# APPENDIX G REPORT OF WETLANDS DELINEATION

**ASSOCIATED ELECTRIC COOPERATIVE, INC.**

# PRELIMINARY JURISDICTIONAL WETLANDS DETERMINATION

## Norborne, Missouri

*Prepared for*

Associated Electric Cooperative Inc

September 8, 2006

URS Corporation
1001 Highlands Plaza Drive West
Saint Louis, MO 63110
(314) 429-0100
Project # 21561720.00200

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Associated Electric Cooperative Inc

# PRELIMINARY JURISDICTIONAL WETLAND DETERMINATION SITE SUMMARY FORM

## PROJECT PROPONENT

Name: Associated Electric Cooperative, Inc
Address: PO Box 754
Springfield, Missouri
65801
Telephone: (417) 885-9227

## PJD CONSULTANT

Name: URS Corporation

Address: 1001 Highlands Plaza Drive West, Suite 300
Saint Louis, Missouri 63110
Telephone: (314) 429-0100
(314) 429-0462 fax

## LOCATION

County: Carroll
State: Missouri
Section: 8, 16, 17, 18, 19, 20, 21, 29, 30
Range: 25W
Township: 52N
Water: Missouri River
River Mile: 310

General Directions: From Interstate 70, take the Interstate 65 North exit. From I-65 North, turn on Missouri Highway 24 North. From Highway 24 North, turn on Missouri Highway 10 West. Turn right on County Road D at Norborne, Missouri. Continue on County Road DD when County Roads D and DD meet. The site property is at the intersection of County Roads DD and JJ.

County Map Attached? ___ Yes _X_ No
Location Map Attached? _X_ Yes ___ No

## NATURAL RESOURCE CONSERVATION SERVICE CONSULTATION

| | | |
|---|---|---|
| NRCS Wetland Inventory Available? | ___ Yes | _X_ No |
| Inventory Map Attached? | ___ Yes | _X_ No |
| NRCS CPA 026 Attached? | ___ Yes | _X_ No |
| NRCS CPA 038 Attached? | ___ Yes | _X_ No |
| Crop History Attached? | ___ Yes | _X_ No |
| NRCS Designation? | _X_ Yes | ___ No |

Notes:

# PRELIMINARY JURISDICTIONAL WETLAND DETERMINATION SITE SUMMARY FORM

## COUNTY SOIL SURVEY

Published Survey Available? _X_ Yes ___ No
Map and Legend Attached? _X_ Yes ___ No
Soil Mapping Unit(s) in Delineation Area:

| Symbol | Name |
|---|---|
| 10041 | Knox silt loam, 14-20% slopes |
| 10055 | Knox silt loam, 5-9% slopes |
| 10063 | Knox silty clay loam, 9-14% slopes |
| 13507 | Bremer silty clay |
| 13598 | Booker silty clay |
| 36023 | Landes fine sandy loam |
| 36046 | Wabash silty clay |
| 66007 | Leta silty clay |

## U. S. GEOLOGICAL SURVEY (USGS) TOPOGRAPHIC MAPPING

Map Name: Norborne, Missouri – 7.5 Minute Quadrangle
Copy Attached? _X_ Yes ___ No

## NATIONAL WETLANDS INVENTORY (NWI) MAPPING

NWI Map Available? _X_ Yes ___ No
Copy Attached? _X_ Yes ___ No

NWI Designations in Delineation Area:

| Symbol | Classification |
|---|---|
| PEMAd | Palustrine, Emergent, Temporarily Flooded, Partially Drained/Ditched |
| PEMC | Palustrine, Emergent, Seasonally Flooded |
| PEMCd | Palustrine, Emergent, Seasonally-Flooded, Partially Drained/Ditched |
| PEMCx | Palustrine, Emergent, Seasonally Flooded, Excavated |
| PUBFx | Palustrine, Unconsolidated Bottom, Semipermanently Flooded, Excavated |

## PRELIMINARY JURISDICTIONAL WETLAND DETERMINATION SITE SUMMARY FORM

### FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) NATIONAL FLOOD INSURANCE RATE MAPPING (FIRM)

Map Available? _X_ Yes ___ No
Copy Attached? _X_ Yes ___ No

### AERIAL AND GROUND PHOTOGRAPHY

USDA FSA Aerial Photographs – 2003 and 2004 (included in Appendix D)
Site Photographs (included in Appendix C)

### OTHER PRIMARY SOURCES OF INFORMATION

USGS National Water Information System: Web Interface
USGS 06895500 Missouri River at Waverly, Missouri, 1996-2005 gage data

# EXECUTIVE SUMMARY

Associated Electric Cooperative, Inc. (AECI) is proposing to develop a new coal-fired generation unit in Carroll County, Missouri. The subject property is located near the town of Norborne, Missouri. The construction of the generation unit is classified as a major federal action, since the United States Department of Agriculture/Rural Utility Service (USDA/RUS) has been asked to assist with financing for the project. This requires that the project be reviewed under the National Environmental Policy Act (NEPA). Planning for the Environmental Impact Statement (EIS), to be completed under the NEPA review, identified the need for a wetland delineation in the area of the proposed plant structures, including the access roads, water line, discharge line and substations. The EIS planning additionally identified the need for review of available data to identify potential wetlands in three proposed routing corridors which will connect the proposed new generation unit to one of two existing rail lines.

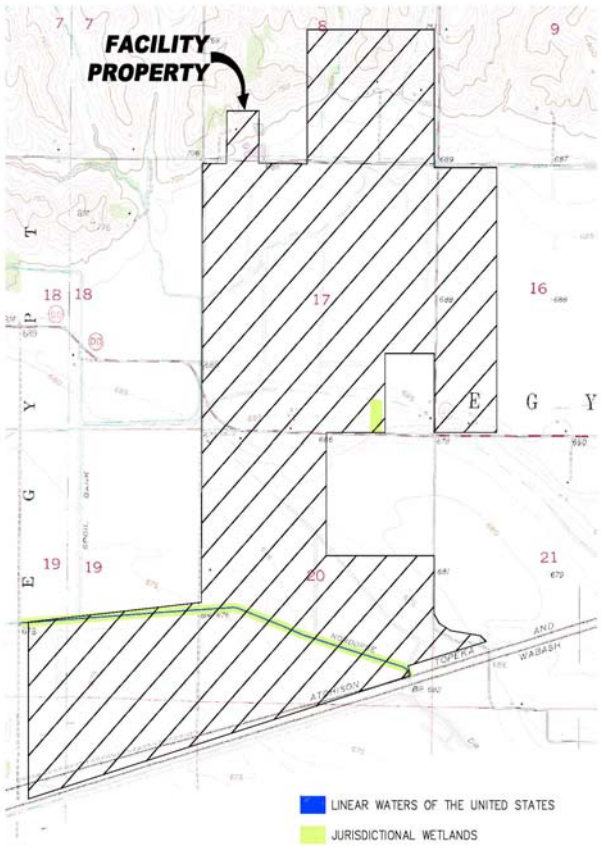
The scope of work for the subject Preliminary Jurisdictional Wetland Determination is to identify the jurisdictional wetlands and Waters of the United States that may exist within the facility property. In addition to the delineation completed for the facility property, available documented information was reviewed for the areas within the proposed routing corridors. A drive-by survey was also conducted for the routing corridors.

URS Corporation found from its review of available documented information and field conditions that there are 3.5 acres of Waters of the United States, including 2.9 acres of jurisdictional wetlands within the facility property.

**Figure ES-1**, provided below, presents the locations of the identified Waters of the United States, including the jurisdictional wetlands. Of the three proposed routing corridors, Alternative Corridor #1 appears to contain the

# EXECUTIVE SUMMARY

least amount of forested wetland, although it lies within the Missouri River floodplain. Alternative Corridors #2 and #3 each contain significant portions of major area major area tributaries. These tributaries are wooded and have associated floodplains.




**ES-1: Facility Site Delineation Results**

# SECTION ONE Background

Associated Electric Cooperative Inc. (AECI) is proposing to develop a new 660 megawatt baseload coal-fired generation unit at the site of the subject preliminary jurisdictional wetland determination. The subject property is located near the town of Norborne, in northwest Missouri. The constructed generation unit would require direct access to two nearby, existing rail lines. Three alternative rail corridors have been identified for the Norborne site, two to the rail line to the north of the site and one to the rail line to the south of the site.

AECI's proposed construction of the Norborne facility is classified as a major federal action, given that AECI has applied for project financing through USDA/RUS. The project, thus, necessitates review under the National Environmental Policy Act (NEPA). The planning for the EIS identified the need for a wetland delineation in the area of the proposed plant structures, including the access roads, water line, discharge line and substations. Additionally, the EIS planning identified the need for review of available data to identify potential wetlands in the proposed rail corridors.

This report presents the findings of the preliminary jurisdictional wetland determination conducted for the proposed Norborne generation unit. Both a review of available documented information and a drive-by survey were conducted for the three alternative rail corridors. Findings for the rail corridors are also presented in this report. This report addresses both jurisdictional wetlands and Waters of the United States that may exist in the area anticipated as a part of the development effort. The property currently owned by AECI and intended for development of the generation unit is herein referred to as the facility property. The proposed rail corridors are herein referred to as the corridor alternatives.

# SECTION ONE Background

## 1.1 PROJECT LOCATION

The site is located northwest of Norborne, Missouri in Carroll County, Missouri. The facility property measures approximately 1,500 acres in size. It consists primarily of farmed corn and soybean fields. Several drainage ditches traverse the farmed fields. The areas through which the corridor alternatives have been proposed consists of farmed corn and soybean fields, pasture and fallow field. Numerous farm ponds dot the landscape within the areas of the proposed corridor alternatives. Wakenda Creek and the Wakenda Creek West Fork also traverse a significant portion of two of the corridor alternatives. The Missouri River lies approximately six miles south of the facility property. **Figure 1** is a site vicinity map, which depicts the site relative to the community of Norborne and the Missouri River.

## 1.2 PROJECT DESCRIPTION

The major components of the new 660 megawatt baseload coal-fired generation unit will include a pulverized coal-fired boiler, steam turbine generator, cooling tower, emission control equipment and stack. Coal will be delivered to the plant via rail. A rotary railcar dumper will unload the coal, where it will then be conveyed to either a coal yard for storage or directly to the power block area. A waste fly ash pond will also be constructed within the facility property.

A rail study was done to evaluate the various options for rail access to the site. As mentioned above, three alternative routing corridors have been proposed to connect the facility property to the three nearby rail lines. Both Norfolk Southern (NS) and Burlington Northern Santa Fe (BNSF) railroads have lines that run along the southern boundary of the facility property. An additional BNSF railroad line runs approximately 6.8 to 7.2 miles north of the facility property. Corridor Alternative #1, which lies almost entirely on property owned by AECI, would link the facility property to the NS or BNSF rail lines to the south. This connection measures approximately 2.5 miles in

length, and includes the area directly south of the facility property. Corridor Alternatives #2 and #3 would link the facility property to the BNSF rail line to the north. Corridor Alternative #2 is known as the "East Connection", and Corridor Alternative #3 is known as the west connection. Corridor Alternative #2 measures approximately 6.8 miles in length. A significant portion of Wakenda Creek lies within Corridor Alternative #2. This corridor would meet the BNSF rail line just south of where the rail line intersects Wakenda Creek. Corridor Alternative #3 measures approximately 7.2 miles in length. A significant portion of the Wakenda Creek West Fork lies within Corridor Alternative #3. Corridor Alternative #3 would meet the BNSF rail line at a location south of Corridor Alternative #2. Corridor Alternative #3 extends from Carroll County, Missouri into Ray County, Missouri. Each of the three corridor alternatives measures one mile wide. The exact location of the rail line within the corridor will be determined based on consideration of engineering and environmental factors.

## 1.3 PROJECT PURPOSE

### General Purpose

The goal of this project is to identify jurisdictional wetlands or Waters of the United States existing within the project area associated with development of the AECI Norborne facility in Carroll County, Missouri.

### The Preliminary Jurisdictional Wetland Determination

The purpose of this Preliminary Jurisdictional Wetland Determination is to:

1. Determine if any "Jurisdictional Wetlands" exist on any portion of the project site, and
2. Locate any preliminarily determined wetlands and their boundaries, when identified.

# SECTION TWO Methodology

## 2.1 AREAS UNDER CORPS OF ENGINEERS JURISDICTION

Routinely, the process of conducting a wetlands investigation and determination involves gathering preliminary information and conducting a field investigation to identify the presence of wetlands subject to U.S. Army Corps of Engineers jurisdiction. The process begins by utilizing existing government agency information and data from other sources to identify potentially significant areas. This information is then compiled and used to screen the project area via visual reconnaissance.

A visual reconnaissance was performed throughout the entire project area to highlight: a) the various wetland delineation methods to be employed, b) potential wetland areas and c) potential non-wetland areas. This first step identified problematic areas, as well as indicated appropriate strategies to be utilized in these areas under the different mapping protocols outlined in the U.S. Army Corps of Engineers (COE) *1987 Wetland Delineation Manual* (1987 Manual).

## 2.2 FIELD WORK FOR WETLAND DETERMINATION

Potential wetlands were field examined throughout the approximately 1,500 acre area which comprises the facility property. Fieldwork utilized the wetland mapping and identification protocols of the U.S. Army Corps of Engineers in all areas.

