# INITIAL SITE EVALUATION

## PROPOSED WETLAND COMPENSATION SITE, ST. CLAIR COUNTY, CAHOKIA, IL
## FAP 999 (NEW RIVER CROSSING)
## P98-088-91


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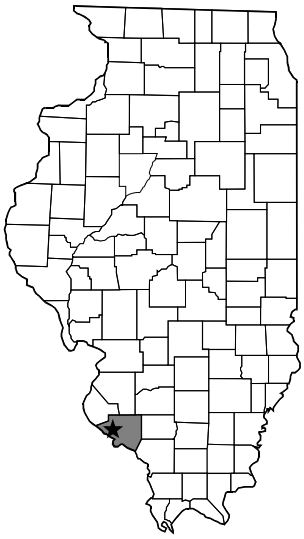

**CONTENTS**

INTRODUCTION. . . . . 1

PROPOSED WETLAND COMPENSATION SITE, ST. CLAIR COUNTY NEAR CAHOKIA, IL. . . . . 1

Summary. . . . . 1

Restoration/Creation Considerations. . . . . 2

*Hydrology*. . . . . 2

*Geology*. . . . . 3

*Soils*. . . . . 4

*Wetlands*. . . . . 4

*Hydrologic Alterations*. . . . . 4

Restoring/Creating Wetland Hydrology. . . . . 5

FILE DATA. . . . . 6

FIELD DATA. . . . . 12

REFERENCES. . . . . 21

APPENDIX A. . . . . 23

FIGURES. . . . . 24

PHOTOS. . . . . 28

## INTRODUCTION

This Initial Site Evaluation report was prepared by the Illinois State Geological Survey (ISGS) to provide the Illinois Department of Transportation (IDOT) with preliminary information regarding a proposed wetland compensation site near Cahokia in St. Clair County, Illinois. This report is for screening purposes only. File information (pages 7 to 12) and field observations (pages 13 to 21) of the hydrogeomorphic features of the site are the primary focus of this report. Field observations presented here may not reflect long-term conditions at this site. Biological features, such as habitat, are only included as part of a broad analysis of the landscape. This Initial Site Evaluation report and any conclusions contained herein are not a substitute for a hydrogeologic characterization, which may include geologic investigation, well installation, surveying, and long-term monitoring of site conditions.

The proposed site lies just south of Cahokia in St. Clair County and is located in the W ½, Section 10, T1N, R10W (Figure 1), and contains 60 acres (24.3 hectares). It is bounded by the raised roadbed of IL 3 to the west, a drainage ditch and railroad tracks to the east, a residential area to the north, and the levee of Prairie du Pont Creek to the south. Based on historic topographic maps and aerial photographs, the southern half of the site was excavated some time between 1954 and 1962, probably during the construction of the new IL 3 bridge over Prairie du Pont Creek.

## PROPOSED WETLAND COMPENSATION SITE, ST. CLAIR COUNTY NEAR CAHOKIA, IL

### Summary

Based on the points below, the potential for successful wetland restoration of the proposed site is considered **low-moderate** (exclusive of areas that may already be wetland).

- The drainage ditches which converge at the southern tip of the site will backflood the site whenever flood waters cannot be conveyed to Prairie du Pont Creek via the Missouri-Pacific gravity drain (MOPAC drain) or the Blue Waters Pumping Station (Figures 1 & 3). However, because the ditches drain residential areas north and west of the site, the quality of the flood waters is questionable.

- Darwin silty clay, a state and county-listed hydric soil, is mapped over the entire site, excluding that which was excavated (Figure 4). Mottled soil was observed below a depth of 10 inches (0.25 m) in a hand-auger boring completed in the east-central area of the site (B1, Figure 3). No saturated soil was encountered through 72 inches (1.83 m). However, farm fields north of the proposed site experienced widespread shallow ponding in response to a major rain event on May 7$^{th}$ (see Photo #7). Percolation rates are expected to be low in Darwin soils.

- The borrow pit area is classified on the National Wetlands Inventory (NWI) as a palustrine, emergent (PEMC) wetland (Figure 3). However, the area now appears to be a combination of forested and emergent wetlands. Water marks and hydrophytic vegetation were widely observed in the southern quarter of the site. Therefore, this area may meet the criteria for a jurisdictional wetland.

- The ditch running through the northern half of the site and along its eastern perimeter was dug before 1934. The topographic map for that year depicts marshy conditions throughout the proposed site. Aerial photographs from 1940 show what appears to be productive farmland, suggesting the ditch successfully drained the marshland. However, because it is now part of a large and heavily-engineered storm-water drainage network, this ditch cannot be modified in any substantial manner. Hence, no major hydrologic alterations can be reversed.

Given the information available at the time of this report, the apparent options for wetland restoration are given below:

- Fill in the minor ditches draining the upper (northern) tier of the site into the main drainage ditch (see red ditches on Figure 3) and remove any tile that may be present. This is an area of mapped hydric soil and so removing these hydrologic alterations may lead to wetland hydrology redeveloping.
- Excavating the northern half of the site to an elevation similar to that in the existing wetland is not recommended for the following reasons:
    - A water budget is needed to determine if enough water is available to support the excavated area.
    - The quality of the water is unknown and therefore must be determined before using the given sources for habitat restoration.
    - Although the elevation of boring B1 (Figure 3) was only about 30 inches (0.75 m) above the elevation of the line of cattails near the center of the site (Photo 2), the northern boundary of the site may be as much as four to six feet above ground surface at the cattails. Therefore the required excavation may be extensive.

Before any of the above modifications are considered, the following recommendations should be addressed:

- Perform a level II hydrogeologic assessment of the site.
- Determine the thickness and extent of near-surface sediments.
- Conduct a detailed elevational survey and tile search.
- Assess the water quality of the major drainage ditches. Water quality should also be considered when and if a planting schedule is prepared for this site.
- Determine if hazardous materials were ever dumped in the borrow pit.

**Restoration/Creation Considerations**

***Hydrology***

The ditch running through the northern half and along the eastern perimeter of the site (Figures 1 and 3) has been in place since at least 1934 (USGS, 1934). It is assumed that the ditch was created to drain the site for agriculture. Historic topographic maps suggest the site was marshy until about 1968 (Figure 2). However, aerial photos from 1940 (USDA, 1940) reveal that the site was under cultivation. Therefore, the drainage ditch appears to have successfully drained the area.

Regardless of the exact timing and life span, marshy conditions were certainly once manifested over the proposed site. The topographic contours visible in Figures 1 and 2 and the mapped soil (Darwin silty clay) indicate that the area was once the southern arm of a river meander, an oxbow lake or some other slack-water feature (USDA, 1978). Long, thin curvilinear depressions pockmark the area north and east of the site, representing point bar deposits on the former west bank of the river. Due east of the proposed site, Lily Lake lies in one such depression. A permanent open-water (albeit excavated) feature, its elevation is very similar to that of the residential area north of the site.

