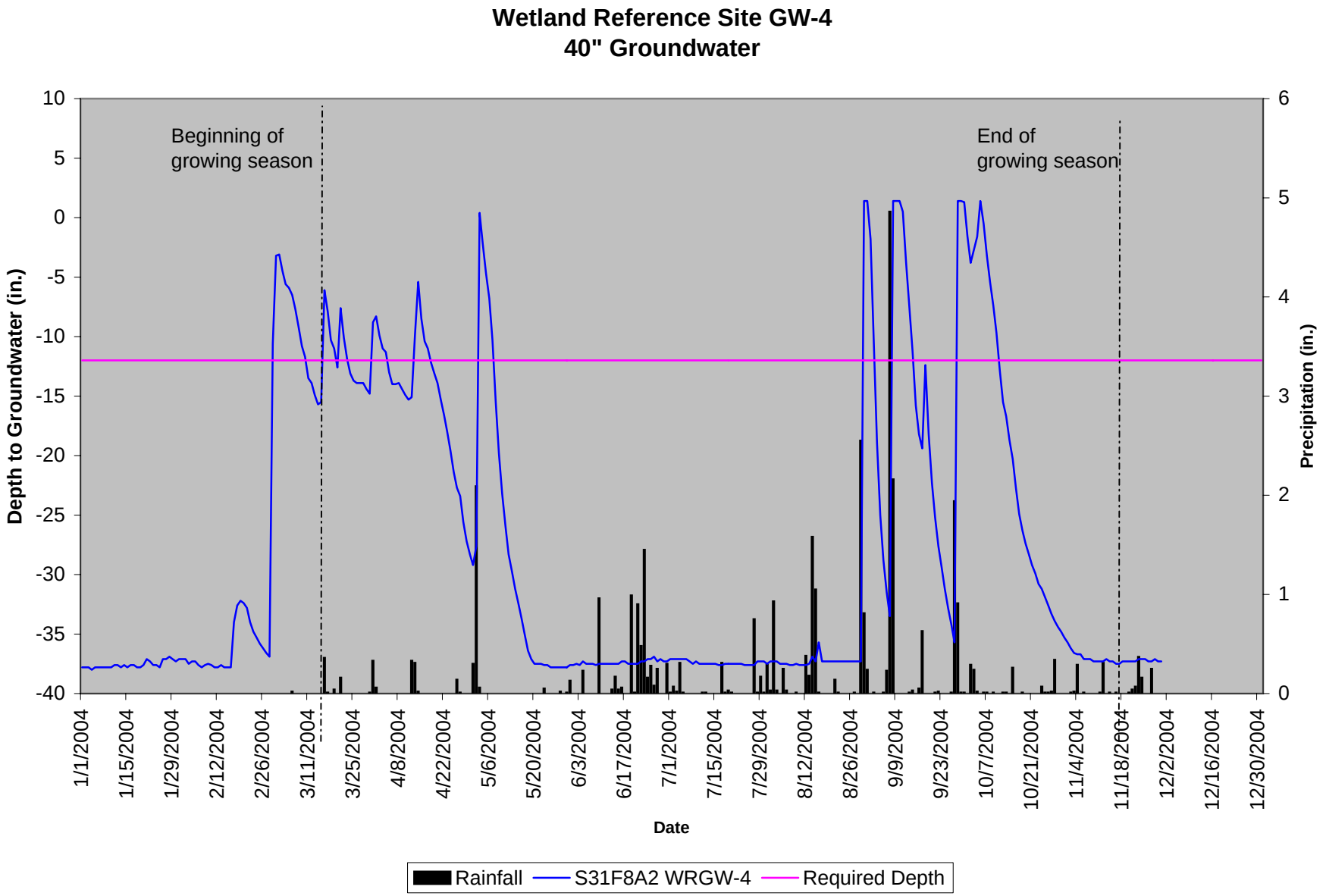


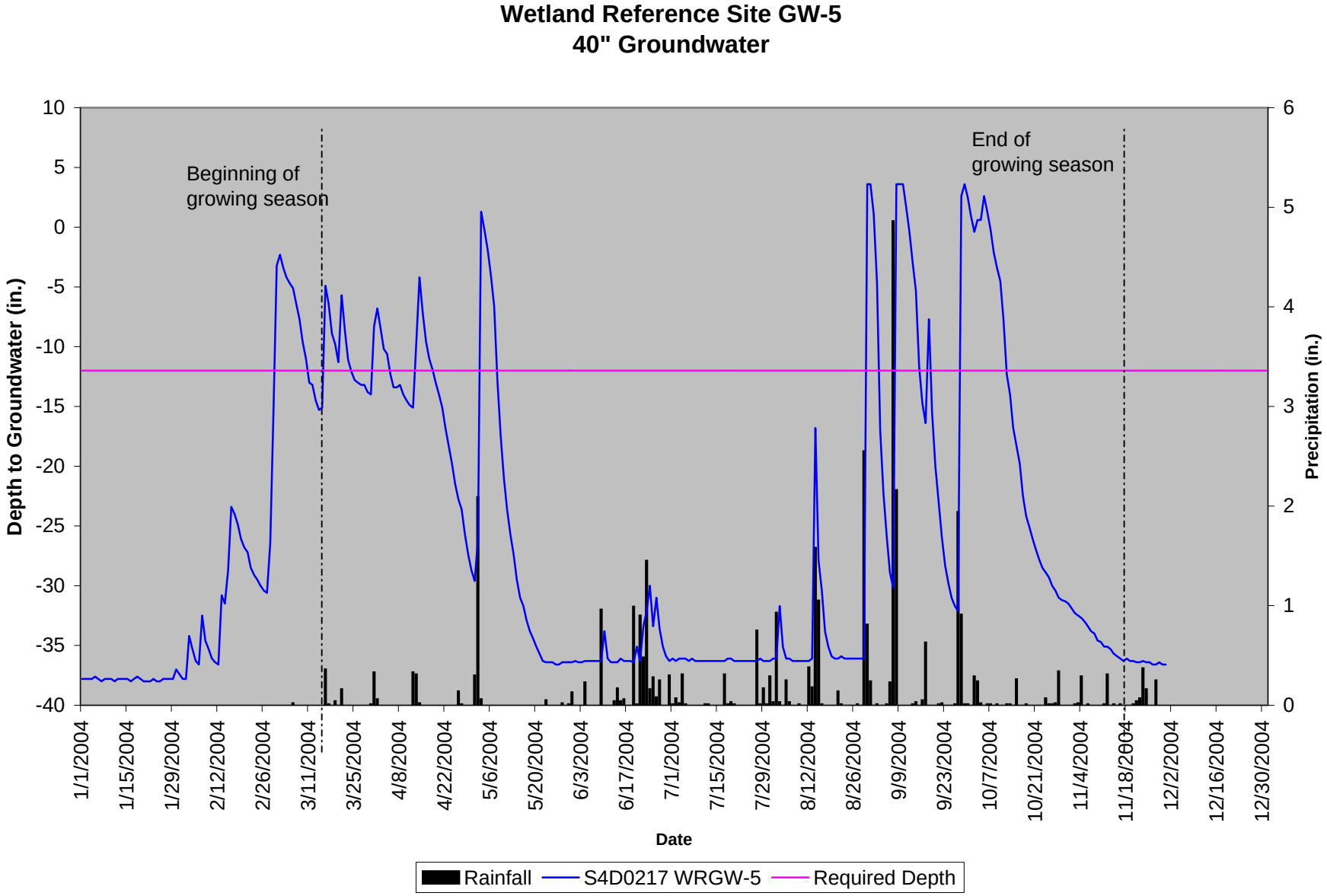
GROUNDWATER GAUGE GRAPHS

WETLAND REFERENCE SITE


Wetland Reference Site GW-1
40" Groundwater
Beginning of growing season
End of growing season
Depth to Groundwater (in.)
Precipitation (in.)
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Date
Rainfall
S497ECB WRGW-1
Required Depth

