PLAINFIELD POTENTIAL WETLAND COMPENSATION SITE: FINAL HYDROGEOLOGIC CHARACTERIZATION REPORT

Illinois Route 59, near Plainfield
Will County, Illinois
(Federal Aid Project 338)

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Coastal and Wetlands Geology Unit

Illinois State Geological Survey
615 East Peabody Drive
Champaign, IL 61820-6964

Submitted Under Contract No. AE89005 to
Illinois Department of Transportation
Bureau of Design and Environment, Wetlands Unit
2300 South Dirksen Parkway
Springfield, IL 62764

March 12, 1997

**Illinois State Geological Survey
Open File Series 1997–5**

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EXECUTIVE SUMMARY

The hydrogeology of a potential wetland compensation site near Plainfield, Illinois, was studied between December 1994 and December 1996. The study area is located in the floodplain on the north side of the Du Page River directly east of Illinois Route 59. Relief in the study area is less than 1.5 m. Dolomite bedrock occurs at depths of 3.6 to 4.2 m in the study area, but crops out in nearby locations. Sediments in the floodplain include a sand and gravel bed 0.8 to 1.8 m thick that occurs at about 0.9 to 1.2 m in depth between two silt beds. Ground water discharges from the uplands north of the study area into the floodplain, then flows southerly toward the Du Page River. There is an upward component of flow from the sand and gravel aquifer toward land surface. Wetland hydrology was not positively shown in any of the wells located on site. Surface water is supplied to the site primarily by flooding from the Du Page River and by a ditch on the north side of the site. Water in the ditch is minimal and often stagnant, and is likely derived locally from ground-water discharge and some runoff from adjacent slopes. The Du Page River is entrenched 1.5 to 2 m below land surface, and did not flood the site except during a record rainfall event. Because the Du Page River is not considered amenable for use in the compensation site due to entrenchment, high velocity flows, and water-borne debris, no adequate surface-water source was found for use in the compensation area. No field tiles or other hydrologic alterations were observed. The proposed compensation activities at the site would not involve restoration of the original water source for the hydric soils, so any construction would be considered wetland creation. Excavation to the water table in order to cause ground-water discharge is the proposed method for wetland creation on site. Excavation is proposed to an elevation of about 181.4 m (depth of about 0.9 m near well 1), with side slopes of about 30:1. A connection between the excavation and the ditch is proposed to limit the depth of standing water in the excavation and to allow inflow of surface water from the ditch when available. The connection should be made on the downstream end to prevent channelization through the excavation, and should be armored with riprap and/or vegetated to prevent erosion. No drainage from the roadway should be allowed to flow into the compensation area. Road-salt use increases chloride levels above general use standards in the surface water of many roadside compensation sites, which is detrimental to plant growth and to successful wetland establishment.

The text and illustrations in this document have received only limited scientific and editorial review.

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INTRODUCTION

This report was prepared by the Illinois State Geological Survey (ISGS) to provide the Illinois Department of Transportation (IDOT) with final conclusions regarding the hydrogeologic conditions in a potential wetland compensation site located along Illinois Route 59 near Plainfield, Illinois (fig. 1).

The purpose of this report is to identify the hydrogeologic conditions within the study area, and to make recommendations regarding the design of the proposed wetland compensation site. This report includes ground- and surface-water level data collected from December 1994 through December 1996, when data collection for this characterization was ended. If the site is chosen for compensation, then tasking for additional well installation and monitoring should occur at that time in accordance with any permit requirements.

In August 1994, consulting firm Gannett Fleming, Incorporated of Wood Dale, Illinois, made geologic borings and installed monitoring wells in the study site based on a plan prepared by ISGS. This report combines geologic data collected by Gannett Fleming with hydrologic data collected during monitoring by ISGS. The entire report submitted to ISGS and IDOT by Gannett Fleming is reproduced in Appendix A.

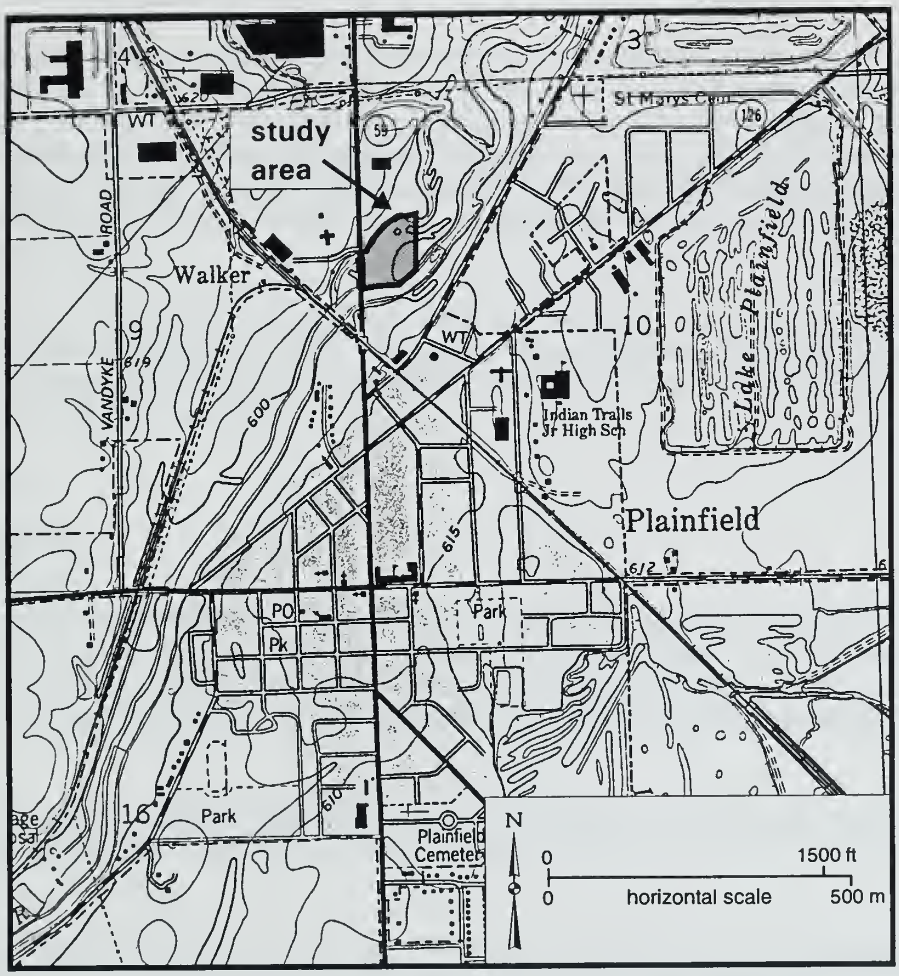

Figure 1 Location map showing the study area (shaded) on the Plainfield, IL 7.5-minute topographic map (U.S. Geological Survey 1993). Contour interval is 10 ft (3 m).

The study area is located in the W½ of the SW¼ of the NW¼ of Section 10, T36N, R9E in Will County. The site is located in the northeastern quadrant of the intersection of Illinois Route 59 and the Du Page River on the north edge of Plainfield, Illinois, and is within the floodplain of the Du Page River.

METHODS

The geology of the study area was characterized by drilling three borings (1 through 3) (fig. 2) using a CME all-terrain mounted drilling rig. Split-spoon samples 0.6-meters (m) long were collected continuously to the base of the boring. Well logs received by ISGS from Gannett Fleming are reproduced in Appendix A.

The ground-water hydrology of the site was characterized by measuring water levels in monitoring wells (fig. 2) installed at various depths in each geologic boring. Two to three monitoring wells were installed at each boring location. The lower and middle wells at each location were installed in one borehole. At locations where three wells were installed, a second borehole was made for the upper well. Monitoring wells were installed in open boreholes after auger withdrawal. Surface-water levels in the Du Page River were measured from the bridge railing at point A (fig. 2). Water-level elevations and depths to water in wells and at the stage gauge are reported in Appendix B. Water levels were monitored monthly.

Well casing and screen consisted of 2.5-centimeter (cm) diameter Schedule 40 PVC pipe. Well screens were 0.6 to 1.5 m in length, and contained slots 0.25-millimeter (mm) wide. The annulus surrounding each well screen was packed with quartz sand 0.25 to 0.50 mm in diameter. Wells were backfilled with granular bentonite, and were sealed at land surface with concrete. Wells were developed by flushing water into the well casing until the discharge ran clear. Construction information including well-screen depths are given in the Gannett Fleming report in Appendix A.