The southern half of the proposed site is a former borrow pit, excavated between the years of 1954 and 1962[1]. It is likely the materials were used in the construction of the approach to the IL 3 bridge over Prairie du Pont Creek. Bounded by the IL 3 road grade on the west and a rudimentary access road on the east, the former pit is very close to the terminus of a major interior drainage ditch - Blue Waters Ditch (Figure 1) - and is accordingly susceptible to water level fluctuations in this ditch.

[1] Based on historical aerial photographs (USDA, 1962) and topographic maps (USGS 1954, 1968)

As the surrounding area was developed for housing and agriculture, artificial or artificially-enhanced drainage pathways were created to drain former slack-water locations and depressions. At the present time, four ditches converge near the southern tip of the site and flow into Blue Waters Ditch (see Figure 3):

1. two ditches, draining areas of southwestern Cahokia, merge on the west side of IL 3 and flow in a culvert under the highway towards the east,
2. the main ditch that runs through the site and south along the west flank of the Missouri-Pacific railroad tracks drains the proposed site and accepts appreciable residential runoff, and
3. one ditch that flows south along the east flank of the Missouri-Pacific railroad tracks, draining primarily farm fields.

Blue Waters Ditch itself drains a significant part of the Cahokia-Centreville area via Goose Canal (Figure 1). At its western limit, the collective discharge of the above ditches is routed south through the levee into Prairie du Pont Creek via a gravity drain (Figure 3, Photo 6), referred to as the MOPAC drain (Missouri-Pacific Railroad, J. Ruffords, pers. comm., 2000). Under normal circumstances, the gravity drain is open, allowing Blue Waters Ditch to drain freely. However, when stage in Prairie du Pont Creek and/or the nearby Mississippi River is high, gate valves in the drain are closed so that the interior areas will not be back-flooded (J. Ruffords, per. comm., 2000). In the past, when the drain was closed for long time periods, water in Blue Waters Ditch was pumped out into Prairie du Pont Creek via the South Pumping Station upstream at the end of Harding Ditch (Figure 1). However, this only occurred after the water in Harding Ditch itself was sufficiently evacuated. Because Harding Ditch also drains a large area and often fills very quickly, it was common for Blue Water Ditch to flood interior areas before it could in turn be pumped (R. Dieckmann, per. comm., 2000). This situation was remedied by the construction of a dedicated Blue Waters Ditch Pumping Station in the late 1980's, the location of which is indicated in Figure 1.

In a telephone interview with Ron Dieckmann of the U.S. Army Corps of Engineers, St. Louis District, Mr. Dieckmann referred to the southern portion of the proposed site as a “natural ponding area,” both because of its reduced elevation and its proximity to Blue Waters Ditch. Photo 5 shows the channel through which the southern portion of the proposed site both floods and drains. This channel is incised 1.5 to 2 feet below the surrounding ground surface, suggesting that it transmits appreciable flow. This channel profile is probably enhanced by the fact that the water levels in Blue Waters Ditch are artificially controlled. Water ponded in the wetland may be catastrophically drained when pumping ensues or the gravity drain is opened.

An interview with Mr. Rash, a long-standing homeowner in the residential area north of the site, provided further evidence of on-site flooding (D. Rash, per. comm., 2000). He presented pictures showing ponding in the farm field just north of the site to the degree that it attracted Canada geese (the same area is depicted in Photo 7). Mr. Rash also informed us of the fact that appreciable residential runoff enters the ditch running through the northern portion of the site and this was confirmed by field reconnaissance. The likelihood of untreated residential runoff from both sides of the highway flooding the site through the ditch system poses obvious water quality concerns for wetland restoration.

The whole of the proposed site is mapped as a flood-hazard area by the Federal Emergency Management Agency (FEMA, 1980). It is considered an area of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown (406 ft NGVD 29), but no flood hazard factors are determined.

### *Geology*

Surface sediments on site are mapped as Cahokia Formation alluvium over Henry Formation outwash sand and gravel (Lineback, 1979; Berg and Kempton, 1988). Both units are greater than 6 m (19.7 ft) thick (Berg and Kempton, 1988). Situated in the American Bottoms, the proposed site lies on Mississippi River floodplain deposits. The presence of alluvial sediments was confirmed by a hand-auger boring (pg. 17).

Bedrock lies at a depth between 100 and 200 feet (30.5 and 61 m) below the surface and is mapped as Middle Valmeyeran Series of the Mississippian System, consisting primarily of carbonates with some dolomites and evaporites (Willman *et al.*, 1967).

### *Soils*

Two soil types are mapped on site - Darwin silty clay and its variant (Figure 4). Both are listed on the state and county hydric soils lists and are mollisols (USDA, 1978, 1991, 1995). Darwin silty clay is poorly drained and frequently flooded for long durations from March through June when it has an apparent high water table between 0 and 2 feet (0 and 0.61 m) below land surface (USDA, 1978). The Darwin variant is commonly flooded for brief durations from November through June when it has an apparent high water table between 0 and 2 feet (0 and 0.61 m) below land surface (USDA, 1978). The main difference between the two soils is that the variant may include soils that have a sandy or loamy substratum, and generally has sandy material below a depth of 36 inches (0.91 m) (USDA, 1978).

The borrow pit was dug in an area of Darwin variant soil. As excavation may have been greater than 36 inches (0.91 m), the permeability of the soil in the area of the former borrow pit may be substantially different from that of the Darwin soil to the north. Regardless, the area is prone to seasonal flooding and so hydric soil is likely to have redeveloped since the borrow pit was completed.

### *Wetlands*

One NWI-wetland was mapped on site - an area of palustrine, emergent, seasonally-flooded wetland (PEMC) occurring in the former borrow pit (Figure 3, USFWS, 1988). During the site visit in March, it was found that palustrine, forested element is now present. Large willow (*Salix* spp.), eastern cottonwood (*Populus deltoides*), and silver maple (*Acer saccharinum*) trees were observed. The density of trees and particularly of willow stems increases towards the southern limit of the site. Otherwise, localized tree "islands" are present, especially along the west and northwest part of the mapped wetland. In many places, the understory consisted not of tree species but of sedges (*Carex* spp.), reed canary grass (*Phalaris arundinacea* L.), and cattails (*Typha* spp.) (see Photos 3 & 4).

A well-established "stand" of cattails north and west of the forested area suggests emergent wetland conditions and is curious for its location up-gradient of the forested area, *i.e.* obligate wetland plants up-slope of facultative plants such as silver maple (FACW) and cottonwood (FAC+) (see Photos 1 & 2). This, coupled with observed tree throws, standing dead tree stems and the herbaceous understory may indicate the onset of wetter conditions in the southern portions of the proposed site. Exactly why this may be happening is difficult to determine. More frequent incidence of high stage in Blue Waters Ditch is one possible explanation.

The areas discussed above represent as much as a quarter and possibly more of the proposed site, and are areas that may meet the three-parameter definition of a wetland and outlined in the 1987 Corps manual (USACE, 1987).

### *Hydrologic Alterations*

The ditch running through and along the eastern boundary of the proposed site is one of the major hydrologic alterations present. Now over 65 years old, it was likely dug for agricultural purposes, to drain marshy conditions once common in the American Bottoms. Agricultural runoff enters this ditch via a few shallow field ditches and through overland flow as evidenced by incidences of gully erosion. In addition to field runoff, this ditch now receives residential runoff from the community north of the proposed site.