The online version of the COE Wetlands Delineation Manual, January 1987 (Technical Report Y-87-1), as well as COE Regulatory Guidance Letters and Memoranda were utilized for the study area. Despite the large size of the facility property, the character and distribution of potential wetlands within the investigated area suggested that the Routine Method for areas less than five acres in size was the most appropriate. This method is based on the size of potential wetlands found on site, rather than the size of the property.

The "Plot Type" survey was utilized to examine the area immediately adjacent to creeks and drainage ditches. In this method, two to three data points were evaluated at each plot location, with at least one point inside the potential wetland boundary and one outside the potential wetland boundary. For each examined point, a soil probe was advanced to a targeted depth of 16 inches below ground surface (bgs), and soils were logged for texture, color, depth, hydric soil indicators and any other taxonomic characteristics deemed important for that point. The COE 1987 Manual makes accommodations for advancement of a probe rather than establishment of a soil pit when the soil profile is not comprised of loose or rocky material or does not contain a large volume of water. Vegetation was characterized for the area by dominance, stratum and wetland indicator status.

The COE 1987 Manual provided the principle guidelines for conducting the fieldwork for the delineation. The COE 1987 Manual, as well as other field references, were used to review the existing field condition information, to determine the presence of wetland vegetation, soils and hydrology. A listing of references is contained in **Appendix A**, the completed field data forms are in **Appendix B**, photographic documentation of site conditions is included in **Appendix C** and historical aerial photographs (years 2003 and 2004) are included in **Appendix D**.

## 2.3 ATYPICAL SITUATIONS

An atypical situation may exist if positive indicators of hydrophytic vegetation, hydric soils and/or wetland hydrology could not be found due to effects of recent human activities or natural events. Activities and/or events include unauthorized activities, natural events and man-induced wetlands**.** Although one or more of the indicators may not exist, the area may be determined as a wetland by utilizing historic information from sources such as aerial photography, previous site inspections, adjacent vegetation, NRCS records, public interviews (individuals familiar with the area) and NWI maps.

Section F of the COE 1987 Manual governs treatment of atypical situations regarding wetlands.

Protocols in Section F of the COE 1987 Manual should not be used in circumstances where human activities were previously authorized or exempted from COE regulation. In these circumstances, the procedures presented for either the routine or comprehensive method must be followed. Concerning the area under investigation for this preliminary jurisdictional wetland determination, the entire 1,500-acre facility property has essentially been impacted by recent human activities (i.e., farming and its associated practices). Given that these activities are exempted from COE regulation, the investigated area was treated per the COE Routine Method guidelines.

## 2.4 REVIEW OF HYDROLOGY

Wetland hydrology criteria were reviewed by utilizing available topographic mapping, Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), on-site field indicators, available aerial photography and gage data for major nearby water bodies.

The wetlands field investigation for the 1,500-acre facility property was conducted on August 1 and 2, 2006. A drive-by visual survey of the corridor alternatives was conducted on August 3, 2006. At the time of the investigation, temperatures were high and precipitation was below normal for the season. The smaller drainage ditches within the investigated area were dry at the time of the investigation; however, the larger creeks and drainageways did carry some water. Weather conditions evident during the investigation are of little significance in making the determination because most evaluated parameters only develop over prolonged wet conditions and do not normally exist as a result of temporary conditions or fluctuations. With this in mind, this section discusses the site conditions as they were observed in the field and as they pertain to the parameters outlined in the COE 1987 Manual.

# SECTION TWO Methodology

The field investigators traversed the drainage ditches and creeks throughout the 1,500-acre facility property, in addition to the corridor immediately north of the BNSF railroad bounding the southern portion of the facility property. Utilizing observations of changes in vegetation and evidence of potential hydrology, the investigators established investigation plots for potential wetlands along the drainage ditches, creeks and railroad corridor. Plots 1, 2 and 3 were established on the north side of the south-bounding BNSF railroad. Plots 4, 5, 7 and 8 were established along the Norborne Drainage Ditch. Plot 6 was established at the convergence of three drainage ditches within a farmed field in the southwestern portion of the facility property. Plot 9 was established along a roadside drainage ditch, adjacent to County Road 300. Plots 10 and 11 were established along a drainage ditch within a farmed field in the north-central portion of the facility property. Information concerning the present vegetative species, nature of the soils and hydrology characteristics is presented in Section 3 of the report.

# SECTION THREE Discussion of Wetlands

In addition to examining the drainage ditches, creeks and a section of the railroad corridor, the field investigators visually examined approximately 60 acres comprising the northeastern portion of the facility property (Kevin Edgar property on **Figure 2**). This area appeared to be formerly farmed, and is presently fallow field. No potential wetlands were observed in the area. An unnamed creek traverses the landscape here. Field personnel walked the length of the creek. For the most part, the creek bed was very steep with little benching. When benching was observed, it was typically just upstream of felled trees that had partially dammed the creek, thus, causing water to backup in very high flow conditions. Given that some element of hydrology could be present in these benched areas, field personnel conducted a cursory review of vegetation, if any, and soils present at the benched areas. No wetland indicators were present (see Photos #17 and #18).

## 3.1 VEGETATION

The vegetation parameter was examined for existing vegetative cover types. The vegetative cover was evaluated based on established wetland vegetation criteria.

At each area or plot suspected of being a wetland, the dominant vegetative species was evaluated at four levels of strata (over-story or tree canopy; subcanopy or shrub layer; groundcover or herbaceous layer and vine) or at each level of vegetative strata present. More than fifty percent of the plant species in an area must be hydrophytic (e.g., plants having adaptations for growing in anaerobic conditions) in order for that area to meet the vegetative criteria for wetlands. The three types of hydrophytic plants identified in the COE 1987 Manual are obligate (OBL), facultative wetland (FACW) and facultative (FAC). Obligate wetland plants almost always (99%) naturally occur in wetlands. Facultative wetland plants usually (66%) occur in wetlands. Facultative plants have a similar likelihood of occurring in both wetlands and non-wetlands. Each of the plant species observed to exist in

the suspected wetland areas at the subject site was compared to the *National List of Plant Species That Occur in Wetlands: North Central (Region 3)* (USFWS, 1988), to determine its hydrophytic classification. According to the COE 1987 Manual, the hydrophytic vegetation wetland parameter may also be satisfied if the plants present display morphological, reproductive or physiological adaptations to wet environments, or if there is visual observation of plant species growing in areas of inundation or prolonged soil saturation. **Table 1** of this report lists the plant species identified on site, along with their respective wetland indicator status.

Identification of plants was somewhat difficult for this delineation effort because most of the observed species were not flowering. The timing of the field investigation occurred after the spring flowering event and too early for much of the summer flowering event. Thirty-six dominant plant species were identified in the established plots. **Figure 3** presents the locations of the potential wetland plots examined throughout the facility property.

The percent dominance values presented below are total dominance values (i.e., the percent total coverage for each plant species identified within the subject plot). Thus, to determine whether at least 50% of the present species were of hydrophytic character, per COE requirements, it was necessary to examine the species-specific dominance percentages in an additive manner. For example, a plot may have had only 60% of its surface vegetated (the total of the dominance percentages noted in this report). However, if 50% or more of that vegetation was determined to meet the criteria for wetland vegetation, then the plot met the same hydrophytic vegetation criteria set out by the COE 1987 Manual.

Determination of whether an individual plot met the hydrophytic criteria was subjective at times, as many of the identified vegetative species did not have an assigned wetland indicator in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*, and indicators from related, surrogate species were used.

**Potential Wetland Area 1 – Plots 1A, 1B and 1C**

Barley (*Hordeum vulgare*, 40%), *Ellisia* (*Ellisia nyctelea*, 15%), mullein (*Verbascum thapsus*, 15%), nipple-wort (*Lapsana communis*, 10%) and green foxtail (*Setaria viridis*, 10%) were identified in Plot 1A. All observed species are herbaceous. Barley, the most dominant of the present species, is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other plants of the *Hordeum* genus were listed, and their wetland indicators range from FAC to FAC+. *Ellisia* was the only other plant identified in Plot 1A with a wetland indicator status wetter than FAC. *Ellisia*'s indicator is FAC+, and its dominance was 15%. The remainder of the plants identified in Plot 1A are either not listed or have a wetland indicator status of FAC or drier: mullein (FACU-, 15%), nipple-wort (NL, 10%) and green foxtail (FAC to FACU+, 10%). Barley, the dominant species of Plot 1A, does not have a listed wetland indicator status and the wetland indicator statuses of its listed relatives are neutral to slightly wetter than neutral. *Ellisia*, the only species identified in Plot 1A with a wetland indicator wetter than neutral, occurred at a dominance of only 15%. Therefore, Plot 1A does not meet the hydrophytic criteria.

Nipple-wort (*Lapsana communis*, 60%), freshwater cordgrass (*Spartina pectinata*, 30%) and common milkweed (*Asclepias syriaca*, 5%) were identified in Plot 1B. All observed species are herbaceous. Nipple-wort, the most dominant plant species of Plot 1B, is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. Freshwater cordgrass, comprising 30% of the present plant species in Plot 1B, has a wetland indicator of FACW+. Common milkweed (5% dominance) is not listed; however, indicator statuses for other members of the *Asclepias* genus range from OBL to UPL. Plot 1B was established in a depressional area with a potential to accumulate water during rain and/or flooding events. Therefore, it is expected that at least some plant species adapted for wet environments would be present here (i.e., freshwater cordgrass). However,

Plot 1B is not dominated by hydrophytic vegetation, thus, this plot does not meet the hydrophytic criteria.

Wild oat (*Avena fatua*, 80%), fleabane (*Erigeron canadensis*, 10%) and barley (*Hordeum vulgare*, 5%) were identified in Plot 1C. All observed species are herbaceous. Wild oat, the most dominant plant species in Plot 1C, is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. Fleabane and barley also do not have listed wetland indicators. However, other species of the Erigeron and Hordeum genuses are listed. Their wetland indicators range from FACW to FACU and FACW- to FAC+, respectively. Given that the highly predominant species in Plot 1C is not listed, nor are any representatives of its genus, Plot 1C does not meet the hydrophytic criteria.

**Potential Wetland Area 2 – Plots 2A, 2B and 2C**

Nipple-wort (*Lapsana communis*, 50%), yellow nutsedge (*Cyperus esculentus*, 40%) and common milkweed (*Asclepias syriaca*, 5%) were identified in Plot 2A. All observed species are herbaceous. Nipple-wort, the most dominant plant species identified at Plot 2A is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. The two remaining species identified in Plot 2A (yellow nutsedge and common milkweed) were also not listed. However, other species of the *Cyperus* and *Asclepias* genuses are listed. Their wetland indicators range from FACU- to OBL and UPL to OBL, respectively. The "scatter" of wetland indicator status for observed plant species is wide. Estimates of species' dominance indicate that 50% of the plot is not comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 2A does not meet the hydrophytic criteria.

Yellow nutsedge (Cyperus esculentus, 40%), Pennsylvania smartweed (Polygonum pensylvanicum, 40%), nipple-wort (Lapsana communis, 10%), sawtooth sunflower (Helianthus grosserserratus, 1%) and tall ironweed (Vernonia gigantea, 1%) were identified in Plot 2B. All observed species are

herbaceous. Yellow nutsedge, one of the more dominant species observed in Plot 2B (40% dominance), is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other species of the *Cyperus* genus are listed. Their wetland indicators range from FACU- to OBL. Pennsylvania smartweed (40%) has a wetland indicator of FACW+. Nipple-wort (10%) is not listed. Sawtooth sunflower (1%) has a wetland indicator of FACW-. Tall ironweed (1%) has a wetland indicator of FAC. The "scatter" of wetland indicator status for observed plant species is wide. Estimates of species' dominance indicate that at least 50% of the plot is comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 2B meets the hydrophytic criteria.

Wild oat (*Avena fatua*, 70%), tall ironweed (*Vernonia gigantea*, 20%) and fleabane (*Erigeron canadensis*, 5%) were identified in Plot 2C. All observed species are herbaceous. Wild oat, the most dominant observed plant species in Plot 2C, is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. Tall ironweed (20%) has a wetland indicator of FAC. Fleabane (5%) is not listed; however, other listed species of the genus *Erigeron* have wetland indicators that range from FACU to FACW. Estimates of species' dominance indicate that 50% of the plot is not comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 2C does not meet the hydrophytic criteria.

### Potential Wetland Area 3 – Plots 3A, 3B and 3C

Thistle (*Carduus nutans*, 30%), nipple-wort (*Lapsana communis*, 30%) and sandbar willow (*Salix exigua*, 30%) were identified in Plot 3A. Thistle and nipple-wort are herbaceous, while sandbar willow is a sapling/shrub. Thistle and nipple-wort are not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. Sandbar willow has a wetland indicator status of OBL. Given that two species comprising approximately two-thirds of the plants present in Plot 3A are not listed and Plot 3A was established in an upland area immediately adjacent to railroad tracks, this plot likely does

not support a prevalence of hydrophytic species and does not meet the hydrophytic criteria.