The elevations of the stage gauge and wells were measured from a benchmark established on the Illinois Route 59 bridge by IDOT, referenced to the National Geodetic Vertical Datum of 1929. A Sokkia B-1 automatic level and a fiberglass extending rod were used to measure elevations to third-order accuracy.

GEOLOGY

Regional Setting

Topography

The study area is located in the valley of the Du Page River. Total relief from the top of the adjacent valley walls is about 10 m (fig. 1) (U.S. Geological Survey 1993). However, the compensation site lies entirely within the floodplain of the Du Page River and has relief of about 2 m. The river bottom is about 1.5 to 2 m below land surface in the compensation site.

Bedrock

Silurian dolomite is present at depths of less than 6 m (Berg and Kempton 1988). Bedrock crops out in nearby river channels, but not in the study area.

Sediments

Sediments in the floodplain of the Du Page River are less than 6 m thick and are mapped as thin Cahokia Alluvium overlying sand and gravel of the Henry Formation (Willman 1971, Berg and Kempton 1988). South of the river, thicker deposits of Henry Formation sand and gravel have been strip mined. North of the study area, outside the floodplain of the Du Page River, glacial till of the Wedron Formation is mapped at land surface and directly overlies bedrock (Berg and Kempton 1988).

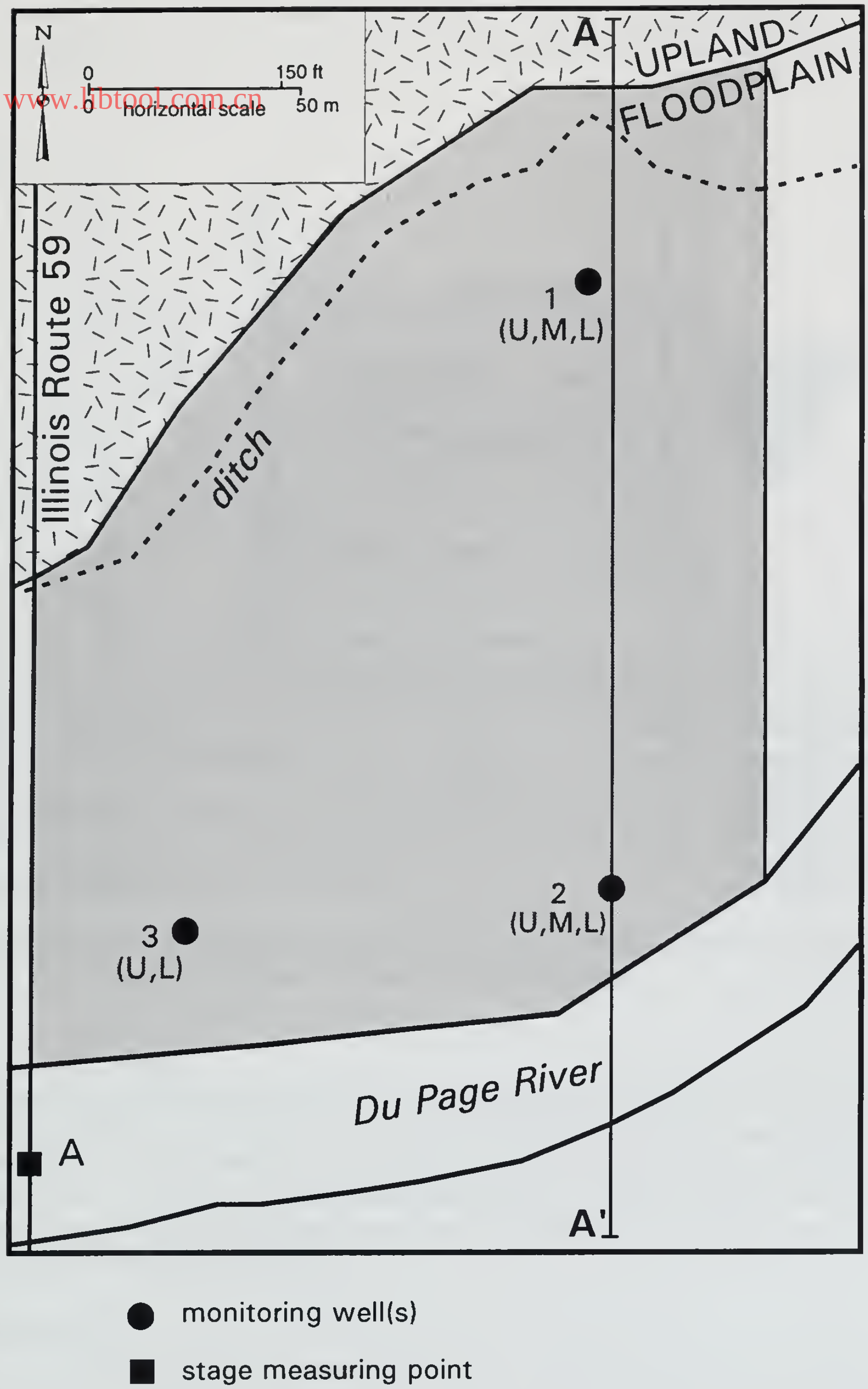

Figure 2 Site map showing the study area (outlined) and locations of geologic borings, monitoring wells, stage measuring point A, and the line of cross section A–A'. Map based on USGS (1993).

Soils

The majority of soil in compensation area is mapped as Du Page silt loam, although Houghton muck is mapped in a small ditch or side channel near the northern boundary of the study area (U.S. Department of Agriculture 1988). Both soils are listed as hydric (U.S. Department of Agriculture 1991), and typically have frequent flooding for long duration in spring.

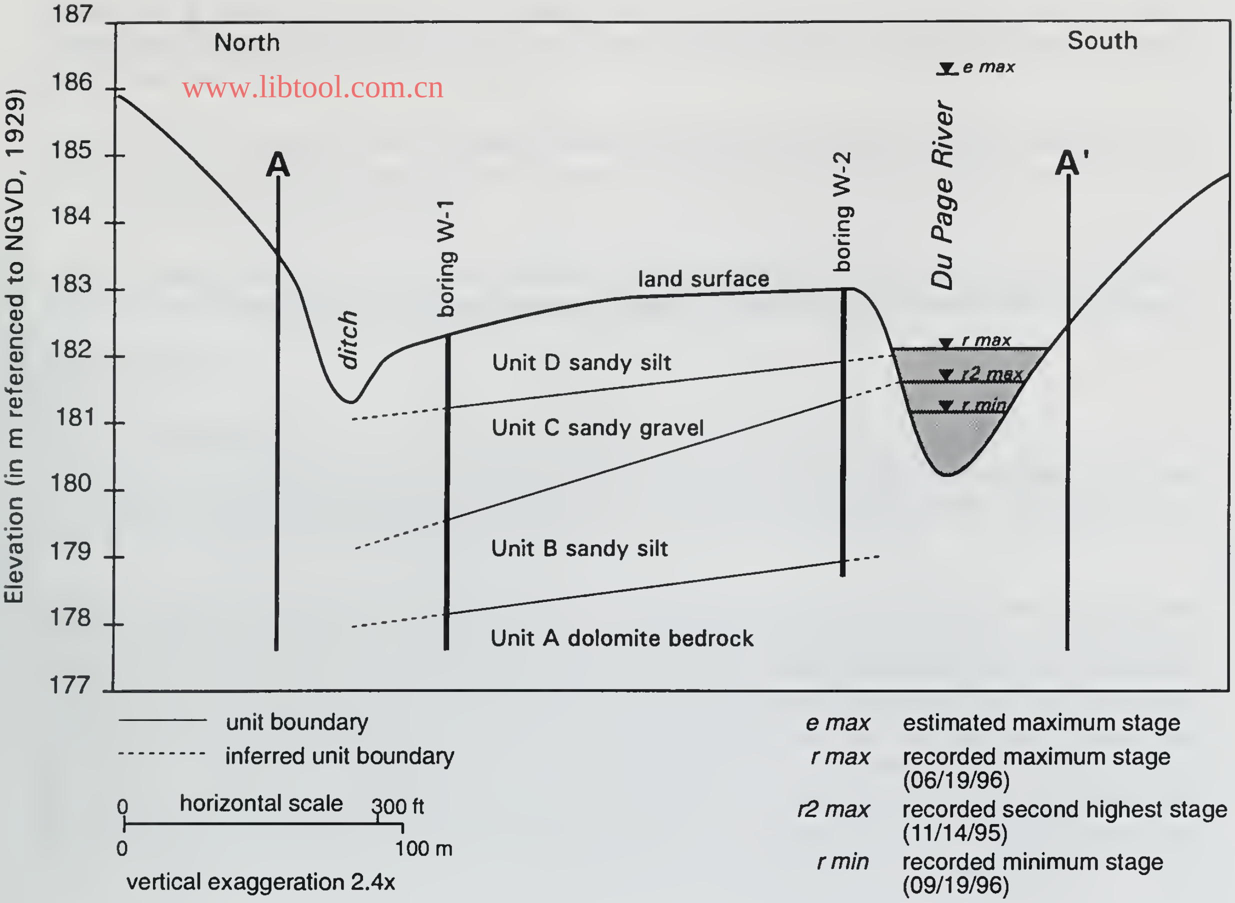

Figure 3 Cross-section A–A', showing each geologic unit encountered and the elevations of the ditch and the Du Page River. Stage data for the Du Page River are also shown.