Another major hydrologic alteration is the borrow pit. Although not a closed depression, its discharge point is artificially controlled by the water level maintained in Blue Waters Ditch.

No indication of drainage tile was observed in the historical aerial photos reviewed or during the site visit.

**Restoring/Creating Wetland Hydrology**

The drainage ditch running through the site accepts substantial quantities of urban runoff. Therefore, it cannot be blocked or rerouted in any way to promote wetland compensation efforts. At least one homeowner in the residential area north of the site believes that the ditch system has been left in disrepair and that this and a lack of adequate pumping is partially to blame for flooded backyards and basements. Any modification of the existing ditch system may raise liability issues in the future.

Regardless of whether the ditch can be modified, the quality of the water flowing in it and the surrounding ditches is questionable and so does not constitute a desirable source of water for wetland restoration. As the south or southeastern quarter probably qualifies as wetland, the focus should therefore fall on that part of the site not previously used for borrow.

According to the county soil survey, undrained Darwin silty clay is suited to “wetland wildlife” (USDA, 1978). While the soil observed on site was less clay-rich than the representative profile, it was nevertheless consistent with the series description. Observed surface-water ponding just north of the site where Darwin soil is also present confirms the presence of low permeability soil (Photo 7). As such, efforts could be made to hinder field runoff by filling any ditches connected to the larger ditch. A low-relief earthen berm or “mini-levee” along the eastern perimeter of the northern field may also prevent runoff from entering the ditch. A detailed elevational survey could determine whether a similar berm along the break in slope between the farm field and the former borrow pit would be necessary.

Excavation of the northern half of the site to an elevation similar to the borrow pit is another possibility. However, it is not recommended before a water budget is calculated to determine if water sources are substantial enough to adequately flood the excavation. Excavation may also be undesirable because the same, possibly low-quality water currently flooding the southern part of the site would be a major input to the excavated area. Furthermore, the northernmost portions of the site are as much as four to six feet above ground surface in the wetland area and may require extensive excavation.

Some additional concerns about the site include:

- Random, small-scale dumping was noted along the access road bounding the eastern perimeter of the site. Before the property is acquired or any compensation effort undertaken, the history of the borrow pit should be reviewed to make certain no materials were dumped on site. Aerial photos taken in 1988 suggest possible activity in the borrow pit area.

- An important consideration is the quality of the water entering the site from the residential areas north and west of the site. Untreated runoff from flooded roads and yards may contain a variety of pollutants. In addition, runoff from IL 3 may be enriched with road salt or other chemicals. When conditions in Blue Waters Ditch preclude the immediate transfer of runoff to Prairie du Pont Creek, it is highly likely that this water will back up into the site.

| **FILE DATA** | |
|---|---|
| **Date of site visit** | March 16, May 2, May 8, and June 8, 2000 |
| **Field crew** | March 16: Steve Benton, Brad Ketterling<br>May 2: Keith Carr, Brad Ketterling<br>May 8: Brad Ketterling<br>June 8: Brad Ketterling, Geoff Pociask |
| **General location** | |
| Section, Township, Range | W ½, Section 10, T1N, R10W |
| County | St. Clair, IL |
| 7.5-minute quadrangle | Cahokia, IL (USGS 1993) |
| **Site size** (measured planimetrically by ISGS) | ~60 acres (24.3 hectares) |
| **Major land use of site** | The northern half was planted with winter wheat at the time of the site visit. The southern half was once a borrow pit and is now colonized by cattails, poplar, silver maple, and willow trees. |
| **Recent weather trends** | The preceding summer and fall were unusually dry, precipitation was 11 inches below average for the period July through December, 1999 (see Appendix A). |
| **Geomorphic setting** | American Bottoms, floodplain of the Mississippi River. |
| **Topography** | The site slopes gently to the south, while the borrow pit area is more depressional with side slopes. |
| **Physiographic subdivision** (Leighton, et al. 1948) | Salem Plateau Section, Ozark Plateaus Province |
| **Bedrock geology** | |
| Uppermost Unit (Willman et al. 1967) | Middle Valmeyeran Series of the Mississippian System, mostly carbonates, some dolomites and evaporites. |

## FILE DATA

**Bedrock geology** (continued)

| | |
|---|---|
| Depth to bedrock (Piskin and Bergstrom 1975) | 100 to 200 feet. |
| Structure (Herzog et al. 1994) | Bedrock valley parallel to the Mississippi River. |

**Quaternary geology**

| | |
|---|---|
| Drift thickness (Piskin and Bergstrom 1975) | 100 to 200 feet |
| Surface sediments (Lineback 1979) | Cahokia Formation (modern alluvium) |
| Stack-unit sequence to 15 m depth on site (Berg and Kempton 1988) | Cahokia Formation alluvium greater than 6 m (19.7 ft) thick over Henry Formation outwash sands and gravels greater than 6 m (19.7 ft) thick. |

**Wetland classification** (from NWI, U.S. Fish and Wildlife Service 1988)

| **location on site** | **code** | **descriptors** |
|---|---|---|
| southern third of site | PEMC | palustrine, emergent, seasonally flooded |
| **off-site wetlands** | | |
| Blue Water Ditch, southeast of site | R2UBHx | riverine, lower perennial, unconsolidated bottom, excavated |
| Prairie DuPont Creek and banks | R2UBHx | riverine, lower perennial, unconsolidated bottom, excavated |
| | PFO1A | palustrine, broad-leafed deciduous, temporarily flooded |
| | PFO1C | palustrine, broad-leafed deciduous, seasonally flooded |
| drainage ditch on east side of railroad tracks | PFO1Ax | palustrine, broad-leafed deciduous, temporarily flooded, excavated |

## FILE DATA

**Susceptibility to flooding** (from FEMA, 1980)

| location relative to site | code | descriptors |
|---|---|---|
| entire site | AH | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown (406 ft NGVD 29), but no flood hazard factors are determined. |

**USGS gauging station(s) in vicinity:**

| Location | Station # | Distance from site |
|---|---|---|
| No gauging stations located near the site. | | |