Yellow nutsedge (*Cyperus esculentus*, 50%), sandbar willow (*Salix exigua*, 40%), common milkweed (*Asclepias syriaca*, 5%), nipple-wort (*Lapsana communis*, 5%) and wild morning glory (*Convolvulus sepium*, <1%) were identified in Plot 3B. Yellow nutsedge, common milkweed and nipple-wort are herbaceous species. Sandbar willow is a sapling/shrub species and wild morning glory is a vine. Yellow nutsedge (50%), the most dominant plant species observed in Plot 3B, is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other species of the genus *Cyperus* are listed, and their wetland indicators range from FACU- to OBL. Sandbar willow has a wetland indicator of OBL. Common milkweed (5%) is not listed; however, other species of the genus *Asclepias* have wetland indicators that range from UPL to OBL. Nipple-wort (5%) and wild morning glory (<1%) are not listed. The "scatter" of wetland indicator status for observed plant species is wide. Estimates of species' dominance, together with the fact that this plot was established in a depressional area likely to pond water during rain and/or flood events, indicates that at least 50% of the plot is comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 3B meets the hydrophytic criteria.

Wheat (*Triticum aestivum*, 40%), nipple-wort (*Lapsana communis*, 20%), giant ragweed (*Ambrosia trifida*, 10%), wild oat (*Avena fatua*, 10%), fleabane (*Erigeron canadensis*, 10%) and sandbar willow (*Salix exigua*, 10%) were identified in Plot 3C. Wheat, nipple-wort, giant ragweed, wild oat and fleabane are herbaceous species. Sandbar willow is a sapling/shrub species. Wheat, nipple-wort and wild oat are not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. Giant ragweed (10%) has a wetland indicator of FAC+. Fleabane is not listed; however, other listed species of the *Erigeron* genus have wetland indicators ranging from FACU to FACW. Sandbar willow has an indicator status of OBL. The

"scatter" of wetland indicator status for observed plant species is wide. Estimates of species' dominance indicate that at least 50% of the plot is not comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 3C does not meet the hydrophytic criteria.

### Potential Wetland Area 4 – Plots 4A and 4B

Barley (*Hordeum vulgare*, 80%) and morning glory (*Ipomoea cairica*, 10%) were identified in Plot 4A. Barley is a herbaceous species and morning glory is a vine. Barley is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other species of the genus *Hordeum* have wetland indicators that range from FAC+ to FACW-. Morning glory is listed, but does not have an assigned wetland indicator status. Given that plants belonging to the same genus as barley are wetter than FAC and barley comprises 80% of the observed plant species in the plot, Plot 4A appears to meet the hydrophytic criteria. Although, it is important to note that the majority of the vegetation in Plot 4A was dead, it appeared that the adjacent soybean field had been recently sprayed with a herbicide.

Rice cutgrass (*Leersia oryzoides*, 30%), dotted smartweed (*Polygonum punctatum*, 30%) and arrowhead (*Sagittaria ambigua*, 30%) were identified in Plot 4B. All observed species are herbaceous. Each of the three identified species has a wetland indicator status of OBL. Therefore, Plot 4B meets the hydrophytic criteria.

### Potential Wetland Area 5 – Plots 5A and 5B

Rice cutgrass (*Leersia oryzoides*, 40%), giant ragweed (*Ambrosia trifida*, 25%) and prairie dogbane (*Apocynum cannabinum*, 25%) were identified in Plot 5A. All observed species are herbaceous. Rice cutgrass has an indicator status of OBL. Giant ragweed has an indicator status of FAC+. Prairie dogbane has an indicator status of FAC. Estimates of species' dominance indicate that at least 50% of the plot is comprised of plants with

an indicator status of FAC or wetter. Therefore, Plot 5A meets the hydrophytic criteria.

Dotted smartweed (*Polygonum punctatum*, 45%) and arrowhead (*Sagittaria ambigua*, 45%) were identified in Plot 5B. Both species are herbaceous. Both species have a wetland indicator status of OBL. Therefore, Plot 5B meets the hydrophytic criteria.

### Potential Wetland Area 6 – Plot 6A

False flax (*Camelina microcarpa*, 60%), Pennsylvania smartweed (*Polygonum pensylvanicum*, 30%) and velvetleaf (*Abutilon theophrasti*, 10%) were identified in Plot 6A. All observed species are herbaceous. False flax is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, another species of the *Camelina* genus is listed and has a wetland indicator of FAC-. Pennsylvania smartweed has an indicator status of FACW+. Velvetleaf has an indicator status of FACU-. Estimates of species' dominance indicate that at least 50% of the plot is not comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 6A does not meet the hydrophytic criteria.

### Potential Wetland Area 7 – Plot 7A

Prairie dogbane (*Apocynum cannabinum*, 30%), rice cutgrass (*Leersia oryzoides*, 20%), fleabane (*Erigeron canadensis*, 15%), silver maple (*Acer saccharinum*, 10%) and wild morning glory (*Convolvulus sepium*, 10%) were identified in Plot 7A. Prairie dogbane, rice cutgrass and fleabane are herbaceous species. Silver maple is a tree. Wild morning glory is a vine. Prairie dogbane (30%) has a wetland indicator status of FAC. Rice cutgrass (20%) has an indicator status of OBL. Fleabane (15%) is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other members of the *Erigeron* genus have wetland indicators that range from FACU to FACW. Silver maple (10%) has an indicator status of FACW. Wild morning glory (10%) is not listed. Estimates of species'

dominance indicate that at least 50% of the plot is comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 7A meets the hydrophytic criteria.

### Potential Wetland Area 8 – Plots 8A and 8B

Soybean (*Glycine max*, 50%) was identified in Plot 8A. It is a cultivated, herbaceous species. Soybean is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. Plot 8A was established immediately adjacent to a planted soybean field. This plot does not meet the hydrophytic criteria.

False flax (*Camelina microcarpa*, 30%) and winter cress (*Barbarea vulgaris*, 10%) were identified in Plot 8B. Both species are herbaceous. False flax is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other species of the *Camelina* genus are listed with a wetland indicator status of FAC-. Winter cress has a wetland indicator of FAC. Estimates of species' dominance indicate that at least 50% of the plot is not comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 8B does not meet the hydrophytic criteria.

### Potential Wetland Area 9 – Plots 9A, 9B and 9C

Barnyard grass (*Echinochloa crusgalli*, 90%) and eastern burningbush (*Euonymus atropurpureus*, 1%) were identified in Plot 9A. Barnyard grass is a herbaceous species and eastern burningbush is a sapling/shrub species. Barnyard grass has a wetland indicator status of FACW. Eastern burningbush has an indicator status of FAC-. Plot 9A meets the hydrophytic criteria.

Barnyard grass (*Echinochloa crusgalli*, 50%), arrowhead (*Sagittaria ambigua*, 40%), groundnut (*Apios americana*, 5%) and winter grape (*Vitis vulpina*, 5%) were identified in Plot 9B. Barnyard grass and arrowhead are herbaceous species. Groundnut and winter grape are vines. Barnyard grass

(50%) has a wetland indicator status of FACW. Arrowhead (40%) has a wetland indicator status of OBL. Groundnut (5%) has a wetland indicator of FACW. Winter grape (5%) has a wetland indicator of FACW-. Estimates of species' dominance indicate that at least 50% of the plot is comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 9B meets the hydrophytic criteria.

Barnyard grass (*Echinochloa crusgalli*, 50%), nipple-wort (*Lapsana communis*, 40%), blue vervain (*Verbena hastata*, 5%) and winter grape (*Vitis vulpina*, 1%) were identified in Plot 9C. Barnyard grass, nipple-wort and blue vervain are herbaceous species. Winter grape is a vine. Barnyard grass (50%) has a wetland indicator status of FACW. Nipple-wort (40%) is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. Blue vervain (5%) has an indicator status of FACW+. Winter grape (1%) has an indicator status of FACW-. Estimates of species' dominance indicate that at least 50% of the plot is comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 9C meets the hydrophytic criteria.

**Potential Wetland Area 10 – Plots 10A, 10B and 10C**

Roughleaf dogwood (*Cornus drummondii*, 40%), sweet vernal grass (*Anthoxanthum odoratum*, 10%) and cinquefoil (*Potentilla canadensis*, 10%) were identified in Plot 10A. Sweet vernal grass is a herbaceous species, roughleaf dogwood is a tree and cinquefoil is a vine. Roughleaf dogwood (40%) has a wetland indicator status of FAC. Sweet vernal grass (10%) has an indicator status of FACU. Cinquefoil (10%) is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other species of the *Potentilla* genus are listed, with wetland indicators ranging from FACU- to OBL. Estimates of species' dominance indicate that at least 50% of the plant species in this plot have an indicator status of FAC or wetter. Therefore, Plot 10A does not meet the hydrophytic criteria.

Sweet vernal grass (*Anthoxanthum odoratum*, 20%), roughleaf dogwood (*Cornus drummondii*, 20%) and cinquefoil (*Potentilla canadensis*, 5%) were identified in Plot 10B. Sweet vernal grass is a herbaceous species, roughleaf dogwood is a tree and cinquefoil is a vine. Sweet vernal grass (20%) has a wetland indicator status of FACU. Roughleaf dogwood (20%) has an indicator status of FAC. Cinquefoil (5%) is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other listed species of the *Potentilla* genus have wetland indicators ranging from FACU- to OBL. This plot area contains little ground vegetation, but is heavily shaded. Estimates of species' dominance indicate that at least 50% of the plot is not comprised of plants with an indicator status of FAC or wetter. Therefore, Plot 10B does not meet the hydrophytic criteria.

Roughleaf dogwood (*Cornus drummondii*, 20%), sweet vernal grass (*Anthoxanthum odoratum*, 10%) and cinquefoil (*Potentilla canadensis*, 5%) were identified in Plot 10C. Sweet vernal grass is a herbaceous species, roughleaf dogwood is a tree and cinquefoil is a vine. Roughleaf dogwood (20%) has a wetland indicator status of FAC. Sweet vernal grass (10%) has a wetland indicator status of FACU. Cinquefoil (5%) is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other listed species of the *Potentilla* genus have wetland indicators that range from FACU- to OBL. Groundcover is somewhat sparse in this plot area, but it is heavily shaded. Estimates of species' dominance indicate that at least 50% of the plant species present in this plot have an indicator status of FAC or wetter. Therefore, Plot 10C meets the hydrophytic criteria.

### Potential Wetland Area 11 – Plots 11A, 11B and 11C

Roughleaf dogwood (*Cornus drummondii*, 40%) and sweet vernal grass (*Anthoxanthum odoratum*, 15%) were identified in Plot 11A. Sweet vernal grass is a herbaceous species and roughleaf dogwood is a tree. Roughleaf dogwood has a wetland indicator status of FAC. Sweet vernal grass has a wetland indicator of FACU. Tree species are present within this plot in

several stages of maturity, ranging from saplings to trees with a diameter at breast height of several feet. Due to the immaturity of several of the saplings, it was difficult to identify these species with certainty. Of the two species identified in Plot 11A, at least 50% of those were comprised of a species with a wetland indicator status of FAC. Therefore, Plot 11A meets the hydrophytic criteria.

Roughleaf dogwood (*Cornus drummondii*, 20%) was identified at Plot 11B. Roughleaf dogwood is a tree. No ground vegetation was present in this area, only overhead canopy cover from trees. The wetland indicator status for roughleaf dogwood is FAC. Given that this was the only identified species present in the plot, Plot 11B meets the hydrophytic criteria.

Cinquefoil (*Potentilla canadensis*, 40%), roughleaf dogwood (*Cornus drummondii*, 20%) and sweet vernal grass (*Anthoxanthum odoratum*, 10%) were identified in Plot 11C. Sweet vernal grass is a herbaceous species, roughleaf dogwood is a tree and cinquefoil is a vine. Cinquefoil (40%) is not listed in the *National List of Plants that Occur in Wetlands (North Central, Region 3)*. However, other listed species of the *Potentilla* genus have wetland indicator statuses ranging from FACU- to OBL. Roughleaf dogwood (20%) has an indicator status of FAC. Sweet vernal grass (10%) has an indicator status of FACU. This plot is almost completely shaded with canopy cover. Estimates of species' dominance indicate that at least 50% of the plant species present in this plot do not have an indicator status of FAC or wetter. Therefore, Plot 11C does not meet the hydrophytic criteria.