Regional Geologic History

Late Wisconsinan glaciers moved across this site, scouring the bedrock surface and depositing clay-rich tills of the Wedron Formation. In the study area, these tills were subsequently removed in broad channels that were formed by meltwaters released from later glaciers that terminated just east of the site. These meltwaters deposited sand and gravel of the Henry Formation at land surface. Later, the Du Page River downcut into the sand and gravel deposits to form the floodplain in which the site is located.

Site Characterization

Information presented below is summarized from boring logs sent by consulting firm Gannett Fleming, Incorporated (Appendix A). Logs of borings made on site show sediments between 3.6 and 4.2 m thick. Cross-section A to A' (fig. 3) shows each unit of sediments and bedrock encountered; figure 2 shows the location of the cross section. Below the sediment sequence, dolomite bedrock (unit A) is present. Little of this unit was penetrated, but it is described as brown to gray and decomposed.

Above the bedrock is a gray to brown sandy silt (unit B). This unit is 1.3 to 2.2 m thick and was encountered at depths of 2.0 to 2.7 m. Some fine to medium sand and a trace of gravel are present. Some coarser beds of silt and sand were noted and the unit coarsens upward. Unit B was described as moist.

Above unit B is a well-graded sandy gravel (unit C). This unit was 0.8 to 1.8 m thick and was encountered at depths of 0.9 to 1.2 m. Unit C has variable amounts of fine to coarse sand and gravel and was described as wet to moist.

Above unit C, at land surface, is a dark brown to tan sandy silt (unit D). This unit was 0.9 to 1.2 m thick and contains some fine sand, gravel, and clay. Roots were also noted. The unit was described as moist and soft.

The sediments described above are consistent with descriptions of both the Cahokia Alluvium and the Henry Formation, so it is not possible to assign a formal name to each unit of sediment.

HYDROLOGY

Regional Setting

Water-well records for this area indicate that water for most private homes and public supplies is drawn from varying depths within the carbonate bedrock. Some private wells withdraw water from sand and gravel above the bedrock.

Surface water enters the study area from several sources. The Du Page River marks the southern edge of the site, and flooded the entire site once during the monitoring period after a record 24-hour rainfall event caused catastrophic flooding Lower portions of the site (e.g. near well 3) are probably flooded every few years as noted by deteriorated debris lines. An unnamed drainage ditch extends along the northern edge of the floodplain near the northern edge of the study area. This ditch originally may have been a natural channel that carried drainage from an upland area of about 4 square kilometers (km), but most or all of that drainage now enters the Du Page River through a cut-off ditch located east of the study area. Water in the ditch on site is now mostly stagnant, but some flow occurs during times of heavy precipitation.

Climate

The growing season is defined as the period of time when soil temperatures exceed 5°C at a depth of 0.5 m (U.S. Army Corps of Engineers 1987). Where soil-temperature data are unavailable, the growing season can be approximated as the number of frost-free days during the year. A killing frost occurs at air temperatures of -2.2°C (28°F) (U.S. Department of Agriculture 1994, undated). Based on data collected at Aurora College (Midwestern Climate Center 1997), about 20 km north of the study area, the median time for this period from 1961 through 1990 was 194 days.

Based on data from 1961 through 1990, average annual precipitation in the region is approximately 92 cm (Midwestern Climate Center 1997); most falls in April through September, when about 10 cm per month is received (fig. 4). Precipitation data were collected at the Brandon Road Dam in Joliet, about 10 km to the south. Evapotranspiration (ET) is very high in summer, so that most ground-water recharge is expected in spring, fall, and winter (Hensel 1992).

During the monitoring period, climatic conditions were quite variable. Figure 4 shows rainfall presented as a running two-month average of rainfall recorded during the monitoring period; this type of averaging smooths the rainfall data and more clearly shows the long-term trends. Precipitation ranged from much below average to well above average. Precipitation was significantly above average in late summer 1994, in winter and late spring 1995, and in late spring and summer 1996, when the highest 24-hour rainfall on record occurred. Precipitation was significantly below average in spring 1994, summer 1995, and early spring 1996.

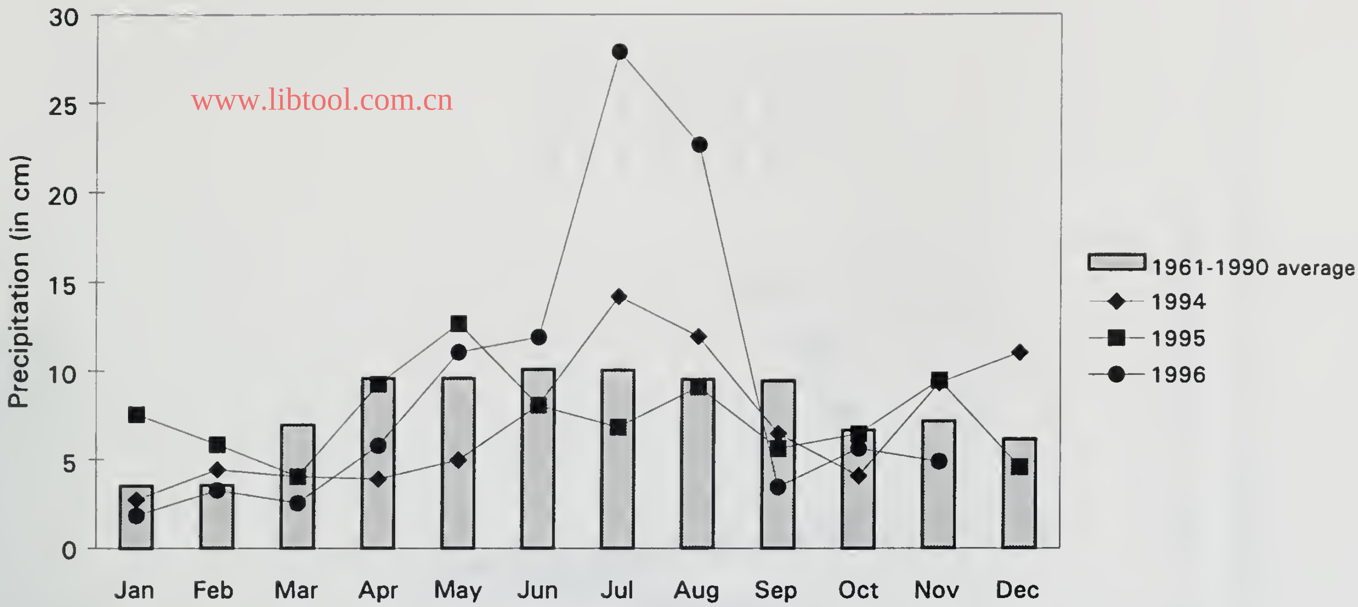

Figure 4 Precipitation data for the region, including mean monthly precipitation between 1961 and 1990 and monthly rainfall during the monitoring period recorded at Joliet, Illinois (data from the Midwestern Climate Center, Illinois State Water Survey). Monthly rainfall during the monitoring period is presented as a two-month running average [e.g. June=(May+June)/2].

Site Characterization

Ground Water

The purpose of the hydrogeologic investigation was to identify aquifers, aquitards, and ground-water flow paths in the study area, and to identify sources of water available to sustain wetlands in the proposed compensation area.

Monitoring wells were installed in various geologic units throughout the site to 1) identify water levels within each unit, 2) compare water levels within and between units, 3) estimate ground-water flow directions, and 4) determine the extent of wetland hydrology at the site. Water levels measured during the monitoring period are shown in Appendix B. Water-level elevations measured in each well and at the measuring point on the Du Page River are shown in figure 5, and the depth to water below land surface in each well is shown in figure 6.