## FILE DATA

**Historical aerial photographs**

| Date | Description |
|---|---|
| 4/2/98 | • All the main ditches are full of water, including that draining through the site from the north and along the eastern perimeter<br>• The tone of the northern third of the site is dark and blotchy, suggesting dampness. The fields east of the site are also wet.<br>• Based on the color of the water in Blue Water Ditch versus that in Prairie du Pont Creek, the gravity drains were not open when the picture was taken.<br>• Lineations are visible in the farm fields, but rather than tile drainage, these probably represent shallow ditches similar to those seen during the site visit in the northern part of the proposed site. Soil texture promotes surface ponding and little percolation, therefore a tile system would not be as effective.<br>• The area mapped as PEMC in the NWI is actually well-forested. The core of the area has a dark tone where trees are less numerous suggesting frequent inundation or saturation.<br>• The tone of the area north of the mapped wetland is bleached and irregular. During the spring 2000 site visit, this area was a dense stand of cattails. The bleached tone in the 1998 photography probably represents the light-colored stems of dead cattails. The outline of this area is very similar to that captured in the 1962 aerial photography.<br>• A permanent open water feature exists east of the site in a long trough-like depression that was once part of a large oxbow. Another ephemeral shallow-water feature, also in a depression, occurs west of the proposed site. Both are bounded by the 405 ft NGVD 29 contour (see Figure 1). |
| 3/11/93 | • In general, very similar to the 1998 photography. However, the boundary around the trees in the mapped wetland is much sharper, suggesting any cattails of shrub-scrub were mowed over.<br>• The ditch flowing under IL 3 from the west (parallel to the Prairie du Pont levee) drains a considerable area, extending up into the residential area west of the proposed site.<br>• The drainage ditch along the southern boundary of the residential area looks freshly maintained.<br>• All the main ditches have water in them. |
| 4/7/88 | • Some standing water is evident in the mapped wetland.<br>• Water is also present in the ditch system all the way north to the residential area and all main ditches are full of water.<br>• The upper tier of the site (above the borrow pit) has a blotchy tone indicating some possibly wet patches.<br>• The mapped wetland appears recently disturbed - possible cutting or thinning, perhaps just the time of year. |

## FILE DATA

**Historical aerial photographs** (continued)

| Date | Description |
|---|---|
| 7/11/73 | • Aerial is printed on a poor quality acetate sheet.<br>• A spur or access road is evident from the northbound lane of IL 3 south to the top of the levee near the southern tip of the proposed site.<br>• The mapped wetland appears to be primarily shrub-scrub.<br>• A very even tone exists throughout the area. The borrow pit is slightly darker.<br>• The residential area and the ditch system are present in their current configuration. |
| 7/9/62 | • The best photography: low flight and good conditions.<br>• The mapped wetland appears to be primarily shrub-scrub with some emergent areas. The only tall trees present are those along the ditch and railroad tracks.<br>• Ponded water is visible in the mapped wetland.<br>• The drainage connection between the mapped wetland and the ditch system is more visible than in subsequent photography.<br>• The gravity drain between Blue Water Ditch and Prairie du Pont Creek is present.<br>• A very sharp contact exists between the farmed areas of the borrow pit and that left undisturbed. There is a very obvious difference in the height of the vegetation, that south of the boundary is higher, possibly weeds, grasses, or cattails.<br>• The main ditches are generally much drier than in subsequent years.<br>• The residential area and the ditch system are present in their current configuration. |
| 7/17/40 | • The borrow pit, IL 3, and the residential area are not present.<br>• The pit was likely used to provide materials for the IL 3 approach to the bridge over the Prairie du Pont Creek.<br>• The levee is present but the gravity drain is not. In its place is what appears to be a two-way culvert of very large diameter (>10 ft), but should logically be a flapper valve only allowing into the Prairie du Pont Creek. The culvert lies at an elevation above the base flow in the Creek. The intake (upstream) elevation looks to be very high (no stereo pair) and hence would only discharge into the Creek after a substantial amount of land was flooded.<br>• The ditch system on both sides of the railroad tracks is in place as is the ditch component that cuts through the northern third of the proposed site. The ditch that currently flows into the southern tip of the site from the west is also present.<br>• There is only a very small portion of what is now the residential area that is not in agricultural use. Otherwise, the entire area has been planted and the tone looks very even.<br>• The curvilinear pattern of the old stream channel / oxbow are very evident in this photo. The proposed site lies on what was once the south bank of the river (the oxbow would have opened towards the west). The wet depression east of the site is also visible and is tree-lined. |

## FILE DATA

**Soils mapped on the site** (USDA 1978)
refer to Figure 3 for mapped locations

| No. | Soil Series | Hydric List | | Drainage class (USDA 1978) | Landscape position and parent material (USDA 1978) | Occurrence on site |
|---|---|---|---|---|---|---|
| | | State (USDA 1991) | County (USDA 1995) | | | |
| 71 | Darwin silty clay | Yes | Yes | A poorly-drained soils that is frequently flooded for long durations from March through June having an apparent high water table between 0 and 2 ft below land surface from March through June. | Nearly level, poorly-drained soils that formed in clayey alluvium, common in the American Bottoms. | Northern 24 acres of the site (see Figure 3). |
| V71 | Darwin silty clay variant | Yes | Yes | A poorly-drained soil that is commonly flooded for brief durations from November through June, apparent high water table between 0 and 2 ft below land surface from November through June. | As above, however, underlying material is stratified sand. | Central 6 acres of the site. The Darwin variant was probably the soil excavated for the borrow pit (see below and Figure 3). |
| NA | Borrow pit | NA | NA | NA | Parent material is assumed to be identical to that of the Darwin silty clay variant. | Southern 30 acres of the site (see Figure 3). |

# some phases of this soil are not frequently flooded for long durations

| **FIELD DATA** | | |
|---|---|---|
| Is site partially non-wetland? | Yes | The southern ¼ of the site probably meets the criteria for wetland status. The northern ¾'s is higher, and is used for agriculture. |
| **Hydric soil(s)** | | |
| mapped on the site? | Yes | The site is composed solely of Darwin silty clay and its variant, both of which are state and county-listed hydric soils. |
| present where wetlands do not occur? | Yes | Approximately half of the site is used for agriculture (north half), planted with winter wheat at the time of the site visit. |
| wetland hydrology altered? | Yes | Primarily via the ditch system running through and along the eastern perimeter of the site. |
| **Hydrologic Alterations Observed** | | |
| levees | Yes | The Prairie du Pont Creek has very large levees. This is due to its proximity to the Mississippi River and the threat of back flooding. |
| drainage tile | ? | None observed during the site visit. The clayey texture and hence low permeability of the soil dictate that surface drainage systems be employed. |
| drainage ditches | Yes | A large (~ 8-10ft wide) ditch drains the field north of the site and the northern portion of the site itself. This ditch has been in existence since at least 1934. An extensive network of drainage ditches surround the proposed site, all of which coalesce near its southern tip on the east side of the railroad tracks in Blue Water Ditch. When levels in the ditch reach a certain level, water is then released through a gravity drain in the levee and into the Prairie du Pont Creek (see Figure 3). |

| **FIELD DATA** | | |
|---|---|---|
| **Hydrologic Alterations Observed (continued)** | | |
| pumps | Yes | There is a pumping station further east of the gravity drain in Blue Water Ditch (see Figure 1). |
| drains | Yes | MOPAC gravity drain (see Figure 1). |
| elevated roadbeds | Yes | The roadbed of IL 3 is elevated as are the railroad tracks. |
| culverts | Yes | A number of culverts exist where the ditches cross IL 3, the railroad tracks, and farm access roads (see Figure 3.) |
| grading / filling | Yes | Some tree cutting and small-scale earth moving was on the access road running along the eastern perimeter of the site adjacent to the ditch. Earth moving may not have been deliberate and simply be soil disturbed by heavy machinery. |
| incised river or creek | Yes | The drainage pathway leading from the mapped wetland towards the southern confluence area is incised about 1-2 ft below land surface. Although dry at the time of the site visit, this pathway is likely a two-way conduit through which the wetland floods and then drains. When the site is flooded behind the gravity drain, its sudden opening likely results in high velocity flow through the channel, hence maintaining a steep profile. |
| excavation | Yes | The southern 50% of the site was excavated in the past, sometime between 1954 and 1962, likely to provide materials for the IL 3 bridge approach just south of the site. The clayey texture of the soil may have also been desirable for landfill capping. |