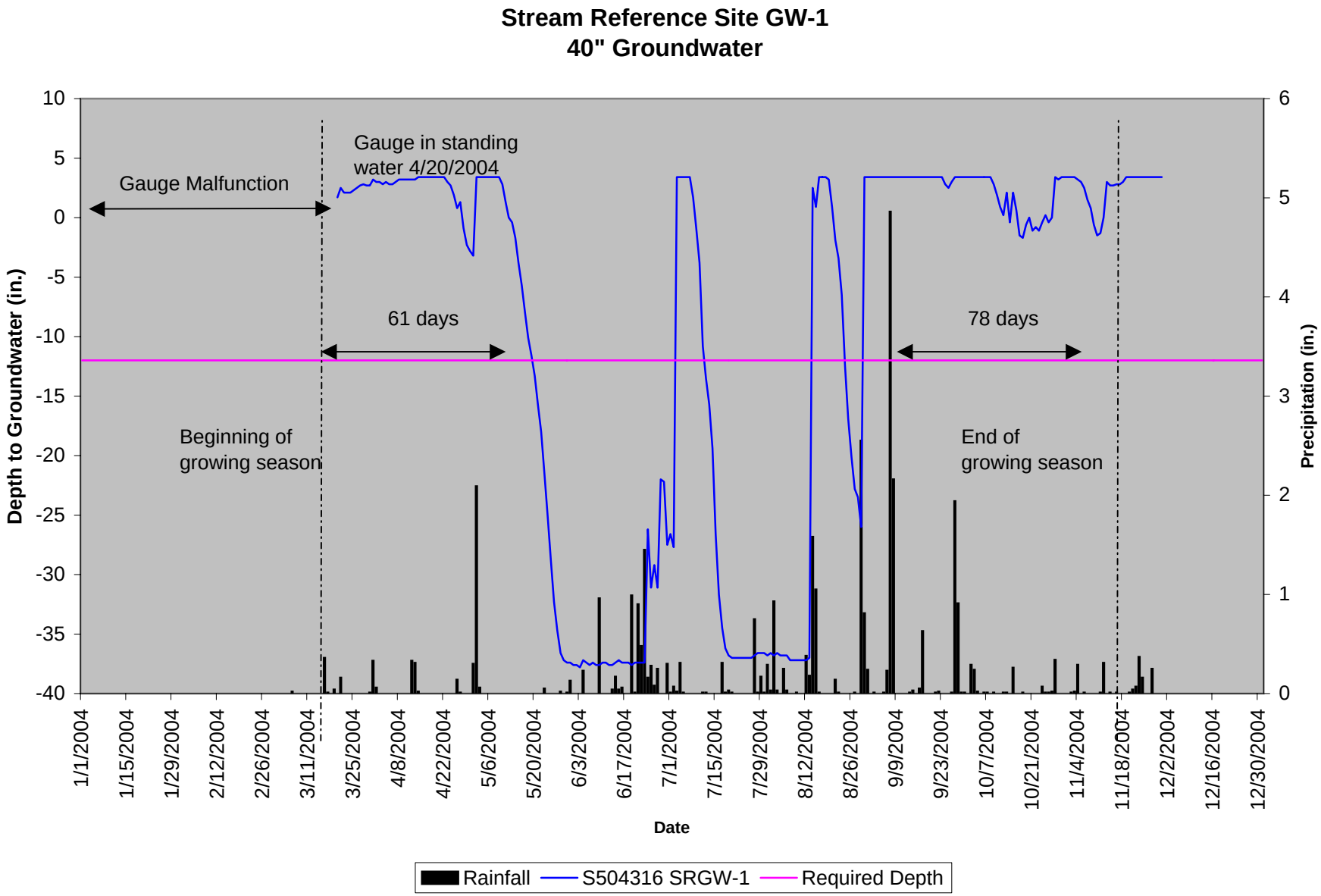

Wetland Reference Site GW-2
40" Groundwater
Beginning of growing season
End of growing season
Depth to Groundwater (in.)
Precipitation (in.)
5
-5
-15
-25
-35
-45
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Date
Rainfall
S31F714 WRGW-2
Required Depth