Ground-water conditions in unit D

The sandy silt of unit D occurs at land surface in the three borings. Ground-water conditions in this unit are unconfined, and will determine if wetland hydrology is present on site. Monitoring well 2U was the only well screened specifically in this unit, and was dry throughout the monitoring period except for one reading on June 19, 1996, when the river was slightly higher than the level in the well. Because the Du Page River is incised and water levels in the river were lower than the base of unit D for most of the monitoring period, water in unit D near well 2U likely drains into the river except during high water-level events, when limited northward ground-water flow may occur.

Although no monitoring well was placed in unit D at boring 3, it is not likely that wetland hydrology would have been present because water levels observed in well 3U did not show levels high enough to achieve wetland hydrology despite an upward gradient from deeper units toward land surface.

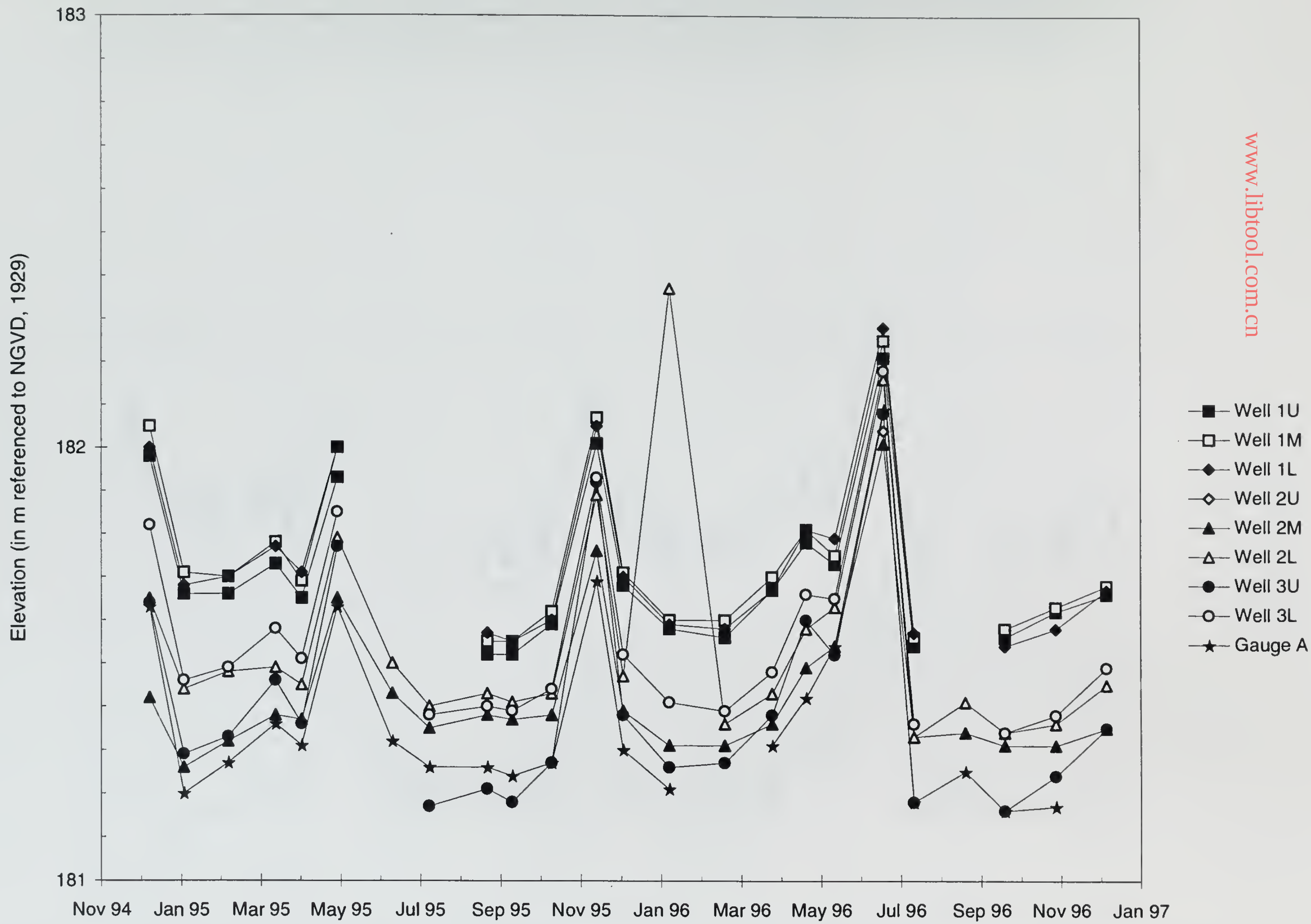

Figure 5 Water-level elevations recorded in all monitoring wells and at stage gauge A during the monitoring period. Units A and B contain wells 1L, 2L, and 3L; unit C contains wells 1M, 1U, 2M, and 3U; and unit D contains well 2U.

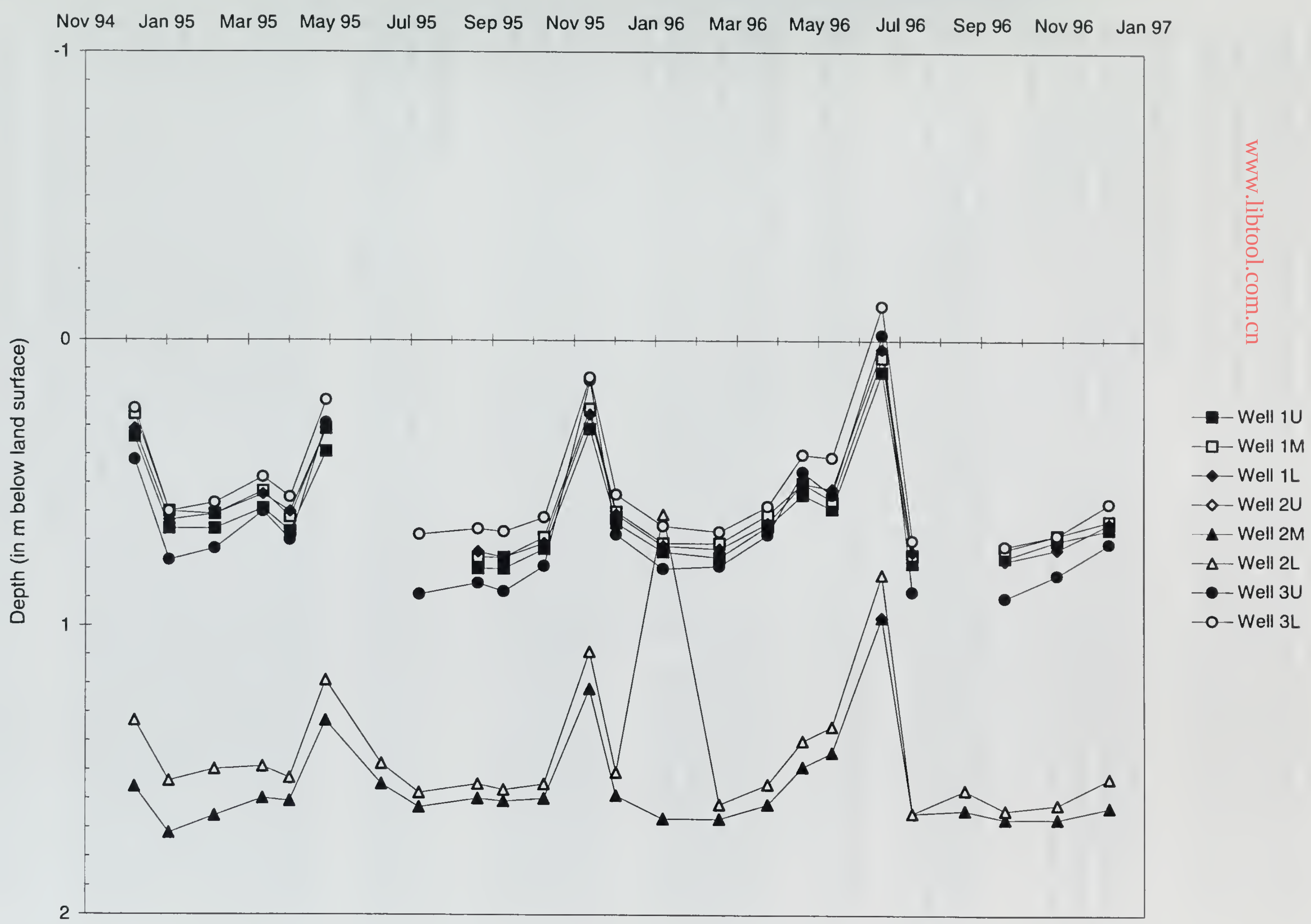

Figure 6 Depth to water below land surface measured in all monitoring wells during the monitoring period. Negative values indicate water levels above land surface. Units A and B contain wells 1L, 2L, and 3L; unit C contains wells 1M, 1U, 2M, and 3U; and unit D contains well 2U.