| **FIELD DATA** | | |
|---|---|---|
| **Hydrologic Indicators Observed** | | |
| *Primary Indicators* (USACE 1987) | | |
| inundated | Yes? | Not observed on-site during the first site visit (03/16/00), but the field north of the site and possibly some localized areas of the site were inundated after the 5/7/00 rainfall event. Some standing water was observed in the ditches during all site visits |
| saturated in upper 12 inches | No | Only in the vicinity of the ditches and perhaps in response to the 5/7/00 rainfall event. |
| water marks | Yes | Water marks were visible on the trunks of trees in the mapped wetland, ~12 inches (0.30 m) above ground surface (see Photo 4). |
| drift lines | Yes | In ditch along eastern perimeter, ~3 to 4 ft (0.9 to 1.2 m) above the channel bottom. |
| sediment deposits | ? | Sediment deposits were noted off site in response to the 5/7/00 rainfall event. Stage in Prairie du Pont Creek rose to a level at which the culverts leading from the gravity drain would have been completely submerged. No obvious deposits in the mapped wetland. |
| drainage patterns | Yes | Rill and gully drainage was noted in the northeast corner of the site (see Figure 3), where runoff from the northern fields flows into the main ditch along the eastern perimeter. |
| *Secondary Indicators* (USACE 1987) | | |
| oxidized root channels in upper 12 inches | No | Not observed in soil boring. |
| water-stained leaves | No | Not observed. |

| **FIELD DATA** | | |
|---|---|---|
| *Secondary Indicators* (USACE 1987, continued) | | |
| local Soil Survey data | Yes | The entire site is mapped as having hydric soils. |
| other (describe) | Yes | A number of tree throws were observed and it was clear that the trees had developed a very shallow rooting system. Although this may be a morphological characteristic of the specific tree species, it may also be a response to high ground-water levels of the permeability of the soil.<br><br>Mottled soil - a hydric soil indicator - occurred below 10 inches (25 cm) in boring B1. |

## FIELD DATA

### Present Hydrogeologic Conditions

*Geology*

The proposed site lies in the American Bottoms some two and a quarter miles from the Mississippi River. Situated on the south bank of a former river meander, the site is underlain by Cahokia Alluvium (of thickness greater than 6 m or 19.7 ft, Berg and Kempton, 1988), the type section of which is two miles southwest of Cahokia (USDA, 1978). Under the Cahokia Alluvium, Henry Formation sands and gravels persist to bedrock, which is between 100 and 200 feet below surface (Piskin and Bergstrom, 1975).

The soil boring B1 was completed using a hand auger. It was located in the east-central area of the site on the upper tier (above the borrow pit) at an elevation only ~30 inches (76 cm) higher that the northern limit of the cattails (see Figure 3).

**Boring B1**

| | |
|---|---|
| 0-16 inches (0-41 cm) | Soft, very dark gray (10YR 3/1) clayey silt (0/TR/85/15), structureless with some live roots. Dark yellowish brown mottles of diameter less than 1 mm (0.04 in) occur below 10 inches and account for up to 15% of whole. |
| 16-32 inches (41-81 cm) | Soft to medium stiff, gray (2.5YR 5/1) clayey silt, massive with disseminated mottles, generally less than 1 mm (0.04 in) in diameter accounting for up to 40% of whole. Mottles are poorly defined and coalesce. Occasional gray, clay rich zones. Calcium carbonate nodules of diameter up to 2 mm (0.08 in) occur at 27 inches (68 cm), and appear to follow the path of old roots. $CaCO_3$ nodules no longer present below 35 inches (0.89 cm). Occasional Fe/Mn nodule up to 2-3 mm (0.08-0.12 in) in diameter, more frequent just above the $CaCO_3$ zone. |
| 32-43 inches (81-109 cm) | Stiff, black (10YR 2/1) clayey silt with old oxidized root channels and some new roots. Some yellowish red (5YR 4/6) mottles, less than 10% of whole. Some Fe/Mn nodules less that 1 mm (0.04 in) in diameter. |
| 43-54 inches (109-137 cm) | Stiff to medium stiff, gray (2.5Y 5/1) clayey silt. Red (2.5YR 4/6) mottles increase dramatically at 43 inches (109 cm) and are distinct, round, up to 2 mm (0.08 in). |
| 54-72 inches (137-183 cm) | Soft to medium-stiff, gray (10YR 5/1 or 2.5YR 5/1) clayey silt, grading to a grayish-brown (2.5YR 5/2) slightly clayey silt (0/TR/95/5) between 60 and 70 inches (152 and 178 cm). Dark yellowish brown (10YR 4/6) mottles represent up to 40% of whole. Discrete mottles have a maximum diameter of 1.5 mm (0.06 in), otherwise they are well disseminated and indistinct, imparting a orange-gray cast to the soil. Woody fibers occur in the silt-rich zone as do some slick clay skins. Roots and large root traces evident. |

| **FIELD DATA** | |
|---|---|
| *Surface water* | |
| sources | |
| rivers | No rivers provide a source of water for the site. It is protected from Mississippi River flood waters by a levee west of Cahokia and that along the Prairie du Pont Creek. However, high water levels in the Mississippi will translate up the Prairie du Pont Creek. If levels in the Creek are higher than those in Blue Water Ditch (see Figure 3), the gravity drains will likely not be opened. Hence, water levels in the ditch system and subsequently on site are directly affected by the stage of the Mississippi River. |
| creeks | As indicated above, the Prairie du Pont Creek does not directly provide water to the site, but its stage will dictate whether or not the gravity drains can be opened to discharge water building up in Blue Water Ditch. |
| overland flow from uplands | Some water from the northern farm field likely does flow down-gradient into the borrow pit. |
| direct precipitation | Total annual precipitation averages 38.14" at Belleville SIU Research Station for the period 1961-1990 (see Appendix A) |
| runoff | The ditch system provides a source of water solely when conditions are such that the gravity drain draining Blue Water Ditch into Prairie du Pont Creek is closed and runoff is enough to back water up onto the site. This has occurred on numerous occasions in the past, as indicated in an interview with an adjacent landowner and USACE personnel. Otherwise, the extensive ditch system is such that it may actually draw down the ground-water levels immediately surrounding them. |
| inputs | |
| ● Direct precipitation and occasional back flooding after extreme rainfall events and/or high stage in the Mississippi River. | |
| outputs | |
| ● The site drains to the south into Blue Water Ditch and subsequently Prairie du Pont Creek. Some infiltration may occur, but soil texture is such that surface-water ponding is more likely. | |

| **FIELD DATA** | |
|---|---|
| *Ground water* | |
| likely direction of unconfined flow | Ground-water flow is likely to the west or southwest towards the Mississippi River or south towards Prairie du Pont Creek. |
| major aquifers | Henry Formation sands and gravels is the likely aquifer. Shallow, water-bearing sand lenses may occur in the Cahokia Alluvium. |
| major aquitards | The surface layer may contain enough clay in certain areas to act as an aquitard. |
| depth to saturated sediments | Not obtained in boring B1. |
| depth to water in borehole | Not obtained in boring B1. |
| discharge evident | No ground-water discharge observed. |
| confined aquifer evident | Not observed. |
| perched water-table evident | Not observed. |