**Table 1 - Vascular Plants Identified**

| Plot | Scientific Name | Common Name | Wetland Indicator Status | % Total Dominance |
|---|---|---|---|---|
| 1A | *Hordeum vulgare* | Barley | FAC+ to FACW- * | 40 |
| | *Ellisia nyctelea* | *Ellisia* | FAC+ | 15 |
| | *Verbascum thapsus* | Mullein | FACU- * | 15 |
| | *Lapsana communis* | Nipple-wort | NL | 10 |
| | *Setaria viridis* | Green foxtail | FACU+ to FAC * | 10 |
| 1B | *Lapsana communis* | Nipple-wort | NL | 60 |

| Table 1 - Vascular Plants Identified | | | | |
|---|---|---|---|---|
| **Plot** | **Scientific Name** | **Common Name** | **Wetland Indicator Status** | **% Total Dominance** |
| | *Spartina pectinata* | Freshwater cordgrass | FACW+ | 30 |
| | *Asclepias syriaca* | Common milkweed | UPL to OBL * | 5 |
| 1C | *Avena fatua* | Wild oat | NL | 80 |
| | *Erigeron canadensis* | Fleabane | FACU to FACW * | 10 |
| | *Hordeum vulgare* | Barley | FAC+ to FACW- * | 5 |
| 2A | *Lapsana communis* | Nipple-wort | NL | 50 |
| | *Cyperus esculentus* | Yellow nutsedge | FACU- to OBL * | 40 |
| | *Asclepias syriaca* | Common milkweed | UPL to OBL * | 5 |
| 2B | *Cyperus esculentus* | Yellow nutsedge | FACU- to OBL * | 40 |
| | *Polygonum pensylvanicum* | Pennsylvania smartweed | FACW+ | 40 |
| | *Lapsana communis* | Nipple-wort | NL | 10 |
| | *Helianthus grosseserratus* | Sawtooth sunflower | FACW- | 1 |
| | *Vernonia gigantea* | Tall ironweed | FAC | 1 |
| 2C | *Avena fatua* | Wild oat | NL | 70 |
| | *Vernonia gigantea* | Tall ironweed | FAC | 20 |
| | *Erigeron canadensis* | Fleabane | FACU to FACW * | 5 |
| 3A | *Carduus nutans* | Thistle | NL | 30 |
| | *Lapsana communis* | Nipple-wort | NL | 30 |
| | *Salix exigua* | Sandbar willow | OBL | 30 |
| 3B | *Cyperus esculentus* | Yellow nutsedge | FACU- to OBL * | 50 |
| | *Salix exigua* | Sandbar willow | OBL | 40 |
| | *Asclepias syriaca* | Common milkweed | UPL to OBL * | 5 |
| | *Lapsana communis* | Nipple-wort | NL | 5 |
| | *Convolvulus sepium* | Wild morning glory | NL | <1 |
| 3C | *Triticum aestivum* | Wheat | NL | 40 |
| | *Lapsana communis* | Nipple-wort | NL | 20 |
| | *Ambrosia trifida* | Giant ragweed | FAC+ | 10 |
| | *Avena fatua* | Wild oat | NL | 10 |
| | *Erigeron canadensis* | Fleabane | FACU to FACW * | 10 |
| | *Salix exigua* | Sandbar willow | OBL | 10 |
| 4A | *Hordeum vulgare* | Barley | FAC+ to FACW- * | 80 |
| | *Ipomoea cairica* | Morning glory | NI | 10 |
| 4B | *Leersia oryzoides* | Rice cutgrass | OBL | 30 |
| | *Polygonum punctatum* | Dotted smartweed | OBL | 30 |
| | *Sagittaria ambigua* | Arrowhead | OBL | 30 |
| 5A | *Leersia oryzoides* | Rice cutgrass | OBL | 40 |
| | *Ambrosia trifida* | Giant ragweed | FAC+ | 25 |

| Table 1 - Vascular Plants Identified | | | | |
|---|---|---|---|---|
| Plot | Scientific Name | Common Name | Wetland Indicator Status | % Total Dominance |
| | *Apocynum cannabinum* | Prairie dogbane | FAC | 25 |
| 5B | *Polygonum punctatum* | Dotted smartweed | OBL | 45 |
| | *Sagittaria ambigua* | Arrowhead | OBL | 45 |
| 6A | *Camelina microcarpa* | False flax | FAC- | 60 |
| | *Polygonum pensylvanicum* | Pennsylvania smartweed | FACW+ | 30 |
| | *Abutilon theophrasti* | Velvetleaf | FACU- | 10 |
| 7A | *Apocynum cannabinum* | Prairie dogbane | FAC | 30 |
| | *Leersia oryzoides* | Rice cutgrass | OBL | 20 |
| | *Erigeron canadensis* | Fleabane | FACU to FACW * | 15 |
| | *Acer saccharinum* | Silver maple | FACW | 10 |
| | *Convolvulus sepium* | Wild morning glory | NL | 10 |
| 8A | *Glycine max* | Soybean | NL | 50 |
| 8B | *Camelina microcarpa* | False flax | FAC- | 30 |
| | *Barbarea vulgaris* | Winter cress | FAC | 10 |
| 9A | *Echinochloa crusgalli* | Barnyard grass | FACW | 90 |
| | *Euonymus atropurpureus* | Eastern burningbush | FAC- | 1 |
| 9B | *Echinochloa crusgalli* | Barnyard grass | FACW | 50 |
| | *Sagittaria ambigua* | Arrowhead | OBL | 40 |
| | *Apios americana* | Groundnut | FACW | 5 |
| | *Vitis vulpina* | Winter grape | FACW- | 5 |
| 9C | *Echinochloa crusgalli* | Barnyard grass | FACW | 50 |
| | *Lapsana communis* | Nipple-wort | NL | 40 |
| | *Verbena hastata* | Blue vervain | FACW+ | 5 |
| | *Vitis vulpina* | Winter grape | FACW- | 1 |
| 10A | *Cornus drummondii* | Roughleaf dogwood | FAC | 40 |
| | *Anthoxanthum odoratum* | Sweet vernal grass | FACU | 10 |
| | *Potentilla canadensis* | Cinquefoil | FACU- to OBL * | 10 |
| 10B | *Anthoxanthum odoratum* | Sweet vernal grass | FACU | 20 |
| | *Cornus drummondii* | Roughleaf dogwood | FAC | 20 |
| | *Potentilla canadensis* | Cinquefoil | FACU- to OBL * | 5 |
| 10C | *Cornus drummondii* | Roughleaf dogwood | FAC | 20 |
| | *Anthoxanthum odoratum* | Sweet vernal grass | FACU | 10 |
| | *Potentilla canadensis* | Cinquefoil | FACU- to OBL * | 5 |
| 11A | *Cornus drummondii* | Roughleaf dogwood | FAC | 40 |
| | *Anthoxanthum* | Sweet vernal grass | FACU | 15 |

| Table 1 - Vascular Plants Identified | | | | |
|---|---|---|---|---|
| Plot | Scientific Name | Common Name | Wetland Indicator Status | % Total Dominance |
| | *odoratum* | | | |
| 11B | *Cornus drummondii* | Roughleaf dogwood | FAC | 20 |
| 11C | *Potentilla canadensis* | Cinquefoil | FACU- to OBL * | 40 |
| | *Cornus drummondii* | Roughleaf dogwood | FAC | 20 |
| | *Anthoxanthum odoratum* | Sweet vernal grass | FACU | 10 |

*Wetland indicator status taken from *National List of Plants that Occur in Wetlands, North Central (Region 3)*.

| | | | |
|---|---|---|---|
| OBL | obligate wetland species | FACW+ | wetter than FACW |
| FACW | facultative wetland species | FACW- | drier than FACW |
| FAC+ | wetter than FAC | FAC | facultative species |
| FAC- | drier than FAC | FACU- | wetter than FACU |
| FACU | facultative upland species | FACU+ | drier than FACU |
| UPL | upland species | NL | not listed |
| NI | no indicator status yet assigned | | |
| * | surrogate species of same genus used | | |

## 3.2 SOILS

Electronic files for the Soil Surveys of Carroll County and Ray County, Missouri were requested from the Natural Resource Conservation Service (NRCS) website. Hard copies of each of the soil surveys were also obtained during a visit to the local NRCS offices.

The facility property is within the limits of Carroll County. According to the Carroll County soil survey, the facility property lies primarily within the Bremer-Cotter-Booker association. Soils of this association are characterized as deep, nearly level, well-drained, poorly-drained and very poorly-drained soils that formed in alluvium. Soils of this association occur on floodplains. Bremer soils account for about 43 percent of the Bremer-Cotter-Booker association. Bremer soils are poorly drained, and in slightly higher areas on the floodplain. Cotter soils comprise 27 percent of the association. These soils are well-drained, and in higher areas of the floodplain. Booker soils comprise 19 percent of the Bremer-Cotter-Booker association. Booker soils are very poorly-drained. They are in the lower areas of the floodplain. Other minor soils comprise 11 percent of the Bremer-Cotter-Booker association. The northernmost portion of the facility

property extends into an area comprised of soils of the Knox-Higginsville-Wakenda association. Soils of this association are characterized as deep, gently sloping to steep, well-drained and somewhat poorly-drained soils that formed in a thick layer of loess. Soils of this association occur on uplands. Knox soils comprise about 31 percent of the Knox-Higginsville-Wakenda association. Knox soils are well-drained, and are located on narrow ridgetops and convex side slopes. Higginsville and similar soils comprise 30 percent of the association. These soils are somewhat poorly-drained, and are in concave areas on side slopes. Wakenda and similar soils, comprising 29 percent of the Knox-Higginsville-Wakenda association, are well-drained. They are on ridgetops, convex side slopes and high stream terraces. Other minor soils comprise 10 percent of the Knox-Higginsville-Wakenda association.

The Carroll County soil survey identifies the following detailed soil map units within the facility property (arranged in approximate order of dominance within the facility property):

| | |
|---|---|
| 13598 | Booker silty clay |
| 13507 | Bremer silty clay |
| 36046 | Wabash silty clay |
| 66007 | Leta silty clay |
| 10063 | Knox silty clay loam, 9-14% slopes |
| 10055 | Knox silt loam, 5-9% slopes |
| 36023 | Landes fine sandy loam |
| 10041 | Knox silt loam, 14-20% slopes |

Booker soils (silty clay, map unit #13598) comprise a vast majority of the facility property area (**Figure 4**). Booker soils, which are deep, nearly level and very poorly-drained, are in broad areas on the Missouri River floodplain. The soil is protected by levees, but is occasionally flooded due to levee breaks or as a result of overflow from local tributaries. It is commonly ponded after heavy rains. The surface layer is typically black, very firm silty clay (5 inches thick). The subsoil extends to a depth of 60 inches or more, and is a very firm clay. The upper part is black (7 inches thick), and the

lower part is very dark gray and gray, with mottling. Nearly all of the Booker acreage is used for cultivated crops (soybeans, corn and small grain). It is best suited to row crops that require a short growing season, as permeability is very low in the Booker soils. Surface runoff is very slow or ponded. The seasonal high water table commonly is 0.5 foot above the surface to 1.0 foot below ground surface during winter and spring. Root development is restricted by poor aeration.

Bremer (silty clay, map unit #13507) and Wabash (silty clay, map unit #36046) soils comprise the second most acreage within the facility property. Similar to the Booker soils, Bremer soils are deep, nearly level, poorly-drained, on the Missouri River floodplain, protected by levees, but occasionally flooded. The surface layer is typically black, firm silty clay loam (12 inches thick). The subsoil extends to a depth of 60 inches or more. The upper part is very dark gray, mottled and very firm silty clay. The next layer is dark grayish-brown, mottled and very firm silty clay. The lower part is a grayish-brown, mottled, firm silty clay loam. Most areas of Bremer soils are used for cultivated crops (corn, soybeans, grain sorghum and small grain). Permeability is moderately slow and surface runoff is slow in the Bremer soils. Land grading, shallow surface drains and open ditches helps to remove the excess water. The seasonal high water table commonly is 1 to 2 feet below ground surface during winter and spring.

Like the Booker soils, and similar to the Bremer soils, Wabash soils are deep, nearly level and very poorly-drained. These soils are on floodplains of Missouri River tributaries, and occasionally flooded. The surface layer is typically very dark gray, firm silty clay (4 inches thick). The subsurface layer is very dark gray, very firm silty clay (10 inches thick). The subsoil extends to a depth of 60 inches, and is very firm silty clay. The upper part is black, and the lower part is dark grayish brown and mottled. Most areas of Wabash soils are used for cultivated crops (corn, soybeans, grain sorghum and small grain). Land grading, shallow surface drains and open

ditches help to remove excess water, as it dries out slowly after rains. Permeability and surface runoff are very slow in Wabash soils. The seasonal high water table commonly is within 1 foot of ground surface during winter and spring.

Leta (silty clay, map unit #66007), Knox (silty clay loam, map unit #10063; silt loam 5-9% slopes, map unit #10055 and silt loam 14-20% slopes, map unit #10041) and Landes (fine sandy loam, map unit #36023) soils account for minor areas, in terms of soil dominance within the facility property. Leta soils are deep, nearly level, somewhat poorly-drained and located on Missouri River floodplains. It is protected by levees, but occasionally floods during levee breaks or overflow of local tributaries. The surface layer is typically very dark gray, firm silty clay (5 inches thick). The subsurface layer is also very dark gray, firm silty clay (7 inches thick). The subsoil is about 13 inches thick, and is a very dark grayish-brown, mottled, firm silty clay with strata of dark grayish-brown silt loam. The substratum extends to a depth of 60 inches or more. The upper part is stratified dark grayish-brown and very dark grayish-brown. It is mottled, very friable, very fine sandy loam. The lower part of the substratum is stratified dark grayish-brown and brown, mottled, friable silt loam and very fine sandy loam. Most areas of the Leta soils are used for cultivated crops (soybeans, grain sorghum, corn and winter wheat). Surface runoff is slow. The surface is covered by water after heavy rainfall or by runoff from adjacent areas. Land grading, shallow surface drains and open ditches help to remove the excess surface water. Permeability is slow in the clayey upper part of the Leta soils, and moderate in the loamy lower part. The seasonal high water table commonly is at a depth of 1 to 3 feet below ground surface during winter and spring.