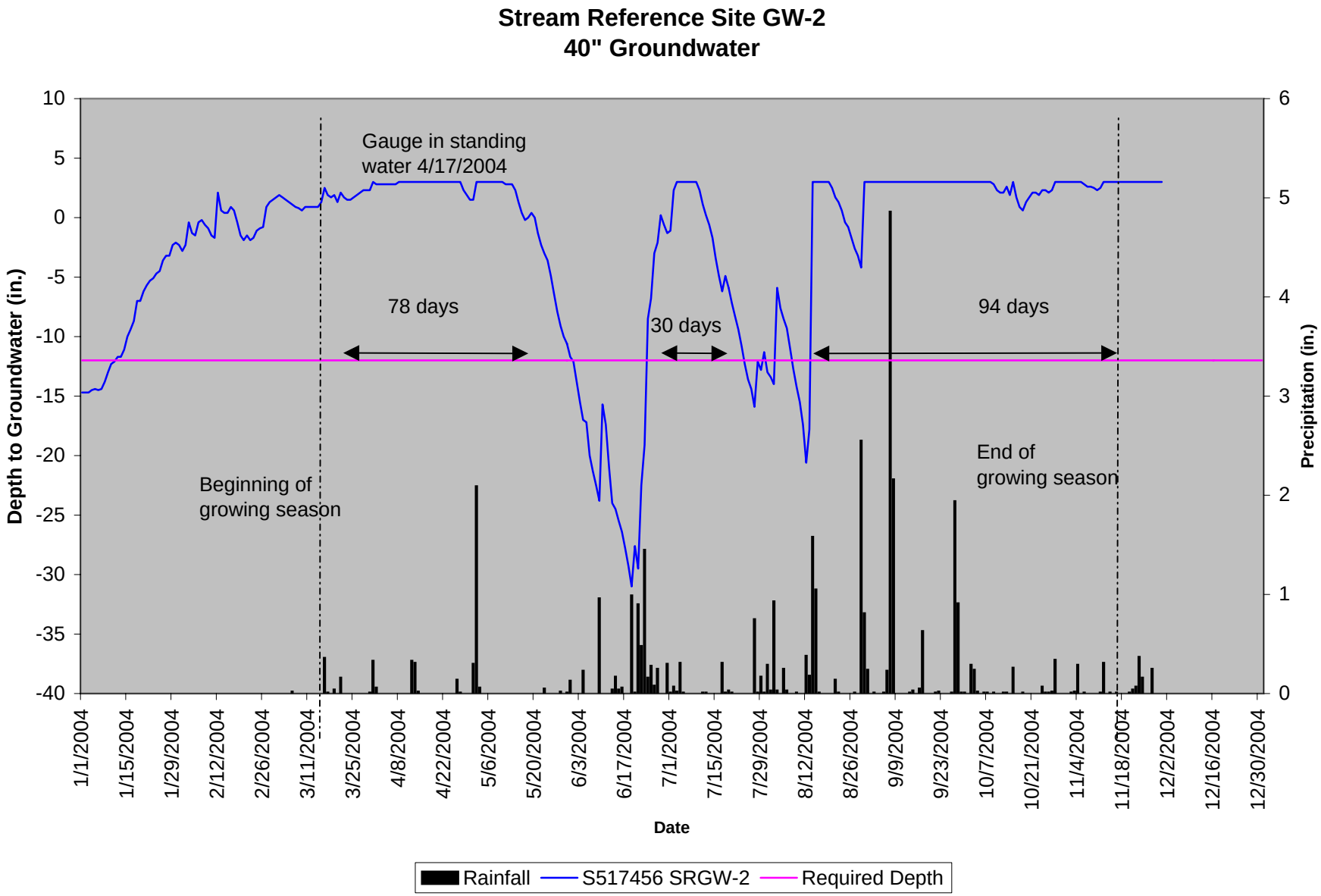

Wetland Reference Site GW-4
40" Groundwater
Beginning of growing season
End of growing season
Depth to Groundwater (in.)
Precipitation (in.)
Date
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Rainfall
S31F8A2 WRGW-4
Required Depth