**FIELD DATA**

**Elevation surveying (all figures are approximations)**

- Near the southern limit of the site, the mapped wetland appears to be only 1.5 to 3 ft (0.5 to 0.9 m) above the channel of the ditch running along the eastern perimeter of the site. Otherwise, the ditch is ~6 to 7 feet (1.8 to 2.1 m) below the unexcavated ground surface.
- The upper, northern, farmed portion of the site appears to be ~3-4 feet (0.9 to 1.2 m) above the area where the cattails first occur in the borrow pit area. The soil boring B1 was completed on the upper tier at an elevation only ~30 inches (76 cm) higher that the northern limit of the cattails.

**Likely water source(s) that supported past wetland hydrology**

Soil texture is conducive to surface-water ponding, so precipitation would have been an appreciable source of water before the area was drained. Mississippi River flood waters probably entered the site before the levee system was constructed.

**Reference Wetland(s)**

| | | |
|---|---|---|
| mapped by NWI on the site ? | Yes | An area of PEMC was mapped in the borrow pit area. |
| mapped by INHS on the site ? | ? | Undetermined. |
| present on the site ? | Yes? | The southern quarter of the site, dominated by cattails, silver maple, poplar and willow trees, probably qualifies as wetland. |
| present near or adjacent to the site ? | Yes | NWI-mapped wetlands exist south of the site, primarily associated with the drainage ditches. A large PFO1A area was mapped east of the site along Blue Water Ditch in what is now a golf course. The area between the levee and the large drainage west-east flowing ditch west of IL 3 is mapped as PEM/SS1A. |

**FIELD DATA**

**Apparent water source(s) supplying current wetlands on the site**

The site slopes to the south and is bounded on the west by IL 3, on the east by railroad tracks, and at the south by the Prairie du Pont levee. Occasional flooding caused by the low relative elevation of the wetland and its location near the confluence of five separate drainage ditches is the primary source of water for the site. The proximity of the Mississippi River may promote high ground-water levels, but the soil texture on site is such that precipitation and runoff play a more important role.

**Differences between wetland and non-wetland areas of site**

Elevation and possibly soil texture because of the excavated surface layer.

**Possible alterations to produce wetland hydrology on the site**

Some of the very shallow ditches draining the farmed fields into the main ditch could be filled and any tile could be removed. The main drainage ditch running through the north half of the site and along its eastern perimeter has been present since before 1934, when the surrounding area was used for agriculture alone. Historical topographic maps indicate that the site of the current residential area and the southern portion of the proposed site were marshy areas. This suggests the ditch was used to de-water the site for agriculture. However, it is highly unlikely that this ditch can be modified in any way as it now provides an discharge pathway for residential runoff. Based on a conversation with an adjacent homeowner, the ditch system actually needs to be better maintained and perhaps retrenched rather than stopped-up in any way.

**Recommendations to consider before site selection and possible detrimental effects of the proposed alterations:**

As runoff generating from residential areas represents a considerable source of water for the site, the quality of this water should be of some concern. Furthermore, the decision to open and close the gravity drains in the Prairie du Pont Creek levee is made in response to conditions in the Creek and Mississippi River, not only those in Blue Water Ditch. If the Mississippi is high for a long period of time, it is assumed the gravity drains will remain closed so as not to flood the area behind the levee. At this point, it is assumed the Blue Waters Pumping Station will start discharging water into Prairie du Pont Creek. If not, high stage in Blue Waters Ditch may lead to the proposed site flooding.

The history of the borrow pit should be ascertained before acquisition occurs to be sure no hazardous materials were dumped there.

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**AERIAL PHOTOGRAPHS**

National Aerial Photography Program
1998, April 2; 45-467

Markhurd Corporation
1993; aerial photographs, Line 45, IL465-468; Line 46, IL465-468
1988; aerial photographs, Line 45, IL465-468; Line 46, IL465-468

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1973; aerial photographs, Line 173, 143-144
1962; aerial photographs, Line SK-3CC, 40, 41, 198, 199
1940; aerial photographs, Line SK-10A, 51-52

## Appendix A Precipitation Data

**Table A1** Total monthly precipitation readings (in inches) for 1998, 1999, the 30-year average for the period between 1961 and 1990, and the 30% above and below normal thresholds at the National Weather Service's Weather Service Office at the Belleville SIU Research Center (Midwestern Climate Information System Station 110510) (Midwestern Climate Information Center 2000 and National Water and Climate Center 2000).

| Month | 1998 | 1999 | 30% probability above normal* | normal 1961–1990 | 30% probability below normal** |
|---|---|---|---|---|---|
| January | 2.21 | 4.83 | 2.27 | 1.86 | 0.87 |
| February | 2.40 | 4.18 | 2.65 | 2.18 | 1.30 |
| March | 5.93 | 2.56 | 4.13 | 3.51 | 2.57 |
| April | 4.41 | 3.40 | 4.02 | 3.39 | 2.37 |
| May | 3.87 | 3.84 | 4.84 | 4.04 | 2.69 |
| June | 7.45 | 5.42 | 4.44 | 3.72 | 2.56 |
| July | 4.18 | 0.99 | 4.18 | 3.45 | 2.05 |
| August | 3.10 | 1.94 | 4.09 | 3.37 | 2.02 |
| September | 0.85 | 0.88 | 3.96 | 3.25 | 1.85 |
| October | 2.09 | 1.79 | 3.41 | 2.80 | 1.64 |
| November | 3.24 | 0.74 | 4.20 | 3.44 | 1.73 |
| December | 1.32 | 2.08 | 3.79 | 3.10 | 1.65 |
| Total Annual | 41.05 | 32.65 | 41.42 | 38.14 | 34.24 |

* 30% chance precipitation amounts will be greater than or equal to the value shown
** 30% chance precipitation amounts will be less than or equal to the value shown