Knox silty clay loam soils are deep, strongly sloping and well-drained. These soils are on the convex side slopes of the uplands bordering the Missouri River floodplain. The surface layer is typically brown, friable silty clay loam

(4 inches thick). It is a mixture of subsoil material and surface soil material. The subsoil is dark yellowish-brown, friable, firm silty clay loam (50 inches thick). The upper part is firm, and the lower part is mottled and friable. The substratum extends to a depth of 60 inches or more, and is dark yellowish-brown, mottled, friable silt loam. Most areas of this soil are used for cultivated crops, hay or pasture. Permeability is moderate and surface runoff is rapid.

Knox silt loam soils are deep, well-drained and moderately sloping. These soils occur on ridgetops and side slopes in the uplands bordering Missouri River floodplains. The surface layer is typically very dark grayish-brown, friable silt loam (6 inches thick). The subsoil is brown and dark yellowish-brown, firm silty clay loam with mottling in the lower part (40 inches thick). The substratum extends to a depth of 60 inches or more, and is brown, mottled, friable silt loam. Permeability is moderate and surface runoff is medium. Most areas of this soil are used for cultivated crops, pasture or hay. A small acreage is used for woodland.

Landes fine sandy loam soils are deep, nearly level, well-drained and in slightly higher areas of the Missouri River floodplain. The surface layer is typically very dark grayish brown, very friable fine sandy loam (7 inches thick). The subsurface layer is very dark grayish brown, friable find sandy loam (13 inches thick). The subsoil is brown, friable loamy fine sand (13 inches thick). The substratum extends to a depth of 60 inches or more, and is brown and dark yellowish brown with mottles. Permeability is rapid and surface runoff is slow. The seasonal high water table is commonly at 4 to 6 feet below ground surface during winter and spring. Most areas of these soils are used for cultivated crops (corn, soybeans and small grain).

According to the Hydric Soils List for Carroll County, the Booker, Bremer, Wabash, Leta and Landes soils are classified as hydric soil (soil that developed anaerobic conditions, usually due to water saturation or flooding present for long durations in the growing season).

It is important to note that a majority, if not all, of the soils within the facility property have been disturbed by past and current farming, construction of roads and establishment of drainage ditches and drainage ways. These soils within the facility property are also protected from the Missouri River by a levee system. Hydric soils that may have occurred prior to human disturbance would not be expected to continue unless they were exposed to the appropriate moisture regime. In this field investigation, the hydric soils parameter was based on the relative ability of the local soil to "express" hydric character. A soil probe was advanced to a target depth of 16 inches below ground surface (bgs) for each plot point. Observations gathered during sampling of soils within each of the potential wetland plots for the facility property are discussed below.

**Potential Wetland Area 1 – Plots 1A, 1B and 1C**

Plot points 1A, 1B and 1C were established adjacent to one another, with Plots 1A and 1C flanking Plot 1B. Plot 1A was established upland, while Plots 1B and 1C were at a lower elevation.

The soil at Plot 1A consisted of silt with sand to a depth of approximately 2 inches bgs, underlain by sand with silt (2-9 inches bgs). The sand with silt was dark reddish brown (5YR 2.5/2). No mottles were present. The sand did not display organic streaking, nor was an organic pan observed within the top 16 inches of ground surface. Organic streaking and the presence of organic pans can be characteristic of hydric sandy soils. Refusal was encountered at a depth of 12 inches bgs. Rock was observed from 9 to 12 inches bgs. The soil at Plot 1A was very dry and appeared to be fill material. Plot 1A was established at the upland edge of a railroad embankment.

Plot 1B contained silt with sand near the surface (1-6 inches bgs), followed by sand and silt. The silt with sand was black (10YR 2/1), and did not contain mottles. The underlying sand and silt (6-10 inches bgs) was also black (10YR 2/1) without mottles. The soil at Plot 1B was dry and very

compact. Plot 1B was established in a depressional area, between Plot points 1A and 1C.

Plot 1C contained topsoil at a depth of 0 to 2 inches bgs. Clay with trace sand was observed at 2 to 16 inches bgs. The clay was very dark gray (5Y 3/1), and did not display mottles. Soil at Plot 1C did display some moisture, and was not as dry as the soils observed at Plots 1A and 1B. Plot 1C was established in a depressional area adjacent to a county road.

Plots 1A and 1B did not contain characteristic features of hydric soil, whereas Plot 1C contained some hydric features (i.e., matrix chroma of 1). Soils of this area, Booker silty clay, are listed on the local Hydric Soils List. However, field observations do not confirm the mapped soil type.

**Potential Wetland Area 2 – Plots 2A, 2B and 2C**

Similar to Plots 1A, 1B and 1C, Plot points 2A, 2B and 2C were established adjacent to a railroad line, with Plot 2A being upland, and Plots 2B and 2C at a lower elevation.

The soil at Plot 2A consisted of silt to a depth of approximately 4 inches bgs, underlain by clay with trace sand. The surface silt was dark grayish brown (10YR 4/2). The clay with trace sand was black (5Y 2.5/1). The clay with trace sand extended to a depth of 16 inches bgs. Mottles appeared at a depth of 12 inches bgs. The mottles were brownish yellow (10YR 6/8), common, distinct and fine. The soil at Plot 2A contained some moisture. Plot 2A was established near the top of a slope leading down from a railroad line.

Plot 2B contained topsoil at the surface (0-1 inches bgs), followed by clay with trace sand (1-16 inches bgs). The clay with trace sand was very dark gray (5Y 3/1). Mottling was observed throughout. The mottles were yellowish red (5YR 4/6), common, distinct and fine. Soil at Plot 2B was dry

and compact throughout. Plot 2B was established in a depressional area, between Plot points 2A and 2C.

Plot 2C contained topsoil at a depth of 0 to 1 inches bgs. Clay with trace sand was observed at 1 to 16 inches bgs. The clay was black (2.5Y 2.5/1). Mottling was present throughout. Mottle color was yellowish red (5YR 4/6). Mottles were few, distinct and fine. Soil at Plot 2C was dry and compact; however, it did display more moisture at a depth of 12 inches bgs. Plot 2C was established in a depressional area adjacent to a county road.

Plots 2A, 2B and 2C did contain low chroma matrix colors and mottles, features characteristic of hydric soil. Soils of this area, Booker silty clay, are also listed on the local Hydric Soils List. Field observations generally confirm the mapped type.

### Potential Wetland Area 3 – Plots 3A, 3B and 3C

Like Plot areas 1 and 2, Plot points 3A, 3B and 3C were established adjacent to a railroad line, with Plot 3A being upland, and Plots 3B and 3C at a lower elevation.

The soil at Plot 3A consisted of sand with some rock at a depth of 0 to 8 inches bgs. This was underlain by rock. The sand at the surface was loose and dry. Plot 3A was established near the top of a slope leading down from a railroad line.

Plot 3B contained topsoil at the surface (0-1 inches bgs), followed by clay with silt (1-16 inches bgs). The clay with silt was black (7.5YR 2.5/1), with dark smearing. The color of the clay changed at a depth of 10 inches bgs to dark brown (7.5YR 3/2). Mottling was also observed at this depth. The mottles were strong brown (7.5YR 5/6), many, distinct and medium. Soil at Plot 3B was very dry. Plot 3B was established in a depressional area, between Plot points 3A and 3C.

Plot 3C contained silt with clay at a depth of 0 to 4 inches bgs, and was black (7.5YR 2.5/1). Clay with silt and sand was observed at 4 to 10 inches bgs. The clay was black (7.5YR 2.5/1), and did not display mottling. At a depth of 10 inches bgs, the sand became trace in abundance and the soil color changed to brown (7.5YR 4/2). Mottling was present in this deeper soil. Mottle color was strong brown (7.5YR 5/8). Mottles were many, distinct and medium. Soil moisture increased with depth at Plot 3C. Plot 3C was established in a depressional area adjacent to a county road.

Plot 3A did not display features characteristic of hydric soil. Plots 3B and 3C did contain low chroma matrix colors and mottles, features characteristic of hydric soil. Soils of this area, Booker silty clay, are also listed on the local Hydric Soils List. However, field observations did not confirm the Booker mapped type, nor its inclusions (Norborne and Bremer).

**Potential Wetland Area 4 – Plots 4A and 4B**

Plot points 4A and 4B were established adjacent to a drainage ditch, at the intersection of a county road and cultivated soybean field. Plot 4A was upland of Plot 4B.

The surface soil at Plot 4A consisted of topsoil (0-2 inches bgs). The topsoil was underlain by a clay with silt and trace sand. The clay extended from 2 inches bgs to 16 inches bgs, and was black (7.5YR 2.5/1). Mottling began at a depth of 6 inches bgs and extended throughout the remainder of the soil probe. The mottles were few, distinct, medium and strong brown (7.5YR 5/8) in color. The soil at Plot 4A was somewhat moist. Plot 4A was established directly adjacent to the planted soybean field, at the upland boundary of the downward slope to the drainage ditch.

Plot 4B soils consisted of silt with sand throughout the entire soil probe (0-16 inches bgs). The silt was very dark bluish gray (Gley 2 3/1/5PB). Mottling was observed throughout. The mottles were strong brown (7.5YR

4/6), few, distinct and medium. Plot 4B was established immediately adjacent to the drainage ditch.

Plots 4A and 4B displayed features characteristic of hydric soil, such as gleyed and low chroma matrix color and mottling. Soils of this area, Booker silty clay, are also listed on the local Hydric Soils List. Field observations for Plot 4B soils generally confirmed the mapped type; however soils observed at Plot 4A did not match the description for Booker soils, nor its inclusions.

**Potential Wetland Area 5 – Plots 5A and 5B**

Similar to Plot 4, Plot points 5A and 5B were established adjacent to a drainage ditch running through a cultivated soybean field. Plot 5A was upland of Plot 5B.

The surface soil at Plot 5A consisted of clay with silt and trace sand (0-2 inches bgs), and was very dark gray (7.5YR 3/1). The surface layer was underlain by very dark gray (2.5Y 3/1) clay. The clay layer extended from 2 inches bgs to 16 inches bgs. Mottling was present throughout the 2-16 inch bgs depth. The mottles were few, faint, medium and yellowish red (5YR 5/6) in color. The soil moisture at Plot 5A increased with depth. Plot 5A was established on a downward slope leading from the soybean field to the drainage ditch.

Plot 5B soils consisted of clay with silt throughout the entire soil probe (0-16 inches bgs). The clay was dark olive brown (2.5Y 3/3) at a depth of 0 to 5 inches bgs. At a depth of 5 inches bgs, the soil color changed to very dark gray (10YR 3/1). Yellowish brown (10YR 5/8) mottling was observed throughout the soil probe. The mottles were few, distinct and medium. The soil was saturated throughout. Plot 5B was established immediately adjacent to the drainage ditch.

Plots 5A and 5B displayed the low chroma matrix colors and mottling characteristic of hydric soil. Soils of this area, Booker silty clay, are also

listed on the local Hydric Soils List. Field observations for Plots 5A and 5B generally confirmed the mapped type.

### Potential Wetland Area 6 – Plot 6A

Plot 6A was established in a depressional area within a soybean field, at the confluence of three drainage ditches.

The surface soil at Plot 6A consisted of silt (0-1 inches bgs), and was black (2.5Y 2.5/1). The surface layer was underlain by black (2.5Y 2.5/1) clay with silt. The clay layer extended from 1 inch bgs to 16 inches bgs. The soil matrix color changed to dark gray (5Y 4/1) at a depth of 10 inches bgs. Mottling was also observed at a depth of 10 inches bgs, and extended through the remainder of the soil probe. The mottles were common, distinct, medium and light olive brown (2.5Y 5/6) in color. The soil moisture at Plot 6A increased with depth, with the soil being very moist at a depth of 12 to 16 inches bgs.

Plot 6A displayed the low chroma matrix colors and mottling characteristic of hydric soil. Soils of this area, Booker silty clay, are also listed on the local Hydric Soils List. Field observations for Plot 6A generally confirmed the mapped type.

### Potential Wetland Area 7 – Plot 7A

Plot 7A was established immediately upland of a steep slope leading to a drainage ditch.

The surface soil at Plot 7A consisted of silt with trace sand (0-16 inches bgs), and was dark brown (7.5YR 3/2). Mottling was not observed. The soil was primarily dry at Plot 7A, with some moisture present with depth.

Plot 7A did not display characteristics of hydric soils. Soils of this area, Bremer silty clay loam, are listed on the local Hydric Soils List. However,

field observations for Plot 7A did not confirm the Bremer mapped type, nor its inclusions (Cotter and Leta).

### Potential Wetland Area 8 – Plots 8A and 8B

Plot points 8A and 8B were established adjacent to a drainage ditch running through a cultivated soybean field. Plot 8A was upland of Plot 8B.

The surface soil at Plot 8A consisted of topsoil (0-16 inches bgs). Plot 8A was established immediately adjacent to the planted soybean field. Some clay was present at the base of the soil probe.