Areas in and adjacent to the unnamed ditch contain organic matter (histic epipedon), sedges, algae deposits, and observed standing water. These factors indicate that wetland hydrology occurs in this area (U.S. Army Corps of Engineers 1987), although no wells were installed in that area to definitively measure water levels because the ditch is narrow (approximately 5 to 8 m). Wetland hydrology was not shown in unit D over the majority of the site away from the ditch.

Ground-water conditions in unit C
Unit C is a sand and gravel aquifer that underlies the entire study area at a depth of about 1 m. The unit was saturated when encountered. Wells 1U, 1M, 2M, and 3U are fully or partially screened in this unit, and show that confined conditions occur. Water levels in well 1M are often slightly higher than those in well 1U (fig. 7), indicating that a component of ground water flow is upward through unit C.

Figure 6 shows that ground water in unit C is capable of upward flow to within about 0.9 m or closer to land surface throughout the year, with the exception of near well 2M. At that location, the higher elevation of the bank and/or incision of the Du Page River causes depressed water levels.

Figure 8 shows the direction of ground-water flow in unit C in March 1996. Throughout the year, ground water generally flows to the south.

Ground-water conditions in units A and B
Unit A is composed of broken and decomposed carbonate bedrock, presumed to be dolomite. It was encountered in all borings, and monitoring wells 1L, 2L, and 3L were placed at the top of the bedrock surface, thus reflecting water levels in units A and B. Water levels in these wells indicate that confined conditions are present in units A and B. The silty nature of unit B suggests that its hydraulic conductivity is less than that of unit A.

As shown in figure 8, ground water in the lower (L) wells flows in a pattern similar to that described in unit C. Water levels are always highest in 1L, indicating ground-water discharge from sediments and/or bedrock in the upland to the north of the study area into the floodplain then toward the Du Page River, indicating that the Du Page River is in a regional discharge area.

Surface Water
Surface waters near the parcel include the Du Page River, located on the south side of the study area, and those in an unnamed ditch that is present along the north side of the study area at the edge of the floodplain.

Water levels in the Du Page River were measured at a point on the Illinois Route 59 bridge at the southwestern corner of the study area, and are shown in figure 2. During the monitoring period, water levels in the river fluctuated about 1 m (181.1 to 182.1 m elevation), although most measurements fell into a range of about 0.5 m (181.1 to 181.6 m elevation). A catastrophic flood following the record 24-hour rainfall in summer 1996 overtopped the bridge, flooding the entire study area to a depth of about 2 to 3 m with an estimated river depth of about 5 m. Regular flooding in spring and fall did not cover any significant portion of the site during the monitoring period. A lower area near well 3 appears to flood more regularly as shown by debris lines, and is mapped as temporarily flooded wetland on the National Wetland Inventory maps of the area (Erickson and Hubbell 1992). However, measurements from well 3U located in this area do not indicate that wetland hydrology is present.

As stated above, wetland hydrology is likely present in the area of the unnamed ditch as shown by primary and secondary indicators of wetland hydrology (U.S. Army Corps of Engineers 1987).

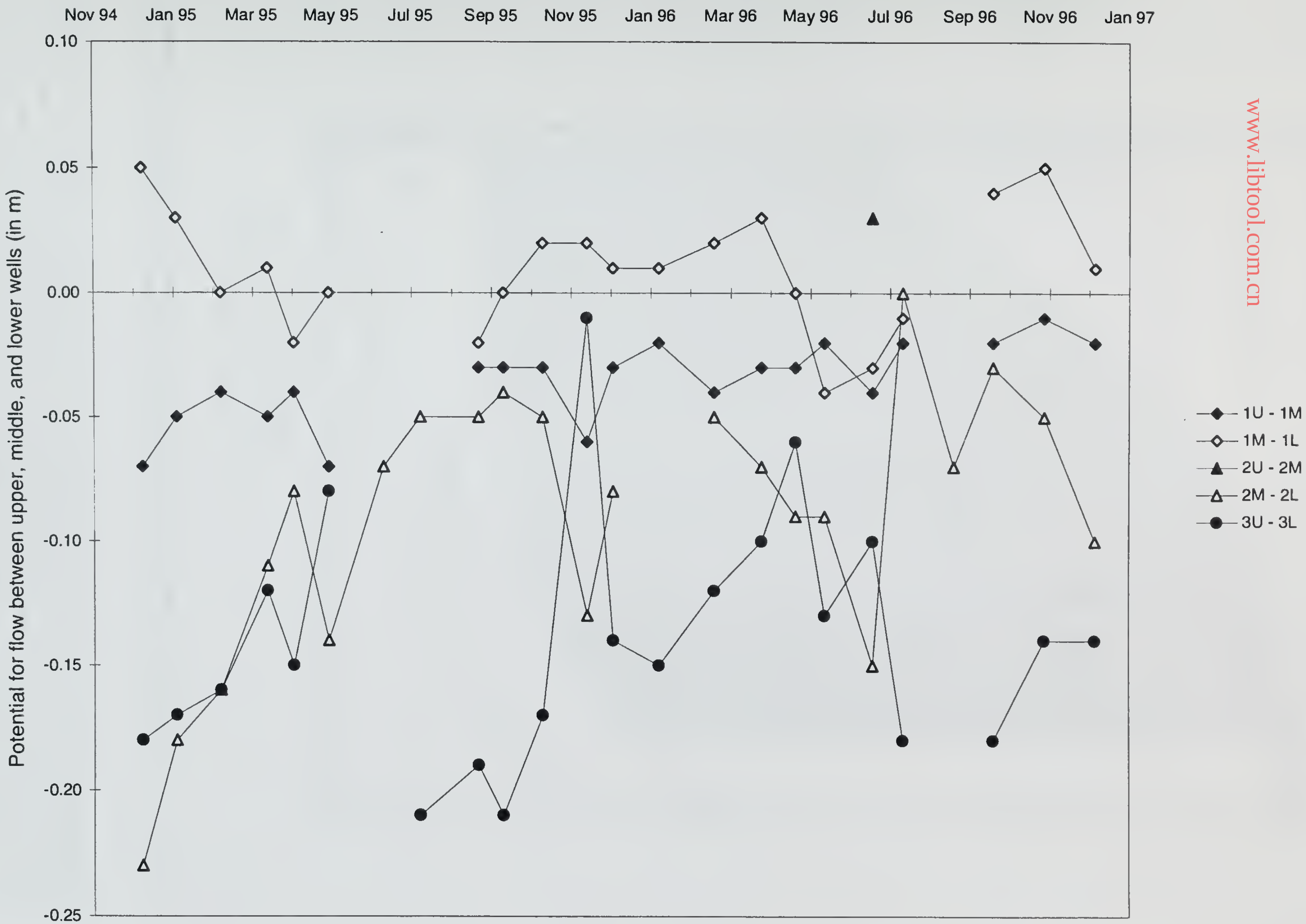

Figure 7 Potential for ground-water flow between upper, middle, and lower wells at each well site during the monitoring period. Negative values indicate an upward flow direction.