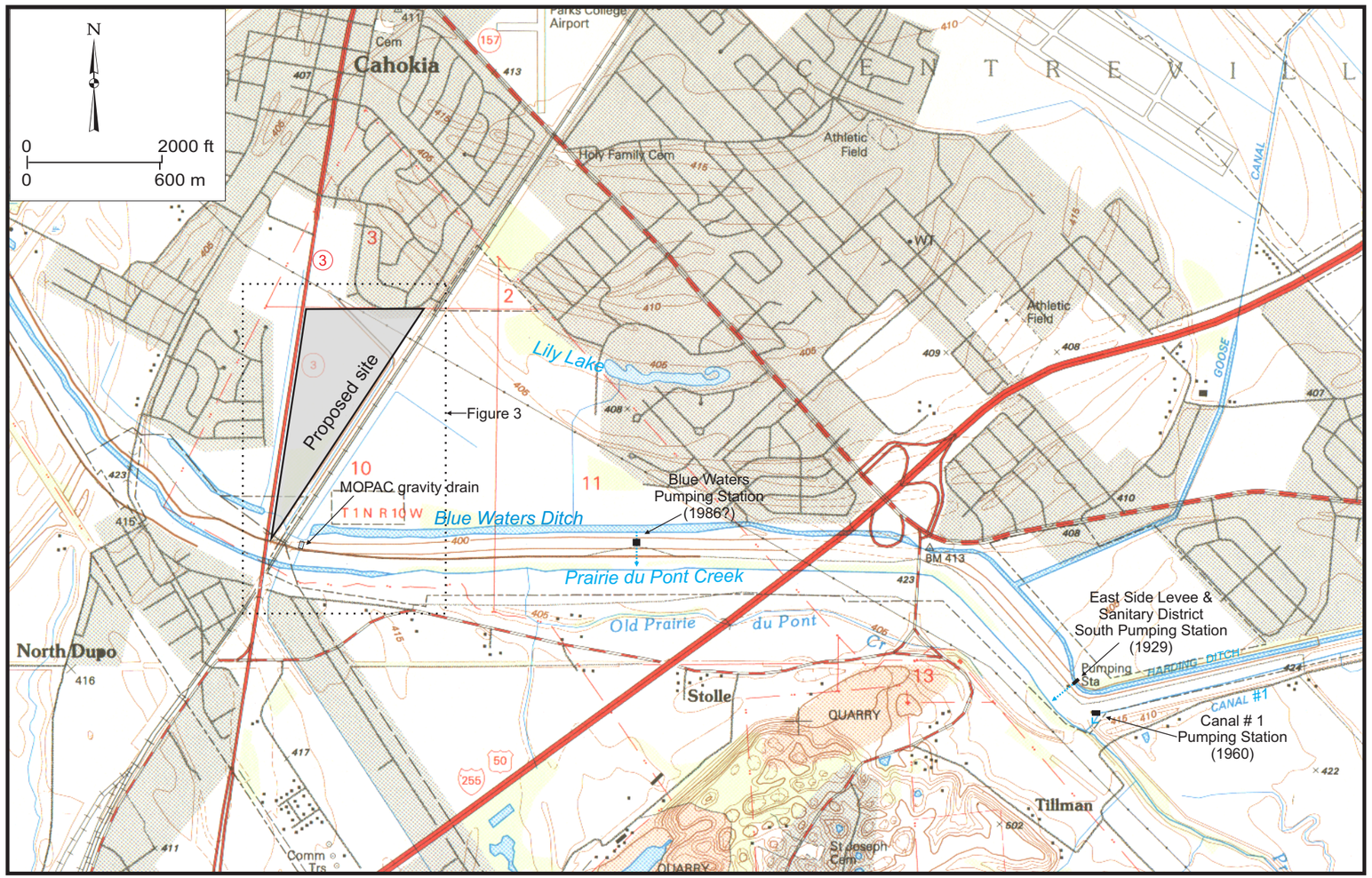


**Figure 1.** Map depicting the proposed wetland compensation site on the USGS topographic map of the area. The site is shaded gray. The residential area north of the site lies upon what is probably the south limb of an old oxbow. Arcuate and closed contours delineate the former course of the river. Lily Lake lies in one of these depressions east of the site. Three pumping stations and one gravity drain are depicted. The MOPAC gravity drain and Blue Waters Pumping Station discharge water from Blue Waters Ditch. The South Pumping Station relieves water from Harding Ditch. The Canal #1 Pumping Station serves Canal #1 (This map is based on 1993 USGS 7.5 Minute Topographic map of the area and field reconnaissance. The size and location of the pumping stations are considered approximate).

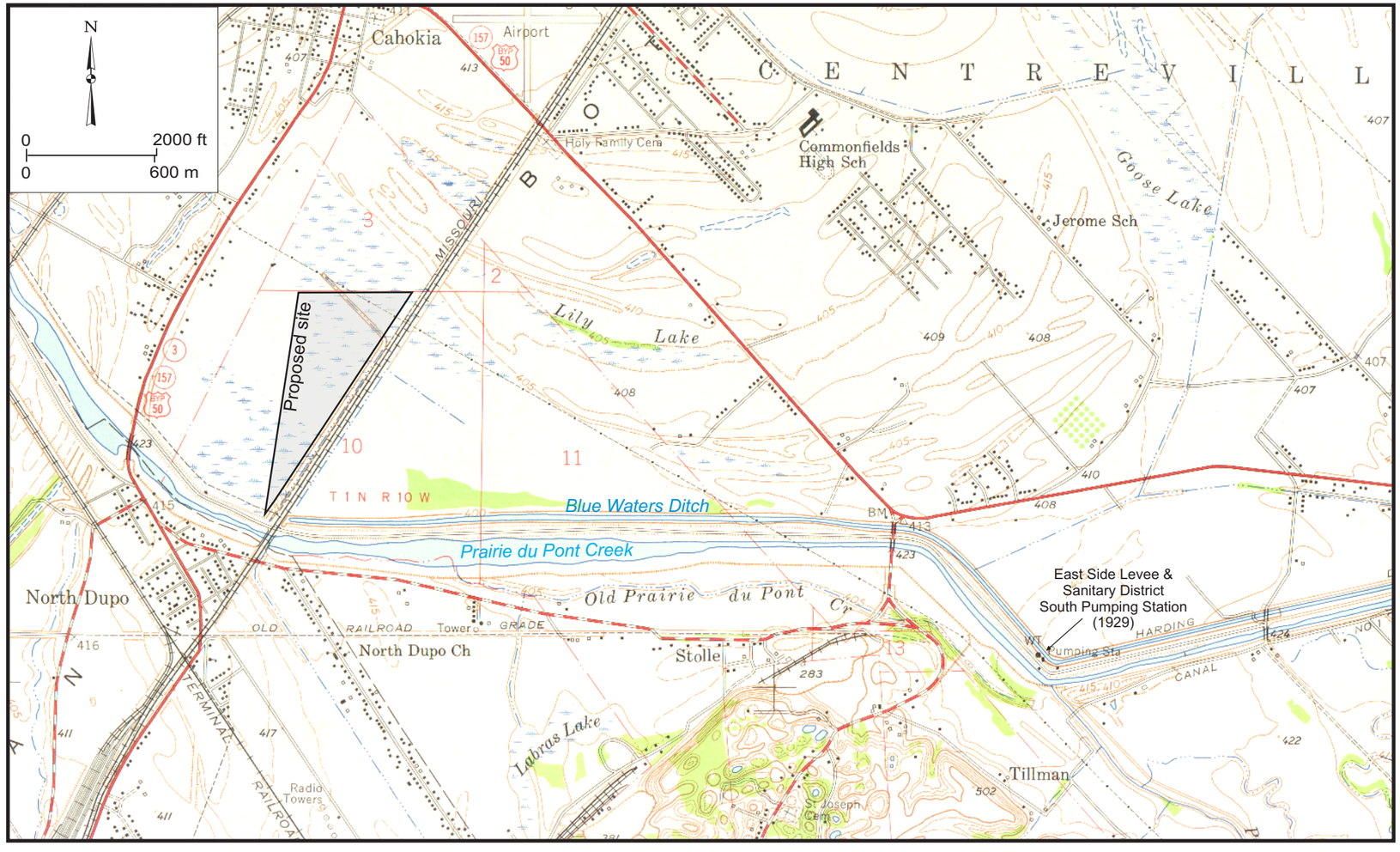


**Figure 2.** Map depicting the proposed wetland compensation site on the 1954 USGS topographic map of the area. The site is shaded gray. Note that most of the proposed site is considered marshland. The former location of Goose Lake is visible on this map, drainage from which represents a substantial input to Blue Waters Ditch (USGS, 1954).

