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## ENVIRONMENTAL ASSESSMENT

# **APPROVAL OF ILLINOIS COAL LEASE MINE PLAN - SUGAR CAMP MINE NO. 1**

**Hamilton and Franklin Counties, Illinois**

**PREPARED BY:**  
TENNESSEE VALLEY AUTHORITY

MAY 2011

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## SYMBOLS, ACRONYMS, ABBREVIATIONS, AND GLOSSARY OF TERMS

§	Section
§§	Sections
<b>Bleeder Shaft</b>	A ventilation shaft that is used to remove (or “bleed”) methane from an underground mine in order to maintain safe air quality conditions
<b>CEQ</b>	Council on Environmental Quality
<b>CFR</b>	Code of Federal Regulations
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>dB</b>	Decibels
<b>EA</b>	Environmental Assessment
<b>ENCA</b>	Ewing-Northern Coal Acquisition
<b>EO(s)</b>	Executive Order(s)
<b>e.g.</b>	Latin term, <i>exempli gratia</i> , meaning “for example”
<b>et al.</b>	Latin term, <i>et alii</i> (masculine), <i>et aliae</i> (feminine), or <i>et alia</i> (neutral), meaning “and others”
<b>et seq.</b>	Latin term <i>et sequential</i> , meaning and the following one
<b>FEMA</b>	Federal Emergency Management Agency
<b>IAC</b>	Illinois Accessibility Code
<b>IDNR</b>	Illinois Department of Natural Resources
<b>IEPA</b>	Illinois Environmental Protection Agency
<b>ILCS</b>	Illinois Compiled Statutes
<b>ISGS</b>	Illinois State Geologic Survey
<b>LLC</b>	Limited Liability Corporation
<b>LP</b>	Limited Partnership
<b>NAAQS</b>	National Ambient Air Quality Standards
<b>NEPA</b>	National Environmental Policy Act
<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>PM<sub>2.5</sub></b>	Particulate matter less than 2.5 microns in diameter
<b>PM<sub>10</sub></b>	Particulate matter less than 10 microns in diameter
<b>RRA</b>	Resource Rich Area
<b>Shadow area</b>	Area aboveground that will subside from underground mining activities
<b>SHPO</b>	State Historic Preservation Officer
<b>TVA</b>	Tennessee Valley Authority
<b>USACE</b>	United States Army Corps of Engineers
<b>USEPA</b>	United States Environmental Protection Agency
<b>USFWS</b>	United States Fish and Wildlife Service
<b>WPA</b>	Works Progress Administration

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# CHAPTER 1

## 1.0 PURPOSE OF AND NEED FOR ACTION

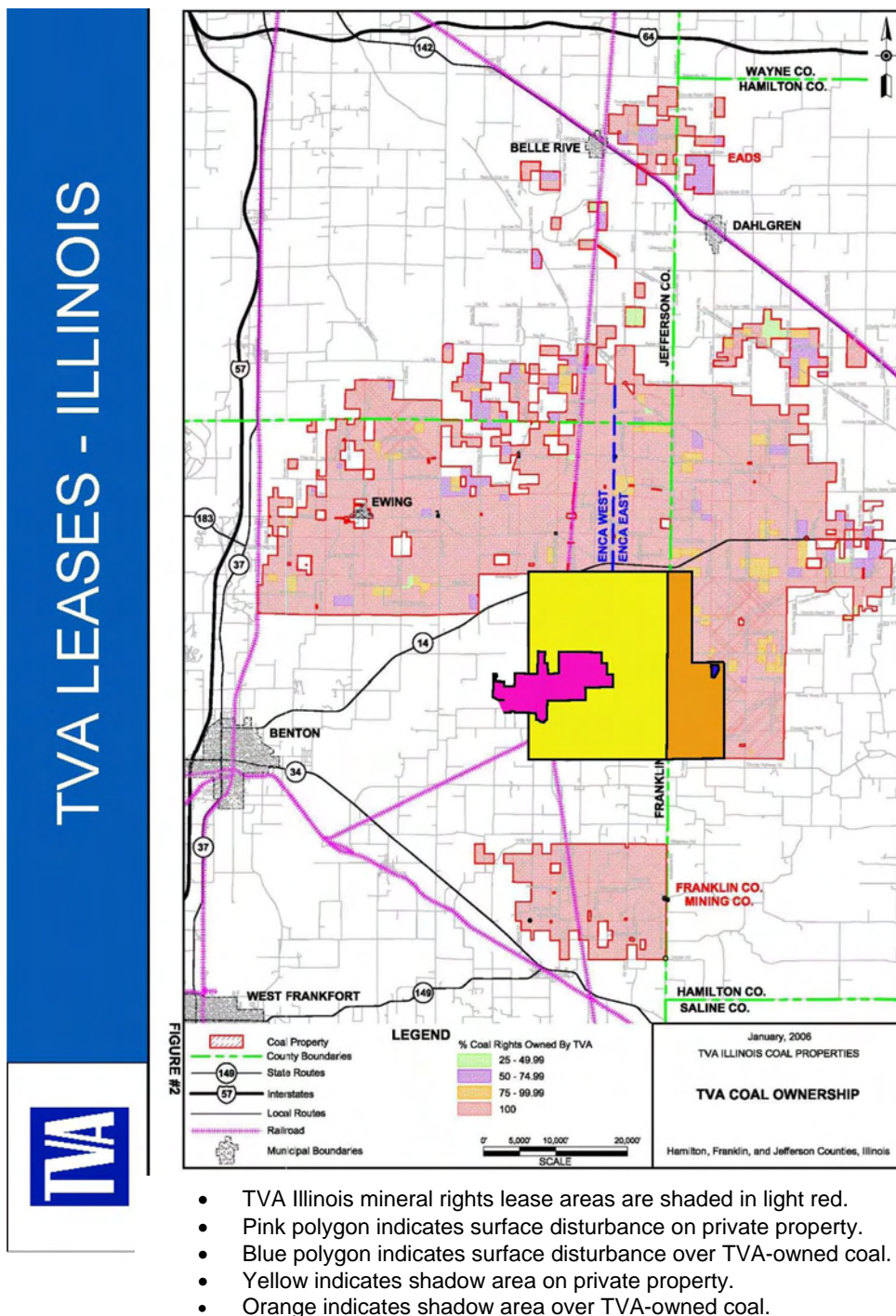
The Tennessee Valley Authority (TVA) is a federal corporation created in 1933 by an act of Congress to promote the economic and social well-being of the residents of the Tennessee Valley region. As part of its regional development mission, TVA constructed one of the nation's largest electric systems, which serves seven states in the southeastern United States. TVA is one of the five largest power generators in the nation, utilizing coal-, nuclear-, hydro-, natural gas-, fuel oil-, and renewable energy-powered generating facilities capable of producing 34,400 megawatts. In 2010, TVA produced about 147,421 gigawatt-hours of electricity.