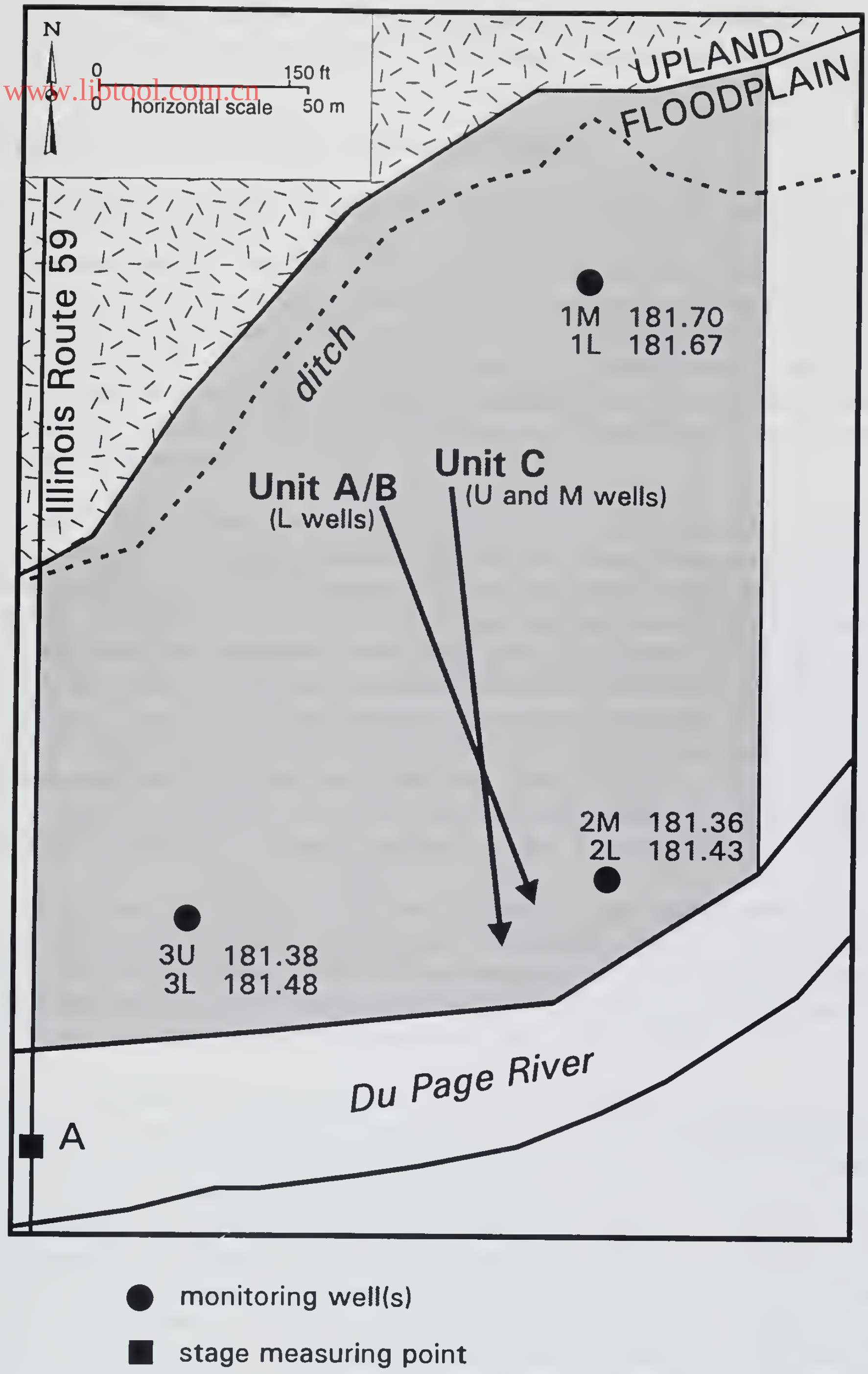

Figure 8 Ground-water flow directions recorded on March 26, 1996. "M" indicates flow inferred from middle monitoring wells, "L" indicates flow inferred from lower monitoring wells.

The base of the ditch is about 0.9 to 1.0 m below land surface (about 181.3 m elevation) at nearby well 1, which shows that the base of the ditch probably downcut into the sand and gravel of unit C prior to the deposition of peaty deposits. Given that water levels in unit C are confined, ground-water discharge from unit C into the ditch likely occurs. The ditch connects to the Du Page River out of the study area about 50 m west of Illinois Route 59. The elevation of the base of the ditch is lower than the maximum levels measured in the Du Page River, which may

indicate that flow from the river to the ditch may be possible. However, water levels in wells at boring 1 are always higher than other wells, so northward flow from the river into the ditch does not occur.

COMPENSATION POTENTIAL OF THE STUDY AREA

Wetland hydrology did not regularly occur during the monitoring period as recorded in monitoring wells located in the study area. No evidence of field tiles was observed, so that the hydric soils mapped on site were likely drained by entrenchment of the Du Page River or other unknown hydrologic changes, possibly including diversion of the original flow in the ditch by the cut-off channel. Because recommendations for this site do not include restoring the original water source of the hydric soils, the establishment of wetland is not restoration, but creation. Wetland creation is not a preferable compensation alternative because it is difficult to measure accurately all the hydrogeologic factors involved, and the balance between the factors may be altered unpredictably by construction.

To create wetlands, it is necessary to either increase the available water or to excavate so that the water table would more closely approach the land surface for longer periods during the growing season. Although some surface-water input is expected via the drainage ditch on the north side of the study area, the ditch often contains stagnant water that is probably mainly derived from ground-water discharge where the base of the ditch is eroded into unit C. Restoring the original flow of the ditch by filling the cut-off ditch east of the site would be problematic because culverts and landscaped areas adjacent to the ditch east of the site may become flooded. Also, the cut-off ditch is expected to carry flashy flows from agricultural lands that may contain significant sediment and chemicals. The Du Page River only flooded the site during a record rainfall. Therefore, no surface-water source is judged adequate to retain on site, and the only viable alternative for creating wetland on site is excavation.

Ground water in the compensation area had the potential to flow upward from unit C to within about 0.9 m of land surface or closer throughout the monitoring period. Ground water may be made to discharge to land surface if the proposed wetland area is excavated, except adjacent to the Du Page River where depressed ground-water levels are found. In any case, the intact bank should be left to prevent erosion of the site by the Du Page River.

The amount of excavation necessary to create wetland hydrology is difficult to predict. Based on the depths to water measured in unit C (fig. 6), the minimum amount of excavation that would be required to create wetland hydrology near wells 1 and 3 is about 0.65 m. This does not account for the additional evapotranspiration (ET) that would occur after excavation, so that additional excavation is needed. It is difficult to predict the amount of additional excavation, because the ground-water system will adjust to the new situation by altering flow paths. Given the high hydraulic conductivity of the sand and gravel substrate, the additional excavation needed should be minimal. In a similar IDOT mitigation site near Orangeville (Miner and Fucciolo 1997), an additional 15 cm of excavation was recommended in a substrate with a lower hydraulic conductivity; the higher conductivity of the present site should require less additional excavation.

As additional evidence, the ditch on the north side of the site can act as a model for the proposed excavation. The ditch intercepts unit C, and caused ground-water discharge that supports wetland plant growth and peat development. The bank of the ditch is about 0.45 m below land surface near well 1, and the bottom is about 0.90 to 0.95 m below land surface (about 181.4 m elevation). The bank contains hydrophytic vegetation and is likely seasonally saturated. The bottom of the ditch contains peaty deposits that are likely saturated most of the year.

Using the ditch as a model, a similar excavation should receive ground-water discharge. The excavation could be connected to the ditch to receive surface-water flow or to drain away any excess standing water in the excavation. This type of excavation would not receive surface flow from the Du Page River except during major flooding events and therefore would not accumulate river-borne debris, although ground-water interchange with the river would be theoretically possible because minimum level in the Du Page River during the monitoring period was 181.16 m. If excavation occurs as proposed, the level of the Du Page River should assure that the water table is never deeper than 0.25 m, thus assuring wetland hydrology.

RECOMMENDATIONS

Excavation of the proposed compensation site to a an elevation of about 181.4 m (about 0.9 m below land surface near well 1) is proposed to create and sustain wetland hydrology. The majority of the compensation site should be excavated to this depth, with a bottom that slopes toward the edges no steeper than 30:1 when possible. A buffer of undisturbed land should be left between the Du Page River and the excavation, perhaps 20 to 30 m, so that the river will not erode into the excavation. A smaller buffer of undisturbed bank about 5 m wide should be left along the south side of the drainage ditch, with a connection made to the excavation to allow flow to and from the ditch. The connection should be on the downstream (western) end to prevent channelization through the excavation. This connection would drain any standing water and allow for emergent vegetation to be established in the excavation. In addition, the connection would allow water input from the ditch during periods of high flow, thus adding another water source for the excavation. Riprap and/or vegetated fabric should be placed in the connection and on its banks to prevent erosion.

Additionally, no drainage from the roadway should be diverted into or through the compensation site. High concentrations of road salt can be extremely detrimental to wetland compensation projects, causing plant mortality and/or a shift to undesirable plant species. Any drainage plans should be altered to avoid this situation.

Excavation should only be performed in dry or frozen conditions to minimize compaction and siltation, and should be done with excavators equipped with tread specifically designed to minimize compaction.

SUMMARY

The hydrogeologic characterization of the study area has been completed. Water-level monitoring occurred between December 1994 and December 1996. If the site is chosen for compensation activities, additional tasking is requested for renewed monitoring and the installation of additional monitoring wells in the excavation.

The study area is located entirely within the floodplain on the north side of the Du Page River north of Plainfield east of Illinois Route 59. Relief in the study area is less than 2 m. The Du Page River is incised about 1.5 to 2 m below land surface in the proposed compensation area. The unnamed ditch is incised about 1 m below land surface in the compensation area.