**Figure 3.** Detailed map of the proposed wetland compensation site showing the major drainage ditches in the area, the approximate extent of the on-site NWI-mapped wetland, and the location of a hand-auger boring (B1). Runoff from five ditches converges at one point south of the proposed site and is discharged into the Prairie du Pont Creek only if the gate valve is open (based on NAPP aerial photograph 98 45-467 taken 4/2/98, NWI wetland from USFWS, 1988)

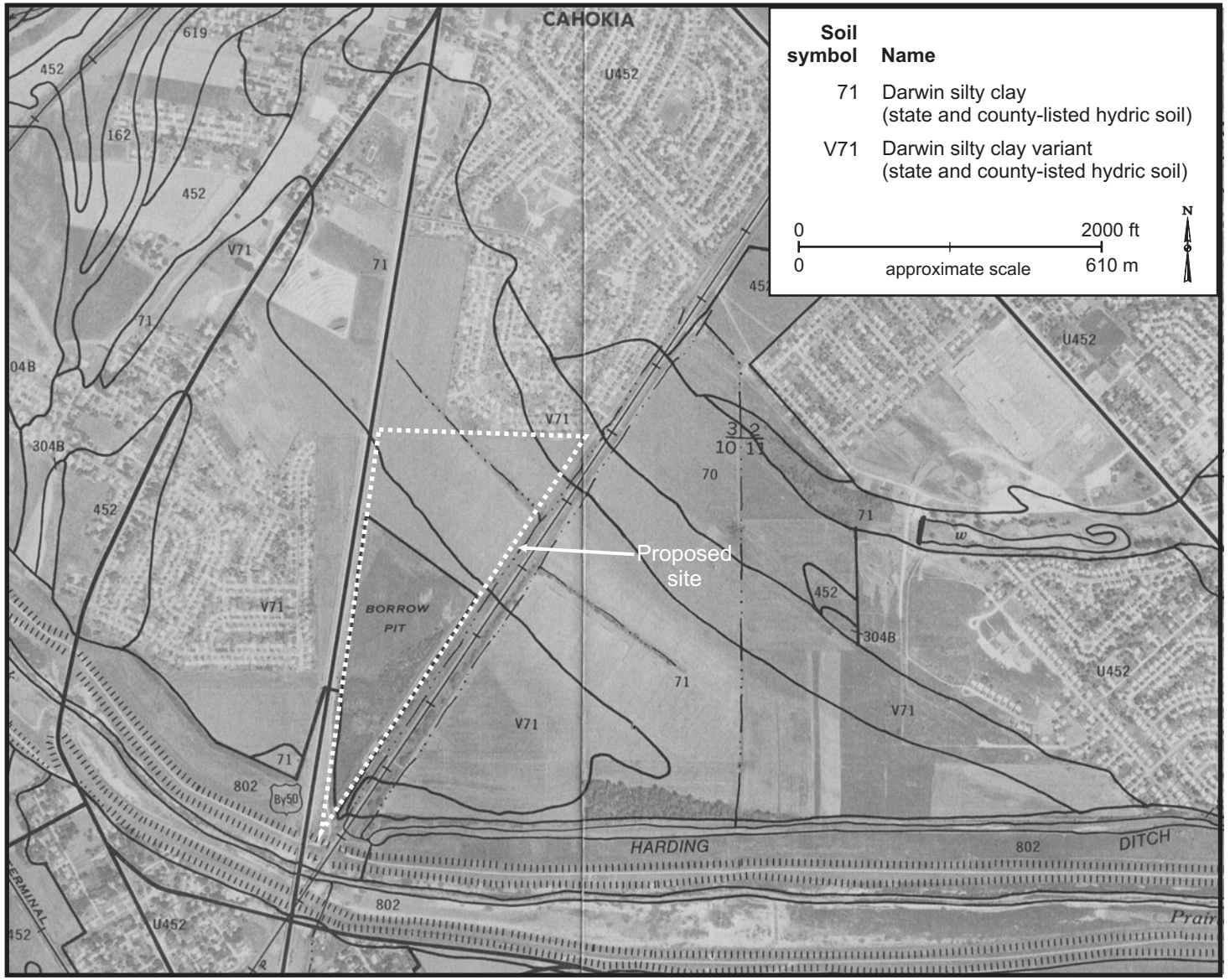


**Figure 4.** Map of soil types occurring within the proposed wetland compensation site and vicinity. Note that Blue Waters Ditch is labeled as Harding Ditch. This is because this map predates the Blue Waters Pumping Station, constructed in the late 1980's (modified from USDA, 1978).

Photo 1

Photo 2

**Photos 1 and 2.** Photo 1 shows the site looking south from just above the break in slope to the borrow pit. Illinois highway 3 is visible on the right. Photo 2 was taken from the eastern perimeter of the site looking southwest along the northern boundary of the forested wetland. Cattails are visible up-gradient of the trees and winter wheat is visible in the foreground. See Figure 3 for photo locations and orientation.

Photo 3

Photo 4

**Photos 3 and 4.** Photo 3 was taken inside the NWI-mapped wetland area mapped. Sedges and cattails were observed under the forest canopy. Recent tree throws and a number of dead trees were noted in this area, possibly a result of excessive moisture conditions. Photo 4 depicts an area that was recently ponded and water marks up to one foot above ground surface are visible on the tree trunks. Again, cattails are visible along the forest edge. See Figure 3 for photo location and orientation.

Photo 5

Photo 6

**Photos 5 and 6.** Photo 5 shows the channel through which water draining through the forested wetland leaves the site. This channel is incised 1.5 to 2 feet below the surrounding ground surface. Photo 6 shows the west terminus of Blue Waters Ditch and the intake to the gravity drain. The culvert under the Missouri-Pacifi tracks is visible in the background. See Figure 3 for photo locations and orientation.

**Photos 7.** Photo 7 shows water ponded on the farm field north of the site on May 8th, 2000 after heavy rains fell in the Metro East area the preceding day. Like the proposed wetland compensation site, this area is mapped as Darwin silty clay. This soil type requires proper drainage to be farmed successfully (USDA, 1978). See Figure 3 for photo location and orientation.