Plot 8B soils consisted of clay/silt at a depth of 0-10 inches bgs. The clay/silt was black (7.5YR 2.5/1). At a depth of 10 inches bgs, the soil color changed to reddish black (2.5YR 2.5/1). Red (2.5YR 4/8) mottling was observed from 10 to 16 inches bgs. The mottles were few, distinct and medium. Soil moisture at Plot 8B increased with depth. Plot 8B was established in the center of the drainageway.

Plot 8A did not display characteristics of hydric soil, whereas Plot 8B soils did display low chroma matrix colors and mottling. Soils of this area, Booker silty clay, are listed on the local Hydric Soils List. Field observations for Plot 8A did not confirm the mapped type and inclusions, but observed soils at Plot 8B did generally confirm the mapped type.

### Potential Wetland Area 9 – Plots 9A, 9B and 9C

Plot points 9A, 9B and 9C were established adjacent to and within a drainage ditch. This drainage ditch was bounded by a cultivated soybean field on one side and a county road on the other.

The soil at Plot 9A consisted of topsoil (0 to 8 inches bgs). Refusal was encountered at 8 inches bgs. The soil at Plot 9A was dry. Plot 9A was established immediately downslope of the soybean field and upslope of the drainage ditch.

Plot 9B contained silt with clay throughout the soil probe (0-16 inches bgs). The surface soil (0-4 inches bgs) color was very dark gray (10YR 3/1). Dark yellowish brown mottles were present at this depth. The mottles were common, distinct and medium. The soil matrix color changed at a depth of 4 inches bgs to very dark greenish gray (Gley 1 3/1/10Y). Mottles were also present at this depth. These mottles were many, distinct, coarse and red (2.5YR 4/8) in color. Soil at Plot 9B was moist. Plot 9B was established within the heavily overgrown drainage ditch.

Plot 9C contained topsoil from a depth of 0 inches bgs to 16 inches bgs. Soil at Plot 9C was dry and compact. Plot 9C was established upland of the drainage ditch and downslope of the adjacent county road.

Plots 9A and 9C did not display features characteristic of hydric soil. Plot 9B did contain gleyed and low chroma matrix colors and mottles, features characteristic of hydric soil. Soils of this area, Booker silty clay, are also listed on the local Hydric Soils List. However, field observations did not confirm the Booker mapped type, nor its inclusions.

**Potential Wetland Area 10 – Plots 10A, 10B and 10C**

Plot points 10A, 10B and 10C were established within a shaded corridor between two cultivated soybean fields. The corridor measured approximately 50 feet wide. The topography of the central portion of the corridor is depressed, and appears to be an intermittent drainageway. Plots 10A and 10C were established upland, and on either side of Plot 10B.

The soil at Plot 10A consisted of topsoil at a depth of 0 to 8 inches bgs. Refusal was encountered at 8 inches bgs. The soil at Plot 10A was very dry and compact. Plot 10A was established upslope of the apparent drainageway.

Plot 10B was very dark gray (2.5Y 3/1) silty clay. This soil extended throughout the length of the soil probe (0-16 inches bgs). No mottling was

present. The soil at Plot 10B was very dry and very hard. Plot 10B was established within the apparent drainageway.

Plot 10C contained silt/clay at a depth of 0 to 12 inches bgs. The soil was very dark gray (10YR 3/1), and did not display mottling. Refusal was encountered at a depth of 12 inches bgs. The soil in Plot 10C was very dry. Similar to Plot 10A, Plot 10C was established upslope of the apparent drainageway.

Plot 10A did not display features characteristic of hydric soil. Plots 10B and 10C did contain chroma matrix colors of 1, although no mottles were present. Soils of this area, Bremer silty clay loam, are listed on the local Hydric Soils List. Field observations did not confirm the Bremer mapped type, as Bremer soils are characterized as having mottles. However, characteristics of the observed soils did match those of the Leta inclusion.

**Potential Wetland Area 11 – Plots 11A, 11B and 11C**

Similar to Plot area 10, Plot points 11A, 11B and 11C were established adjacent to and within an apparent drainageway between two soybean fields. Plots 11A and 11C were established upslope of the drainageway, and Plot 11B was established within the apparent drainageway.

The soil at Plot 11A consisted of topsoil at a depth of 0 to 8 inches bgs. Refusal was encountered at a depth of 8 inches bgs. The soil was very dry and compact. Plot 11A was established approximately 2-3 feet upslope of the base of the apparent drainageway.

Plot 11B contained silty clay throughout the soil probe (0-16 inches bgs). The soil was black (7.5YR 2.5/1) throughout. Mottling was present at a depth of 12 inches bgs, and continued through the base of the soil probe. The mottles were reddish yellow (7.5YR 7/6) and pinkish gray (7.5YR 6/2). They were many, distinct and coarse. The soil at Plot 11B was dry and

compact. Moisture increased slightly with depth. Plot 11B was established within the depressional area, between Plot points 11A and 11C.

Plot 11C contained topsoil at a depth of 0 to 16 inches bgs. The soil was very dry throughout the probe. Plot 11C was established upslope of the apparent drainageway, at an elevation equivalent to that of Plot 11A.

Plots 11A and 11C did not display features characteristic of hydric soil. Plot 11B did contain low chroma matrix colors and mottles, features characteristic of hydric soil. Soils of this area, Booker silty clay, are listed on the local Hydric Soils List. Field observations for Plot 11B did confirm the mapped type.

### Corridor Alternatives #1, #2 and #3

Only a visual screening survey was conducted for the three alternative corridors outside of the facility property; therefore, soil samples were not collected in these areas and detailed observations of soils were not made. The three alternative corridors span both Carroll and Ray Counties.

**Figure 5** presents the NRCS soil map for the area including the facility property and the three alternative corridors. Due to the abundance and distribution of mapped soil types that lie within the corridor areas, the soil map unit designations are not displayed. Alternatively, each mapped soil area was classified as having either a high, medium or low potential to be hydric. The mapped soil areas classified as having high potential to be hydric were those where the major soil type is included on the local hydric soils list. The areas classified as having a medium potential to be hydric were those where the major soil type is not included on the local hydric soils list, but inclusions of the major soil type are on the hydric soils list. The mapped soil areas classified as having low potential to be hydric were those where neither the major soil type for that area, nor its inclusions, are included on the local hydric soils list.

According to the Carroll County soil survey, the three alternative corridor areas are comprised of soils from the Bremer-Cotter-Booker association, the Knox-Higginsville-Wakenda association and the Lagonda-Armster-Grundy association. General characteristics of the Bremer-Cotter-Booker and Knox-Higginsville-Wakenda associations within Carroll County, Missouri were discussed earlier in this section. According to the Ray County soil survey, the western-most portions of the two northernmost alternative corridors are comprised of soils from the Armster-Lagonda-Sharpsburg association, Zook-Nodaway-Bremer association and the Grundy-Lagonda association.

The Lagonda-Armster-Grundy association is characterized as deep, gently sloping to strongly sloping, somewhat poorly-drained and moderately well-drained soils that formed in loess, pedisediment and glacial till on uplands. Approximately 56% of this association is comprised of Lagonda and similar soils. Lagonda soils are somewhat poorly drained, and occur on ridgetops and in slightly concave areas on sides of slopes. Armster soils comprise 20 percent of the Lagonda-Armster-Grundy association. These soils are moderately well-drained. They are on narrow, sloping ridgetops and convex side slopes. Grundy soils, comprising 13 percent of the association, are somewhat poorly-drained. They are on broader ridgetops. Other minor soils comprise approximately 11 percent of the Lagonda-Armster-Grundy association.

The Armster-Lagonda-Sharpsburg association in Ray County, Missouri is characterized as deep, gently sloping to moderately steep, moderately well-drained and somewhat poorly-drained soils, formed in loess, pedisediments and glacial till on uplands. Armster and similar soils comprise approximately 34 percent of this association. Armster soils are moderately well-drained and are on narrow ridgetops and convex side slopes. Lagonda and similar soils comprise 32 percent of the association. These soils are somewhat poorly-drained and are on ridgetops, at the head of drainageways and on slightly concave side slopes. Sharpsburg soils comprise 16 percent of the

Armster-Lagonda-Sharpsburg association. These soils are moderately well-drained and commonly are on the narrow tops and ends of ridges. Other minor soils comprise approximately 18 percent of the Armster-Lagonda-Sharpsburg association.

The Zook-Nodaway-Bremer association is characterized as deep, nearly level, poorly-drained and moderately well-drained soils formed in alluvium on floodplains and terraces. This association occurs on floodplains of the intermediate and small tributaries of the Missouri River. Zook and similar soils comprise about 38 percent of this association. These soils are poorly-drained and are on floodplains along small streams. Nodaway soils comprise 25 percent of the Zook-Nodaway-Bremer association, and are moderately well-drained and on floodplains near the stream channels. Bremer soils account for 19 percent of the Zook-Nodaway-Bremer association. These soils are poorly-drained and are on low stream terraces along small streams. Other minor soils comprise about 18 percent of the Zook-Nodaway-Bremer association.

The Grundy-Lagonda association is characterized as deep, gently sloping and moderately sloping, somewhat poorly-drained soils formed in loess or in loess and pedisediments. Soils of this association occur on uplands, specifically on ridgetops and side slopes on high, broad divides between the major drainageways. Grundy soils comprise about 45 percent of this association. These soils are generally on broad ridgetops and the less dissected, slightly concave side slopes. Lagonda and similar soils account for 34 percent of the Grundy-Lagonda association. These soils are generally on narrower ridgetops and the ends of ridges and on the more dissected, slightly concave side slopes. Other minor soils comprise approximately 21 percent of the Grundy-Lagonda association.

The Carroll County soil survey identifies the following detailed soil map units within the alternative corridor areas, but outside of the facility property (**Figure 5**):

| | |
|---|---|
| 10021 | Greenton silty clay loam, 5-9% slopes |
| 10027 | Higginsville silt loam |
| 10041 | Knox silt loam, 14-20% slopes |
| 10055 | Knox silt loam, 5-9% slopes |
| 10063 | Knox silty clay loam |
| 10071 | Ladoga silt loam |
| 10120 | Sharpsburg silt loam |
| 10122 | Sharpsburg silt loam |
| 10151 | Wakenda silt loam, 2-5% slopes |
| 10153 | Wakenda silt loam, 5-9% slopes |
| 13510 | Colo silty clay loam |
| 30014 | Armster clay loam |
| 30019 | Armster loam |
| 30075 | Gosport silty clay loam |
| 30081 | Greenton silty clay loam, 9-14% slopes |
| 30115 | Lagonda silt loam |
| 30120 | Lagonda silty clay loam |
| 36023 | Landes fine sandy loam |
| 36031 | Nodaway silt loam |
| 36050 | Zook silty clay loam |

Of the above-listed soil map units, the Greenton silty clay loam (5-9% slopes), Ladoga silt loam, Colo silty clay loam, Greenton silty clay loam (9-14% slopes), Landes find sandy loam, Nodaway silt loam and Zook silty clay loam are classified as hydric soil by the Carroll County, Missouri NRCS.

The Ray County soil survey identifies the following detailed soil map units within the two northern alternative corridor areas (**Figure 5**):

| | |
|---|---|
| 6B | Sharpsburg silt loam, 2-5% slopes |
| 6C2 | Sharpsburg silt loam, 5-9% slopes |
| 9D | Snead silty clay loam |
| 24B | Lagonda silt loam |
| 25C2 | Lagonda silty clay loam |
| 31 | Colo silty clay loam |
| 33 | Zook silty clay loam |
| 39 | Nodaway silt loam |
| 41C2 | Armster loam, 5-9% slopes |
| 41D2 | Armster loam, 9-14% slopes |
| 42C3 | Armster clay loam, 5-9% slopes |

42E3 Armster clay loam, 9-20% slopes
56B Grundy silt loam

* note that the new 5-digit map unit numbers were not available for the Ray County, Missouri soil classification.

The Colo silty clay loam and Zook silty clay loam were the only two above-listed soils classified as hydric by the Ray County, Missouri NRCS.

## 3.3 HYDROLOGY

According to the COE 1987 Manual, areas with evident wetland hydrology have a presence and abundance of water such that it produces anaerobic and reducing conditions and influences the characteristics of the vegetation and soil present. The COE 1987 Manual also states that it is "essential to establish that a wetland area is periodically inundated or has saturated soils during the growing season". Table 5 of the COE 1987 Manual specifies the percentages of the growing season in which typical wetland and non-wetland areas are saturated or inundated. Most wetland areas are at least seasonally inundated or saturated (i.e. saturated/inundated for a minimum of 12.5% of the growing season). The COE 1987 Manual states that those areas saturated or inundated for only 5% to 12.5% of the growing season are typically not classified as wetlands. This implies that some wetland areas may be saturated or inundated for less than 12.5% of the growing season (i.e. saturated/inundated for 5% to 12.5% of the growing season).

### Review of Missouri River Gage Data and Carroll County Growing Season Data

The facility property lies within the Missouri River floodplain, yet approximately six miles north of the River. Missouri River data collected from the Waverly, Missouri gage station (#06895500) were obtained from the USGS National Water Information System: Web Interface. These data included daily water elevations for the Waverly, Missouri gage station (this is the nearest Missouri River gage station to the facility property). The elevation data available for the most recent ten-year period (1996-2005)

were reviewed. The total estimated duration and dates of the annual growing season for Carroll County were obtained from the local NRCS office. The River elevation data were compared to the known elevations of the facility property, to determine if, and how often, various portions of the property are inundated or potentially saturated during the growing season.