Dolomite bedrock occurs at depths of 3.6 to 4.2 m in the study area, but crops out in nearby locations. Sediments in the floodplain include a sand and gravel aquifer 0.8 to 1.8 m thick that occurs at depths of 0.9 to 1.2 m between two sandy silt layers.

Ground water discharges from the uplands north of the study area into the floodplain, then flows south toward the Du Page River. Ground-water flow at the site angles slightly east or west according to season. There is an upward component of flow from bedrock into overlying units

over much of the site. Also, there is an upward gradient from the sand and gravel aquifer (unit C) into unit D at land surface.

Water levels measured in the wells did not indicate that wetland hydrology regularly occurred. Sedges and peaty deposits indicate that wetland hydrology may be present in and on the banks of the unnamed ditch. No evidence of field tiles or other hydrologic alterations was found.

Surface-water input to the compensation site is supplied by the Du Page River and by the unnamed ditch on the north side of the site. The ditch is probably a channelized remnant of a former tributary stream, but this segment does not carry its original flow volume since a cut-off ditch was dug to the Du Page River east of the site. Water in the ditch is minimal and often stagnant, and is likely derived locally from ground-water discharge and runoff from adjacent slopes rather than significant flow into the ditch from upland sources. Restoration of flow in the ditch is undesirable due to the likelihood of flashy flows that may contain sediment and agricultural chemicals. The Du Page River is entrenched and does not flood the majority of the site on a regular basis. No surface-water source alone is sufficient to establish wetland hydrology.

Creation of wetlands through excavation is the only alternative for compensation on site. This excavation would primarily receive water from ground-water discharge from unit C, but would also receive direct precipitation and occasional inflow from the ditch. Excavation is required so that land surface would intercept upward flow and cause saturation sufficient to satisfy wetland-hydrology criteria. Excavation is proposed to an elevation of about 181.4 m (about 0.9 m in depth near well 1), sloping outward at about 30:1. A connection to the ditch on the west end of the excavation should be made so that excess standing water can drain off, and so that surface water in the ditch can flow into the excavation when available. The connection should be made on the downstream end to prevent channelization through the excavation.

No drainage from the roadway should be allowed to flow into the compensation area. Road-salt use increases chloride levels above general use standards in the surface water of many roadside compensation sites, which is detrimental to plant growth and to successful wetland establishment.

ACKNOWLEDGMENTS

Funding for this study was provided primarily by the Illinois Department of Transportation under contract AE89005. Additional funding was provided by ISGS. David Larson, Steven Benton, and Nancy Rorick of ISGS reviewed this report. Philip DeMaris and Alison Meanor of ISGS monitored wells at the site.

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APPENDIX A Hydrogeologic report from Gannett Fleming, Inc. containing geologic logs and well construction data

Gannett Fleming
ENGINEERS AND PLANNERS

GANNETT FLEMING, INC.
Suite 200
313 North Walnut Street
Wood Dale, IL 60191
Fax: (708) 616-7274
Office: (708) 616-7270

January 26, 1995

Mr. James J. Miner
Illinois State Geological Survey
615 East Peabody Drive
Champaign, IL 61820

Re: Illinois Route 59
Wetland Mitigation Site

Dear Mr. Miner:

Enclosed is the information you requested regarding the monitoring wells at the proposed replacement wetland along the DuPage River.

The borings and well installations were completed by Groff Testing as a subcontractor to Professional Service Industries. Borings were completed with a CME all terrain vehicle using hollow stem augers. Standard penetration test soil samples were collected using 2-inch split spoons. Soil descriptions on the enclosed logs use the Burmeister classification:

And	35% to 50%
Some	20% to 35%
Little	10% to 20%
Trace	< 10%

The wells were constructed with threaded, flush-joint, 1-inch diameter Schedule 40 screen and riser. Screened intervals are noted on the logs (all screens were 10 slot, i.e.0.010inch). Morie sand was used for the filter packs and coarse granular bentonite was used for the seals above the filter packs. A Portland cement based "sand mix" was used to seal the protective casings and create an anti-perc collar at the ground surface. Well numbers were scribed into the anti-perc collars. The locks on the protective casings are keyed-alike and two keys are enclosed for your use. The wells were developed by surging with tap water until the discharge was clear of sand and fines.

You might want to consider attaching some sort of tall marker flags to the protective casings. The timothy grows over six feet tall in this area making location of the wells a bit difficult when the vegetation is lush.

bem/il 59 geotechnical/isgswell.ltr

Also enclosed is a tabulation of water level measurements made on several occasions following installation of the wells. Please note the first two rounds of measurements were completed before the wells were developed.

Please do not hesitate to contact me if you have questions regarding this material.

Sincerely,

GANNETT FLEMING, INC.

Bernard Markunas
Senior Geologist

Enclosure

pc. M. Matkovic
26955

IL 59 Replacement Wetland
Groundwater Level Data
Depth (In Feet) Below Ground Surface

Well	08-09-94	10-13-94	11-13-94
W-1 (Upper)	0.75	2.05	1.75
W-1 (Middle)	0.75	2.15	1.67
W-1 (Lower)	0.55	2.25	1.65
W-2 (Upper)	Dry	Dry	Dry
W-2 (Middle)	3.67	5.37	5.31
W-2 (Lower)	3.73	5.33	5.08
W-3 (Upper)	5.17	2.87	2.27
W-3 (Lower)	5.17	2.27	1.77

Gannett Fleming
ENGINEERS AND PLANNERS

BORING LOG

BORING NO.	W-1
PROJECT NO.	26955
DATE STARTED	08/08/94
DATE FINISHED	08/08/94

PROJECT/LOCATION	IL 53 REPLACEMENT WETLAND		
GEOLOGIST/~~ENGINEER~~	B MARKUNAS		
DRILLING CONTRACTOR	PSI / GROFF		
DRILLER	R GROFF		
RIG TYPE	CME ATV	DRILLING METHOD	HSA
SURFACE ELEVATION	↘	TOTAL DEPTH OF HOLE	15.5
GROUNDWATER OBSERVATIONS (Date, Time, Level)	N: 597.91 S: 597.81		

DEPTH	SAMPLE NO. & TYPE	BLOWS OR RQD	% RECOVERY	LEGEND	DESCRIPTION OF MATERIALS (Density, Consistency or Rock Hardness; Color; Classification; etc.)	USCS	PID FID	REMARKS
	SS-1	2/3 3/4	50		Dk brown SILT little F sand tr clay. Moist, soft			< .25 TSF Root fibers
	SS-2	WOH - 3	0					
	SS-3	4/5 7/8	50		3.5 Tan, gray CMF GRAVEL some sand, tr silt, wet			C GRAVEL BLOCKED SHOE/SPOON
	SS-4	5/6 6/8	20					Finer gravel, more sand with depth
	SS-5	9/10 7/9	50		9.0 Gray SILT, little MF sand tr. clay, F gravel. Damp			1.75 TSF
	SS-6	3/5 7/8	50					3.25 TSF
	SS-7	5/39 2/15	90					3.25 TSF Less sand with depth
	SS-8	16/100/.1			13.6 Brown, gray decomposed DOLOMITE*			
					15.5 AUGER REFUSAL			

GENERAL REMARKS 2 BORINGS : 1 w/ 2 OBSERVATION WELLS LOWER SCREEN 3.5 - 15.5

MIDDLE SCREEN 8.5 - 3.5

1 w/ 1 OBSERVATION WELL : UPPER SCREEN 0 - 3.5

* BASED ON PUBLISHED DATA - NOT FIELD CHECKED w/ HCL

BORING NO. ______

SHEET ______ OF ______

Gannett Fleming
ENGINEERS AND PLANNERS

BORING LOG

PROJECT/LOCATION	IL 59 REPLACEMENT WETLAND
GEOLOGIST/~~ENGINEER~~	B. MARKUNAS
DRILLING CONTRACTOR	DSI / GRAFF
DRILLER	RON GRAFF
RIG TYPE	CME - ATV
DRILLING METHOD	HSA
SURFACE ELEVATION	~
TOTAL DEPTH OF HOLE	14.0
GROUNDWATER OBSERVATIONS (Date, Time, Level)	N: 600.30 S: 600.10
BORING NO.	W-2
PROJECT NO.	26955
DATE STARTED	08-08-94
DATE FINISHED	08-08-94