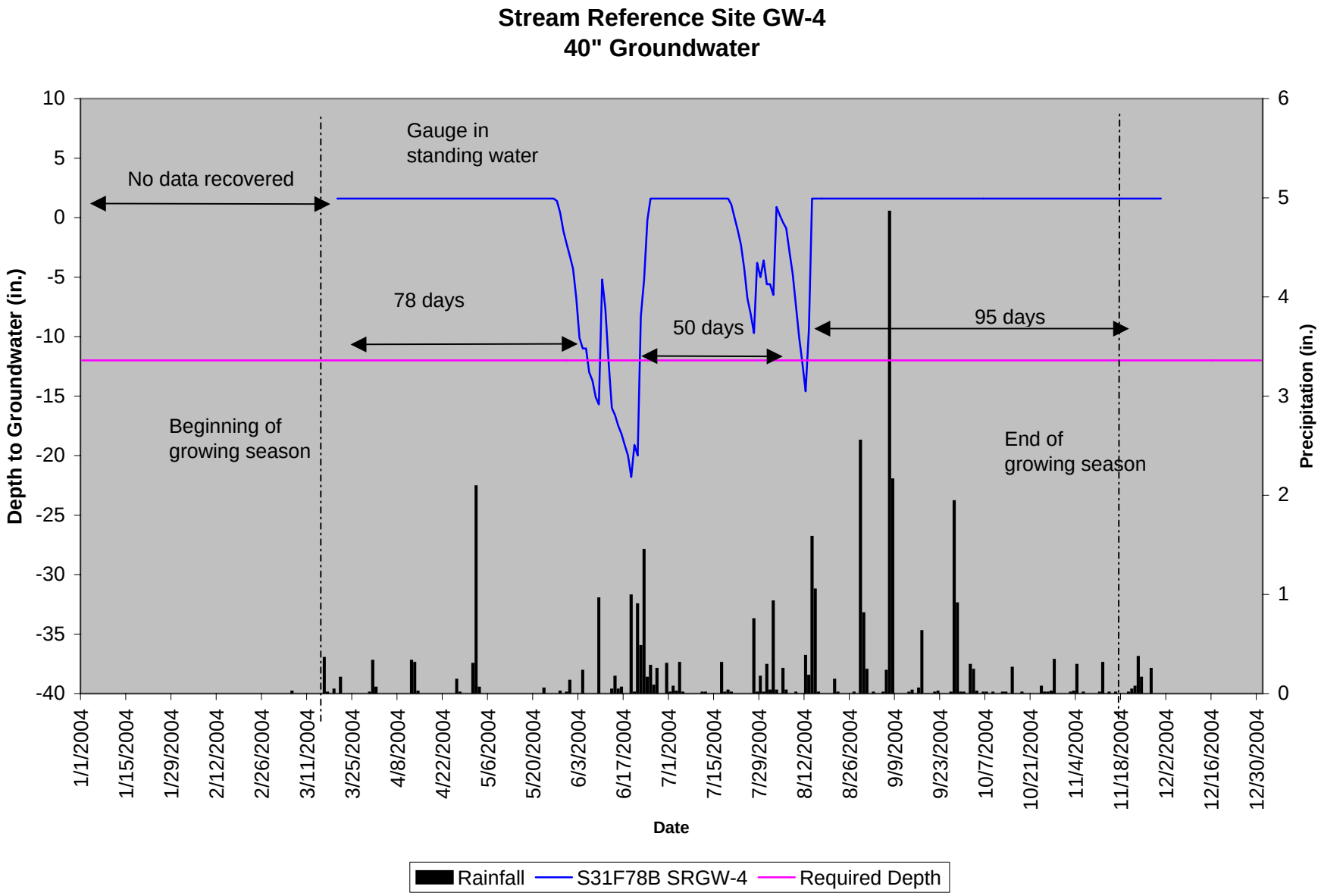

Wetland Reference Site GW-5
40" Groundwater
Beginning of growing season
End of growing season
Depth to Groundwater (in.)
Precipitation (in.)
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Date
Rainfall
S4D0217 WRGW-5
Required Depth

GROUNDWATER GAUGE GRAPHS

STREAM REFERENCE SITE


Stream Reference Site GW-1
40" Groundwater
Gauge Malfunction
Gauge in standing water 4/20/2004
61 days
78 days
Beginning of growing season
End of growing season
Depth to Groundwater (in.)
Precipitation (in.)
Date
Rainfall
S504316 SRGW-1
Required Depth