According to the Carroll County, Missouri NRCS office, the annual growing season is approximately 190 days in duration. The date of the last spring frost is typically April 10 and the first fall frost is typically on October 17. Assuming a 190-day growing season, the 10-day (5% of growing season) and 24-day (12.5% of growing season) high water elevations for the time period between April 10 and October 17 were determined for the Missouri River Waverly, Missouri gage station. The 10-day high elevation represents the highest River elevation maintained for at least 10 consecutive days within the growing season. In turn, the 24-day high elevation represents the highest River elevation maintained for at least 24 consecutive days within the growing season. The 10-day and 24-day high water elevations for each of the years 1996 through 2005 were identified. The 10-day high water elevations for the ten years examined were averaged and the same was done for the 24-day high water elevations. The average 10-day and 24-day high water elevations for the Waverly, Missouri gage station were 663.54 feet National Geodetic Vertical Datum (NGVD) and 661.61 feet NGVD, respectively. **Appendix E** of this report includes the 10-day and 24-day high water elevations for the ten years examined (see the References section of this report for the source of the complete set of water elevation data).

### Review of USGS Topographical Maps

Potential areas that may meet the wetland hydrology criteria were screened by reviewing the USGS 1978 Norborne, Missouri 7.5 Minute Series Quadrangle Topographic Map. Specifically, the map (**Figure 6**) was utilized to aid in the identification of low lying areas and depressional areas that may

be subject to periodic inundation for a sufficient length of time to provide wetland hydrology. The USGS topographic map indicates that the facility property has a flat topography with little relief. According to the 1978 topographic map, the elevation of the facility property ranges from 675 feet NGVD to 685 feet NGVD. An area of higher elevation, with significant relief occurs immediately north of the facility property. Given that the 5% and 12.5% growing season high water elevations for the Missouri River at the nearest gage station are approximately 664 feet NGVD and 662 feet NGVD, respectively, the elevation of the facility property is great enough that it is not likely it would be flooded for the sufficient period characteristic of wetland areas. Additionally, the USGS topographical map displays an agricultural levee bordering the north side of the Missouri River in the vicinity of the facility property.

### Review of NRCS Designation Maps

The NRCS designation map was reviewed for the northern portion of the facility property (north of County Road DD). According to the NRCS designation map, a wetland area exists immediately west of the northern facility property line. According to personnel interviewed at the Carroll County, Missouri NRCS office, that area is in the State's Wetland Reserve Program (WRP). The WRP, managed through the NRCS, is a voluntary program offering landowners the opportunity to protect, enhance and restore wetlands on their property, with technical and potential financial assistance from the NRCS. Field personnel noted, during the site investigation, that this area was marked with conservation boundary signs.

### Review of Federal Emergency Management Agency Maps

The FEMA Firm Flood Insurance Rate Maps for Carroll County, Missouri (Panels 290057 0100 B and 290057 0175 B, dated 10/17/96) and Ray County, Missouri (Panels 290778 0050 B and 290778 0100 B, dated 01/19/83) (**Figure 7**) were reviewed to determine if any areas within the facility property and corridor alternatives exist within the 100 Year Flood

Zone and may pond water for periods long enough to create wetland hydrology. The majority of the facility property is within the 100 Year Flood Zone. According to the Carroll County, Missouri FEMA flood maps, the base flood elevations for the facility property range from 687 to 690 feet NGVD from east to west. According to the USGS 1978 Norborne, Missouri 7.5 Minute Series Quadrangle Topographic Map, the facility property ranges in elevation from 675 feet to 685 feet NGVD. Northern portions of the facility property, where elevations are higher, lie outside of the 100 Year Flood Zone, in areas of minimal flooding.

### Review of US Fish and Wildlife Service National Wetland Inventory Maps

The hydrology investigation also included review of the USFWS NWI map (**Figure 8**). Within the project facility, the noted wetlands are primarily classified as palustrine, emergent. These FWS-mapped areas are scattered throughout the facility property. It is important to note that the FWS wetland classification system requires that a positive indicator of wetlands be present for only one of the three parameters, while the COE 1987 Manual requires that positive indicators for each of the three parameters be present to classify an area as a wetland.

### Potential Wetland Area 1 – Plots 1A, 1B and 1C

Plot area 1 was established adjacent to the railroad which traverses the southern boundary of the facility property. Plot points 1A, 1B and 1C were arranged so that they traversed the vegetated area between the railroad and county road. Plot 1A was located at a higher edge of the railroad embankment where there were no signs of inundation or saturation. Plot 1B was located within a depressional area, downslope of the railroad track. This area could have a potential to accumulate water in rain events or flooding. Plot 1C was located between Plot 1B and the county road, in a depressional area that could potentially receive runoff from the county road in heavy rain events. No indicators of wetland hydrology, such as drift lines, drainage

patterns or water marks, were observed at Plot area 1. Soils at Plot area 1 were dry, with some moisture displayed at Plot 1C. Plot area 1 did not meet the hydrology criteria.

### Potential Wetland Area 2 – Plots 2A, 2B and 2C

As with Plot area 1, Plot area 2 was established adjacent to the Norfolk Southern railroad. Plot points 2A, 2B and 2C were arranged in the same fashion as those within Plot area 1, so that they traversed the vegetated area between the railroad and county road. Plot area 2 was established one-half to one mile east of Plot area 1. Plot 2A was located at an upland point, on the slope leading from the railroad embankment. Plot 2B was located in a depressional area, downslope of the railroad track. Plot 2C was located between Plot 2B and the county road, in a depressional area sloping down from the road. No indicators of wetland hydrology were observed at Plot area 2. Soils at Plot area 2 were, for the most part, dry. Plot area 2 did not meet the hydrology criteria.

### Potential Wetland Area 3 – Plots 3A, 3B and 3C

Plot area 3 was established adjacent to the Norfolk Southern railroad, between Plot areas 1 and 2. Plot 3A was located in an upland area, immediately adjacent to the railroad track. Plot 3B was located in a depressional area, downslope of the railroad tracks. The topography at this location could be conducive to water ponding during heavy rain and/or flood events. Plot 3C was located immediately adjacent to the county road, at an elevation slightly lower than the road. No indicators of wetland hydrology were observed at Plot area 3. Soils at Plot area 3 were dry. Plot area 3 did not meet the hydrology criteria.

### Potential Wetland Area 4 – Plots 4A and 4B

Plot area 4 was established adjacent to a drainage ditch which traverses a cultivated soybean field on the southwestern portion of the facility property. Plot 4A was located directly adjacent to the soybean field, at the beginning

of the downward slope to the drainage ditch. Plot 4B was located downslope of Plot 4A, and immediately adjacent to the drainage ditch. The soil at Plot 4A was somewhat moist; however, no signs of wetland hydrology were observed here. The soil at Plot 4B was saturated to the ground surface. Plot 4A did not meet the hydrology criteria; however, Plot 4B did meet the hydrology criteria.

### Potential Wetland Area 5 – Plots 5A and 5B

Plot area 5 was established adjacent to the same drainage ditch as Plot area 4. However, Plot area 5 was located east of Plot area 4. Plot 5A was at an upland point, on a downward slope leading from the soybean field to the drainage ditch. Plot 5B was located directly adjacent to the drainage ditch. Soil at Plot 5B was saturated to within one inch of ground surface. Soils at Plot 5A were markedly drier, with moisture increasing with depth. Plot 5A did not meet the hydrology criteria; however, Plot 5B did meet the hydrology criteria.

### Potential Wetland Area 6 – Plot 6A

Plot area 6 was established at the convergence of three drainage ditches within a soybean field on the southern portion of the facility property. A plot was established here because it appeared to be a depressional area where water from the converging drainage ditches ponds sufficiently to support vegetation. The soil moisture increased with depth at Plot 6A, with soil becoming very moist at a depth of 12 inches bgs. No indicators of wetland hydrology were observed here, as the soils were not saturated to within 12 inches of ground surface, there were no water marks, drift lines or sediment deposits. Plot area 6 did not meet the hydrology criteria.

### Potential Wetland Area 7 – Plot 7A

Plot area 7 was established immediately upslope of a drainage ditch traversing a soybean field on the southern portion of the facility property. This is the same drainage ditch that Plot areas 4 and 5 were associated with.

Plot area 7 was established east of Plot areas 4 and 5. Plot 7A was located immediately upland of the drainage ditch. A steep slope led down to the ditch. The location of Plot 7A was above the bank that would typically hold water. No signs of wetland hydrology were evident at Plot 7A; therefore, the hydrology criteria were not met here. Although, a wetland fringe does surround the drainage ditch, and extends approximately five feet in elevation above the water's edge.

### Potential Wetland Area 8 – Plots 8A and 8B

Plot area 8 was established adjacent to a drainage ditch running through a soybean field on the southeastern portion of the facility property. Plot 8A was located directly adjacent to the soybean field. Wetland hydrology was clearly not present at this location, as the field is farmed and drained. Plot 8B was located within the drainage ditch. No signs of wetland hydrology were present (saturated soils within upper 12 inches, water marks, drift lines, sediment deposits). Approximately 40% of the drainage ditch contained vegetation. Plot area 8 did not meet the hydrology criteria.

### Potential Wetland Area 9 – Plots 9A, 9B and 9C

Plot area 9 was established adjacent to a drainage ditch which parallels County Road 300, at the northeastern portion of the facility property. The drainage ditch is bordered by the county road and a soybean field. Plot 9A was located immediately downslope of the soybean field and upslope of the drainage ditch. The area was heavily overgrown in vegetation. Plot 9B was located within the ditch basin. The ditch was heavily overgrown with vegetation and the soil was cracked, indicating that it had not held significant water for some time. Plot 9C was located upslope of the drainage ditch and downslope of the county road. The area was highly overgrown with weedy, roadside vegetation. No signs of wetland hydrology, such as water marks, drift lines and sediment deposits, were present at Plot area 9. Plot area 9 did not meet the hydrology criteria.

Standing water was observed at the southeast quadrant at the intersection of County Roads JJ and 300. Based on the vegetation growth patterns, it appeared as though the areas immediately surrounding the culvert pipes at the road intersections hold the most water with the greatest frequency.

### Potential Wetland Area 10 – Plots 10A, 10B and 10C

Plot area 10 was established within a corridor, measuring approximately 50 feet wide, between two soybean fields. The corridor was somewhat vegetated, with much tree cover. There was a depressional area within the center of this corridor that appeared to have the potential to carry water at times. Plot 10A was located within the corridor, east and upland of the depressional area. No obvious water marks nor drift lines were observed at Plot 10A. Plot 10B was located with the depressional area. There was little to no vegetation on the ground here, although, the area was nearly completely shaded with tree cover. Moss and darker coloration was present at the bases of the trees in Plot 10B (i.e., water marks). Drainage patterns and water-stained leaves were also observed here. Plot 10C was located west and upland of the depressional area. Groundcover was somewhat sparse here, but there was much overhead canopy cover. There were no readily apparent drift lines or water marks at Plot 10C. Plots 10A and 10C did not meet the hydrology criteria. Indicators of wetland hydrology were observed at Plot 10B; therefore, Plot 10B met the hydrology criteria.

### Potential Wetland Area 11 – Plots 11A, 11B and 11C

Plot area 11 was established adjacent to a drainageway within a cultivated soybean field. Plot 11A was located approximately 2-3 feet upland of the drainageway, above the cut of the bank. Indicators of wetland hydrology were not present at Plot 11A. Plot 11B was located within the drainageway. No ground vegetation was present in this area, only overhead canopy cover from trees. Drainage patterns and water-stained leaves were evident at Plot 11B. Plot 11C was located upslope of the drainageway, at an elevation equivalent to that of Plot 11A. Plot 11C was located above the cut of the

bank, and water staining and drift lines were not apparent here. Plots 11A and 11C did not meet the hydrology criteria. Plot 11B did meet the hydrology criteria.

### Corridor Alternatives #1, #2 and #3

Alternative Corridor #1 extends south of the facility property, approximately one mile beyond the BNSF and NS railroads. This area, like that of the facility property, has a general elevation of 675 feet NGVD. As stated earlier, the USGS topographical maps indicate that an agricultural levee exists along the north bank of the Missouri River, in the vicinity of the study area. The USGS 1978 Hardin, 1979 Stet and 1979 Roads, Missouri 7.5 Minute Series Quadrangle Topographic Maps were reviewed for Alternative Corridors #2 and #3, which lie north of the facility property (**Figure 6**). Alternative Corridors #2 and #3 lie within the area of higher elevation, north of the facility property. These areas obviously do not have a potential for flooding from the Missouri River. However, Wakenda Creek and the Wakenda Creek West Fork traverse these two corridors. These creeks have associated floodplain areas, as shown on the USGS topographical maps. The general elevations in the areas of Alternative Corridors #2 and #3 range from 700 feet NGVD to 800 feet NGVD.