DEPTH	SAMPLE NO. & TYPE	BLOWS OR RQD	% RECOVERY	LEGEND	DESCRIPTION OF MATERIALS (Density, Consistency or Rock Hardness; Color; Classification; etc. . . .)	USCS	PID FID	REMARKS
	SS-1	2/3 2/3	60		Dk brown SILT, little MF sand, t gravel Damp 1.0 Tan, brown CMF GRAVEL, some CMF sand Damp			Few cobbles
	SS-2	2/2 2/3	80		2.0 Dk brown SILT tr. MF sand			
	SS-3	3/3 4/5	40		3.9 Gray, brown, tan CMF SAND little CMF gravel Wet			Trace silt
	SS-4	3/4 4/7	90		6.5 Gray, brown SILT some sand, little gravel. Moist - wet			Some siltier interbeds, some sandier interbeds
	SS-5	4/5 6/9	50					
	SS-6	3/4 5/5						Water on rods @ 12' 56 2.25 TSF
	SS-7	4/6 23/62/.4						
	SS-8	100/0			13.7 Gray DOLOMITE * 14.0 AUGER REFUSAL			

GENERAL REMARKS 2 BORINGS: 1 W/ 2 OBSERVATION WELLS LOWER SCREEN 9.0 - 14.0
MIDDLE SCREEN: 4.0 - 6.5
1 W/ 1 OBSERVATION WELL: UPPER SCREEN: 0' - 3.9'

* BASED ON PUBLISHED DATA - NOT FIELD CHECKED W/ HCL

BORING NO. W2
SHEET 1 OF 1

Gannett Fleming
ENGINEERS AND PLANNERS

BORING LOG

PROJECT/LOCATION	[illegible] 57 REPLACEMENT WETLAND
GEOLOGIST/~~ENGINEER~~	[illegible] ARLUNAS
DRILLING CONTRACTOR	DS / GROFF
DRILLER	R GROFF
RIG TYPE	CME ATV
DRILLING METHOD	HSA
SURFACE ELEVATION	597.19
TOTAL DEPTH OF HOLE	12
GROUNDWATER OBSERVATIONS (Date, Time, Level)	
BORING NO.	W-3
PROJECT NO.	26755
DATE STARTED	08/09/94
DATE FINISHED	08/09/94

DEPTH	SAMPLE NO. & TYPE	BLOWS OR RQD	% RECOV-ERY	LEGEND	DESCRIPTION OF MATERIALS (Density, Consistency or Rock Hardness; Color; Classification; etc. . . .)	USCS	PID FID	REMARKS
	SS-1	2/2 3/4	50		Dk brown SILT little MF sand moist			
	SS-2	2/2 3/4	30		3.0 Brown, gray CMF GRAVEL and CMF SAND little silt moist			Wet spoon.
	SS-3	5/7 7/8	10					#3 Drove C gravel n size. Upper recover
	SS-4	6/9 6/6	50		7.3 Gray SILT, some MF sand, tr gravel. Damp-moist.			More fines below 9.5'
	SS-5	4/12 5/6	60					
	SS-6	4/6 6/9	30		11.7 Gray DOLOMITE FRAGMENTS*			
					12.0 END OF BORING			

GENERAL REMARKS 1 BORING W/ 2 OBSERVATION WELLS: LOWER SCREEN 9'-12'
UPPER SCREEN 3'-5'

* BASED ON PUBLISHED DATA - NOT FIELD CHECKED W. [illegible]

BORING NO. W-3
SHEET 1 OF 1

APPENDIX B Water-Level Elevations and Depths to Water Below Land Surface

Table B1 Water-level elevations (in m referenced to NGVD, 1929).

Date	12/09/94	01/04/95	02/07/95	03/15/95	04/04/95	05/01/95	06/12/95	07/10/95	08/23/95	09/11/95	10/11/95	11/14/95	12/04/95
Well 1U	181.98	181.66	181.66	181.73	181.65	181.93	*	*	181.52	181.52	181.59	182.01	181.68
Well 1M	182.05	181.71	181.70	181.78	181.69	182.00	*	*	181.55	181.55	181.62	182.07	181.71
Well 1L	182.00	181.68	181.70	181.77	181.71	182.00	*	*	181.57	181.55	181.60	182.05	181.70
Well 2U	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
Well 2M	181.42	181.26	181.32	181.38	181.37	181.65	181.43	181.35	181.38	181.37	181.38	181.76	181.39
Well 2L	181.65	181.44	181.48	181.49	181.45	181.79	181.50	181.40	181.43	181.41	181.43	181.89	181.47
Well 3U	181.64	181.29	181.33	181.46	181.36	181.77	*	181.17	181.21	181.18	181.27	181.92	181.38
Well 3L	181.82	181.46	181.49	181.58	181.51	181.85	*	181.38	181.40	181.39	181.44	181.93	181.52
Gauge A	181.63	181.20	181.27	181.36	181.31	181.63	181.32	181.26	181.26	181.24	181.27	181.69	181.30

Table B1 *continued* (in m referenced to NGVD, 1929).

Date	01/08/96	02/19/96	03/26/96	04/21/96	05/13/96	06/19/96	07/12/96	08/20/96	09/19/96	10/28/96	12/06/96
Well 1U	181.58	181.56	181.67	181.78	181.73	182.21	181.54	*	181.56	181.62	181.66
Well 1M	181.60	181.60	181.70	181.81	181.75	182.25	181.56	*	181.58	181.63	181.68
Well 1L	181.59	181.58	181.67	181.81	181.79	182.28	181.57	*	181.54	181.58	181.67
Well 2U	dry	dry	dry	dry	dry	182.04	dry	dry	dry	dry	dry
Well 2M	181.31	181.31	181.36	181.49	181.54	182.01	181.33	181.34	181.31	181.31	181.35
Well 2L	**182.37	181.36	181.43	181.58	181.63	182.16	181.33	181.41	181.34	181.36	181.45
Well 3U	181.26	181.27	181.38	181.60	181.52	182.08	181.18	*	181.16	181.24	181.35
Well 3L	181.41	181.39	181.48	181.66	181.65	182.18	181.36	*	181.34	181.38	181.49
Gauge A	181.21	*	181.31	181.42	181.54	182.09	181.18	181.25	181.16	181.17	*

Table B2 Depths to water in wells (in m referenced to land surface)

Date	12/09/94	01/04/95	02/07/95	03/15/95	04/04/95	05/01/95	06/12/95	07/10/95	08/23/95	09/11/95	10/11/95	11/14/95	12/04/95
Well 1U	0.34	0.66	0.66	0.59	0.67	0.39	*	*	0.80	0.80	0.73	0.31	0.64
Well 1M	0.26	0.60	0.61	0.53	0.62	0.31	*	*	0.76	0.76	0.69	0.24	0.60
Well 1L	0.31	0.63	0.61	0.54	0.60	0.31	*	*	0.74	0.76	0.71	0.26	0.61
Well 2U	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
Well 2M	1.56	1.72	1.66	1.60	1.61	1.33	1.55	1.63	1.60	1.61	1.60	1.22	1.59
Well 2L	1.33	1.54	1.50	1.49	1.53	1.19	1.48	1.58	1.55	1.57	1.55	1.09	1.51
Well 3U	0.42	0.77	0.73	0.60	0.70	0.29	*	0.89	0.85	0.88	0.79	0.14	0.68
Well 3L	0.24	0.60	0.57	0.48	0.55	0.21	*	0.68	0.66	0.67	0.62	0.13	0.54

Table B2 *continued* (in m referenced to land surface)

Date	01/08/96	02/19/96	03/26/96	04/21/96	05/13/96	06/19/96	07/12/96	08/20/96	09/19/96	10/28/96	12/06/96
Well 1U	0.74	0.76	0.65	0.54	0.59	0.11	0.78	*	0.76	0.70	0.66
Well 1M	0.71	0.71	0.61	0.50	0.56	0.06	0.75	*	0.73	0.68	0.63
Well 1L	0.72	0.73	0.64	0.50	0.52	0.03	0.74	*	0.77	0.73	0.64
Well 2U	dry	dry	dry	dry	dry	0.97	dry	dry	dry	dry	dry
Well 2M	1.67	1.67	1.62	1.49	1.44	0.97	1.65	1.64	1.67	1.67	1.63
Well 2L	**0.61	1.62	1.55	1.40	1.35	0.82	1.65	1.57	1.64	1.62	1.53
Well 3U	0.80	0.79	0.68	0.46	0.54	-0.02	0.88	*	0.90	0.82	0.71
Well 3L	0.65	0.67	0.58	0.40	0.41	-0.12	0.70	*	0.72	0.68	0.57

* no measurement
- indicates water above land surface
** probable measurement error