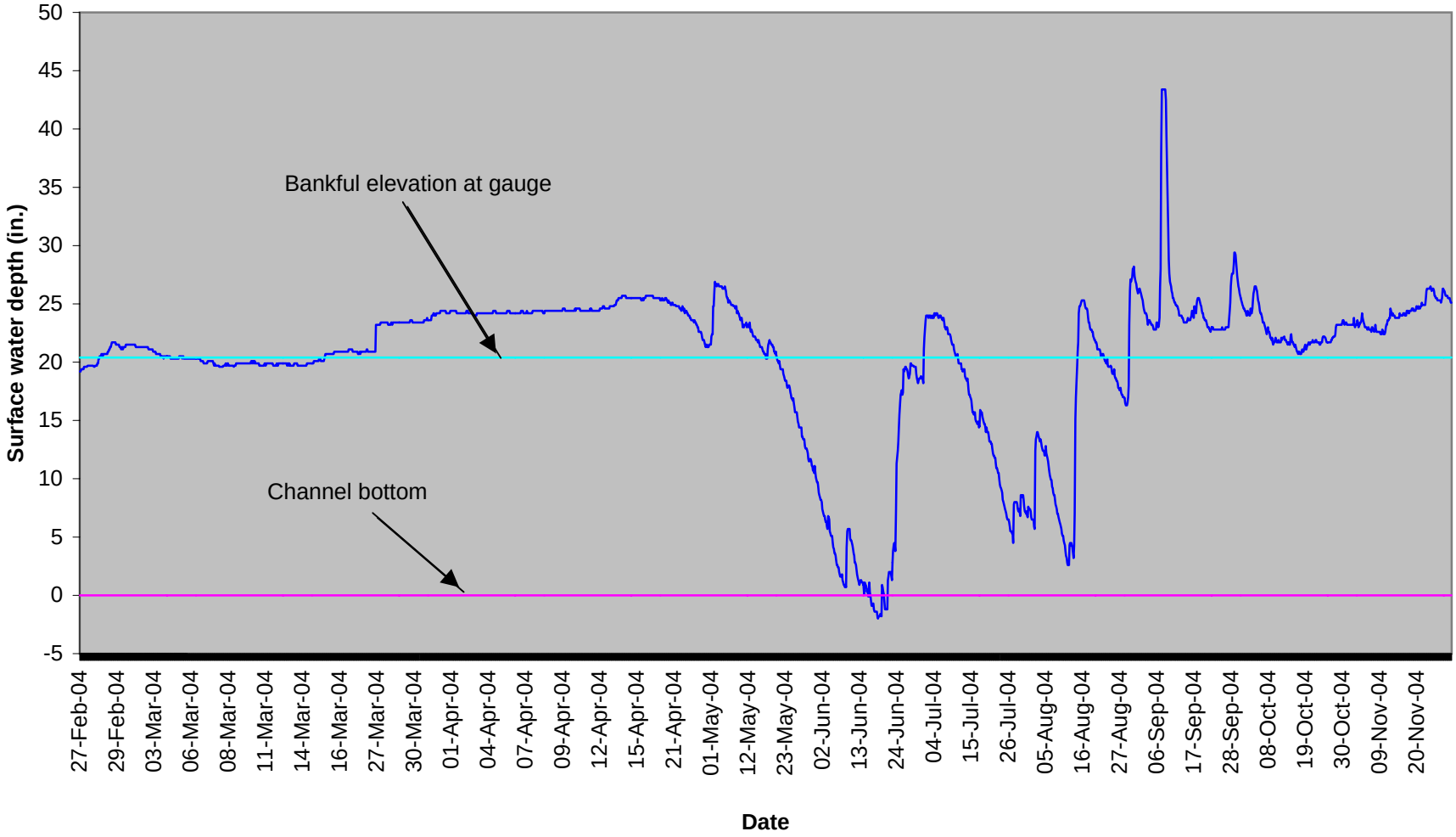

Stream Reference Site GW-2
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
Gauge in standing water 4/17/2004
78 days
30 days
94 days
Beginning of growing season
End of growing season
Date
Rainfall
S517456 SRGW-2
Required Depth


Stream Reference Site GW-4
40" Groundwater
Depth to Groundwater (in.)
Precipitation (in.)
Date
No data recovered
Gauge in standing water
78 days
50 days
95 days
Beginning of growing season
End of growing season
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
6
5
4
3
2
1
0
1/1/2004
1/15/2004
1/29/2004
2/12/2004
2/26/2004
3/11/2004
3/25/2004
4/8/2004
4/22/2004
5/6/2004
5/20/2004
6/3/2004
6/17/2004
7/1/2004
7/15/2004
7/29/2004
8/12/2004
8/26/2004
9/9/2004
9/23/2004
10/7/2004
10/21/2004
11/4/2004
11/18/2004
12/2/2004
12/16/2004
12/30/2004
Rainfall
S31F78B SRGW-4
Required Depth

SURFACE WATER GRAPH

STREAM REFERENCE SITE

Stream Reference Site SG-3
40" Surface Gauge



APPENDIX B

SITE PHOTOS & VEGETATION PLOT LOCATIONS

Key Branch

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

2004

Key Branch

Photo 7

Photo 8

Photo 9

2004

Key Branch Mitigation Site