According to the FEMA Firm Flood Insurance Rate Maps for Carroll and Ray Counties (**Figure 7**), Alternative Corridor #1 lies entirely within the 100 Year Flood Zone. The portion of Alternative Corridor #2 comprised by Wakenda Creek and its floodplain lies within the 100 Year Flood Zone. The remainder of Alternative Corridor #2 is within an area of minimal flooding. For Alternative Corridor #3, the areas immediately associated with the Wakenda Creek West Fork and its floodplain and an unnamed creek in the southern portion of Alternative Corridor #3 are within the 100 Year Flood Zone. The remainder of Alternative Corridor #3 is within an area of minimal flooding. Of the three Alternative Corridor routes, Alternative Corridor #3 contains the least land area within the 100 Year Flood Zone.

According to the USFWS NWI map (**Figure 9**), palustrine, forested/shrub wetlands were identified within the alternative corridors, in addition to palustrine, emergent wetlands. The palustrine, forested/shrub wetlands occur primarily along the major creeks (Wakenda Creek and its West Fork). Several freshwater ponds also dot the landscape within the alternative corridor areas. As stated above, the FWS wetland classification system requires that a positive indicator of wetlands be present for only one of the three parameters, while the COE 1987 Manual requires that positive indicators for each of the three parameters be present to classify an area as a wetland.

## 4.1 WETLAND DELINEATION RESULTS

The land features and areas suspect as wetlands were evaluated based on the criteria set forth in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual. In brief, each plot was examined for the three parameters: hydrophytic vegetation, hydric soils and wetland hydrology. All three parameters must be met in order for the area to be considered a wetland. **Table 2** presents the wetland determination results for the plots examined in the August 2006 investigation, based upon their satisfaction of the three parameters. "Jurisdictional Wetlands" refers to areas, which meet the criteria for the Clean Water Act Section 404 definition of a wetland. According to the COE, areas not hydrologically connected to navigable surface waters should not be classified as "Jurisdictional Wetlands", nor should they be classified as "Waters of the United States".

The facility property lies approximately six miles north of the Missouri River, within the Missouri River floodplain. According to the Carroll County NRCS soil survey, the Missouri River floodplain is nearly level, and measures about nine miles wide at the widest point. The Missouri River is the largest stream in the region. Wakenda Creek and its tributaries drain most of the western portion of Carroll County, the southern portion of the uplands and the northern part of the bottomlands. Wakenda Creek flows eastward toward the Missouri River.

Despite its position within the Missouri River floodplain, a majority of the areas within the facility property do not meet the three parameters necessary for an area to be designated a jurisdictional wetland. Levees protect the land adjacent to the river. Additionally, nearly all of the facility property is cultivated and farmed. Thus, water for much of the area is actively diverted and the land drained. Furthermore, according to Missouri River gage data, all portions of the facility property are saturated/inundated for less than 5% to 12.5% of the growing season. The only areas that qualify as jurisdictional wetlands within the facility property are wetland

fringes associated with drainageways traversing the farmed fields. **Table 3** presents acreage values for the "Jurisdictional Wetlands" and the linear "Waters of the United States" identified within the facility property.

Observations were made at eleven plot locations within the facility property. Plots 4B, 5B and 11B were determined to be wetland. Wetland areas were observed within the portions of the drainage ditches immediately adjacent to the culvert pipes at the road intersections. However, these areas are isolated, and, therefore, would not fall under COE jurisdiction. The remaining plot locations that were examined by field personnel were determined to be non-wetland, due to the lack of one or more wetland field indicators (hydrophytic vegetation, hydric soil and wetland hydrology).

Plot areas 1, 2 and 3 were established adjacent to the Norfolk Southern rail line at the southern edge of the facility property. This area is sloped and consists of a railroad embankment which leads down to a county road. A variety of volunteer vegetative species inhabit this corridor. Slight depressional areas exist at the base of the railroad embankment and directly adjacent to the county road. The mapped soil in this area is Booker silty clay of the Bremer-Cotter-Booker association. The Booker soils are classified as hydric. None of the plots within these areas met all three wetland criteria. Some of the plots met the hydrophytic vegetation parameter and/or the hydric soil parameter. However, none of these plots displayed the necessary indicators for wetland hydrology.

Plot areas 4, 5, 7 and 8 were established adjacent to the Norborne Drainage Ditch. This ditch traverses a series of farmed soybean fields. Plots 4B and 5B were identified as wetland areas. Each of these plots was located directly adjacent to the drainage ditch, where soil was saturated to at least one inch within ground surface. Vegetation and soils identified at Plots 4B and 5B were indicative of wet conditions. Only one plot point was advanced at Plot area 7. Plot 7A was not identified as a wetland, as it was established above the cut of the bank. A wetland fringe, extending from the water's edge to

approximately 5 feet up the bank, does surround the Norborne Drainage Ditch.

Plot area 6 was established at the convergence of three drainage ditches within a cultivated soybean field. This area was not identified as a wetland since it did not meet the hydrophytic vegetation parameter nor the wetland hydrology parameter. The majority of the vegetation in this area was not suited to wet conditions. Signs of hydrology, such as soil saturation within the upper 12 inches of ground surface, were lacking. The surface soils in the area displayed prominent cracking, indicating that the area had not held significant water for some time.

Plot area 9 was established adjacent to a roadside drainage ditch. The ditch was heavily overgrown with volunteer vegetation. Each of the three plots established in this area met the hydrophytic vegetation parameter; however, none of the plots displayed signs of wetland hydrology. Plot 9B, advanced within the drainageway, did display gleyed soils with prominent mottling; however, soils were not heavily saturated. Standing water was present within the ditches where they converge at road intersections. Vegetation growth patterns suggest that these areas hold sufficient water to encourage the presence of hydric soils and to support a predominance of hydrophytic vegetation.

Plot areas 10 and 11 were established within a shaded corridor between two soybean fields. The corridor contained a central depressional area that appeared as though it may accumulate water. None of the plots established within Plot area 10 were identified as wetland. Plot 11B, established within the drainageway, was identified as wetland. Plots 11A and 11C, located 2 to 3 feet higher than the drainageway were not identified as wetland areas. Therefore, a wetland fringe, measuring approximately 1 to 2 feet on either side of the depressional area near Plot 11, exists.

In addition to Plot areas 1 through 11, field investigators examined the creek which traverses the Kevin Edgar property (northeast portion of the facility property). A wetland area was not identified adjacent to this creek. The

banks of this creek were steeply cut (see Photos #17 and #18). Downed trees at various points along the creek appear to impede the flow of water, leading to some erosion and cutting observed along the bank. Field investigators advanced several soil probes along the bank of this creek; however, the soils were hard, dry and did not display the coloring nor other characteristics of hydric soils.

## 4.2 WATERS OF THE UNITED STATES

"Waters of the United States" is defined in **Appendix F**, and are those waters under jurisdiction of the Corps of Engineers, separate from wetlands, yet included in the Section 404 review process. The Norborne Drainage Ditch was evaluated to be "Waters of the United States". The creek examined on the Kevin Edgar property was not considered to be "Waters of the United States", given that its flow is ephemeral and the creek is isolated from nearby jurisdictional waterways.

Using Ordinary High Water Mark points, other observations gathered by the field investigators and a scaled site map, approximate boundaries of the "Waters of the United States" were determined. **Figure 10** presents an outline of the "Jurisdictional Wetlands" and linear "Waters of the United States" within the facility property. In order to differentiate between jurisdictional wetlands and linear "Waters of the United States" (i.e., streambed where vegetation was absent), the total area of "Waters of the United States" and the area of jurisdictional wetlands have been calculated separately. A total of 3.5 acres of "Waters of the United States" do exist within the facility limits of the project site.

**Table 3** presents acreage values for the "Jurisdictional Wetlands" and the linear "Waters of the United States".

| Table 2 – Identified Jurisdictional Wetlands By Plot | | | | | |
|---|---|---|---|---|---|
| | **Meets Vegetation Criteria?** | **Meets Hydrology Criteria?** | **Meets Soils Criteria?** | **Meets Wetland Criteria** | **Area** |
| 1A | No | No | No | No | |
| 1B | No | No | No | No | |
| 1C | No | No | Yes | No | |
| 2A | No | No | Yes | No | |
| 2B | Yes | No | Yes | No | |
| 2C | No | No | Yes | No | |
| 3A | No | No | No | No | |
| 3B | Yes | No | Yes | No | |
| 3C | No | No | Yes | No | |
| 4A | Yes | No | Yes | No | |
| 4B | Yes | Yes | Yes | Yes | See Norborne Drainage Ditch area |
| 5A | Yes | No | Yes | No | |
| 5B | Yes | Yes | Yes | Yes | See Norborne Drainage Ditch area |
| 6A | No | No | Yes | No | |
| 7A | Yes | No | No | No | |
| 8A | No | No | No | No | |
| 8B | No | No | Yes | No | |
| 9A | Yes | No | No | No | |
| 9B | Yes | No | Yes | No | |
| 9C | Yes | No | No | No | |
| 10A | No | No | No | No | |
| 10B | No | Yes | Yes | No | |
| 10C | Yes | No | Yes | No | |
| 11A | Yes | No | No | No | |
| 11B | Yes | Yes | Yes | Yes | 0.3 acres |
| 11C | No | No | No | No | |
| Wetland Fringe adjacent to the Norborne Drainage Ditch | | | | | 2.6 acres |

| Table 3 – Identified Jurisdictional Wetlands | |
|---|---|
| | **Total Area** |
| Jurisdictional Wetland | 2.9 acres |
| Linear Waters of the U.S. | 0.6 acres |

# SECTION FIVE Conclusions

A preliminary jurisdictional wetland delineation was performed on an area associated with the planned construction of a coal-fired generation unit in Carroll County, Missouri. This site is located near Norborne, Missouri. Field work was performed on August 1-3, 2006 to determine the presence and extent of Clean Water Act Section 404 "Waters of the United States", including "Jurisdictional Wetlands". Based upon the onsite jurisdictional wetland delineation and a review of existing information, it is determined that an estimated 3.5 acres of "Waters of the United States" occur within the facility limits of the project site, with 2.9 acres of that area consisting of "Jurisdictional Wetlands".

The constructed generation unit would also require access to the two nearby existing rail lines. Three alternative routing corridors have been identified, and a desktop, screening level survey of potential wetland impacts associated with each of the corridor alternatives was conducted. Based on a review of published data and field observations gathered during a drive-by survey, it appears that each of the three proposed corridors contain potential wetland areas.

The visual screening level assessment, together with a review of documented information, revealed the following information about the three proposed alternative corridors. Alternative Corridor #1 contains soils of the Bremer-Cotter-Booker association. These soils are characterized as deep, nearly level, well-drained, poorly-drained and very poorly-drained soils that formed in alluvium. These soils occur on floodplains. Bremer and Booker soils comprise a majority of the area within Alternative Corridor #1. These soils are classified as hydric. Alternative Corridor #1, the southernmost corridor, does not contain major drainageways, as do the two other corridors. Alternative Corridor #1 also contains the least amount of potential wooded wetland, as forested areas are mainly located along drainageways in this region. Alternative Corridor #1 is located in an area of lower topography (elevations range from 675 to 685 feet NGVD), within the

Missouri River floodplain. According to the FEMA flood insurance rate maps, the majority of the area comprising Alternative Corridor #1 lies within the 100 Year Flood Zone. USFWS NWI maps display a smattering of freshwater emergent wetland areas throughout this area.

Alternative Corridors #2 and #3 contain soils of the Knox-Higginsville-Wakenda association, the Lagonda-Armster-Grundy association, the Armster-Lagonda-Sharpsburg association, the Zook-Nodaway-Bremer association and the Grundy-Lagonda association. Soils of these associations are generally characterized as somewhat poorly-drained to moderately well-drained, deep and gently sloping to strongly sloping. Several hydric-listed soils are included in Alternative Corridors #2 and #3. Alternative Corridors #2 and #3 lie north of the facility property. These corridors are situated primarily in an upland area comprised of the bluffs which border the Missouri River floodplain. The elevation in this area ranges between 700 feet and 800 feet NGVD. Alternative Corridors #2 and #3 contain a significant portion of Wakenda Creek and the Wakenda Creek West Fork, respectively. Wakenda Creek is a major tributary in the area. Wakenda Creek and its tributaries drain most of the western portion of Carroll County, the southern portion of the uplands and the northern part of the bottomlands. Wakenda Creek flows east toward the Missouri River. Likewise, much of the extent of these creeks is bordered by forest, as evidenced in the drive-by survey, on USGS topographical maps and on the USFWS NWI maps. Wakenda Creek and the Wakenda Creek West Fork each have associated floodplains, that of Wakenda Creek being greater in width. These floodplains are considered to be within the 100 Year Flood Zone, according to FEMA. In addition to the forested/shrub wetland areas traversing both Alternative Corridors #2 and #3, the USFWS NWI maps display some emergent wetland areas and freshwater ponds throughout the corridors.

# SECTION SIX Limitations

This Preliminary Jurisdictional Wetlands Determination has the following limitations regarding the fieldwork and the report:

The data produced from field work and information review was performed between August 1 and August 30, 2006, and is limited to that time period; and,

The data produced from the acknowledged documents and information was available during, and is limited to, this same time period. Site photographs are available from the August 1-3, 2006 site visit conducted by the wetland delineation team.