As part of its diversified energy strategy, TVA acquired mineral rights in the southwestern section of the Illinois Basin coalfield. TVA generally leases its mineral rights, at auction, to private coal mining companies. TVA receives a per ton or percentage payment, known as a royalty payment, from each lessee based on the amount of coal recovered from each coal lease. The royalty payment amount varies according to the market. The mine operator then sells the coal on the open market. In 2002, TVA leased these Illinois Basin coalfield reserves to a coal mining company with the condition that any proposed mine plan must first undergo environmental review before mining of the TVA-owned coal and related activities begin. The mine plan must also undergo review by the State of Illinois, which has regulatory authority over mining activities delegated by the federal Office of Surface Mining Reclamation and Enforcement.

In 2008, Sugar Camp Energy LLC (Sugar Camp) obtained a permit from the Illinois Department of Natural Resources (IDNR) Land Reclamation Division for underground longwall mining operations (including the associated subsidence area, called "shadow area" in the mine permit as well as the surface disturbance areas) on approximately 12,103 acres of land in Franklin and Hamilton counties. In 2010, Sugar Camp applied for a Significant Boundary Revision of the existing permit to mine TVA-owned coal under an additional 817-acre shadow area. Sugar Camp also applied for Incidental Boundary Revisions of the permit for road access and the installation of a ventilation bleeder shaft on land overlying TVA-owned coal. This permit was issued in May 2010. The surface facilities and mine entrance to the Sugar Camp Mine No. 1 are located in Franklin County on privately owned land. The TVA-owned coal, located in Hamilton County, would be accessed using the Franklin County mine entrance. The only surface disturbance over TVA-owned coal would be from the ventilation shaft construction and road access modifications. This would include about 5 acres of surface disturbance within a 17-acre parcel for the ventilation shaft construction area and road access. A large portion of the surface-disturbing work had already been completed when TVA received the mine plan for approval. TVA-owned coal underneath approximately 2,600 acres of land is included in the revised mine plan.

TVA has prepared this environmental assessment (EA) under the National Environmental Policy Act (NEPA) to assess potential impacts that may occur due to the approval of Sugar Camp's proposed mine plan of TVA-owned coal underneath approximately 2,600 acres of land. TVA's approval is a federal action and such action is subject to NEPA.

The TVA-owned coal, where the proposed mining would occur, is located in southwestern Hamilton County (Figure 1-1) immediately east of the Franklin and Hamilton county line.



**Figure 1-1. Location of TVA-Owned Coal in Southern Illinois**

### 1.1. The Decision

TVA must determine whether to approve Sugar Camp's mining plan for actions affecting TVA-owned coal.<sup>1</sup> The majority of the mine is on private property in Franklin County for which TVA has no decision or permission granting authorities. The State of Illinois has regulatory authority (i.e., state primacy) over the entire Sugar Camp Mine No. 1; the TVA lease requires additional approval by TVA for actions affecting its mineral rights.

TVA's action includes the approval of a mining plan that proposes to undertake the following activities:

- Construction of a 20-foot-diameter ventilation bleeder shaft (Figure 1-2).
- Surface disturbance of about 5 acres within a specified 17-acre area for construction of surface facilities associated with the bleeder shaft. These facilities include an access road connecting the shaft site to County Road 850N, two culverts (one 30-inch and one 18-inch diameter) underneath the connecting access road, three soil piles, a laydown yard for construction equipment, and a drilling fluid recirculation pond (Figure 1-2).
- The controlled subsidence (sinking of the surface from belowground mining) of about 2,600 acres of land above the TVA-owned coal.

Sugar Camp's actions on private property that do not require TVA's approval include:

- About 1,264 acres of surface disturbance in Franklin County, including wetland modifications, wetland mitigations, and surface facility construction.
- Subsidence of about 9,200 acres in Franklin County.
- Point source discharges to Middle Fork of the Big Muddy River and Akin Creek.

The mining activities occurring on the Franklin County portion of the mine were not considered as connected actions to the proposed Hamilton County action because the Franklin County portion can be mined regardless of TVA's decision on the Hamilton County portion.

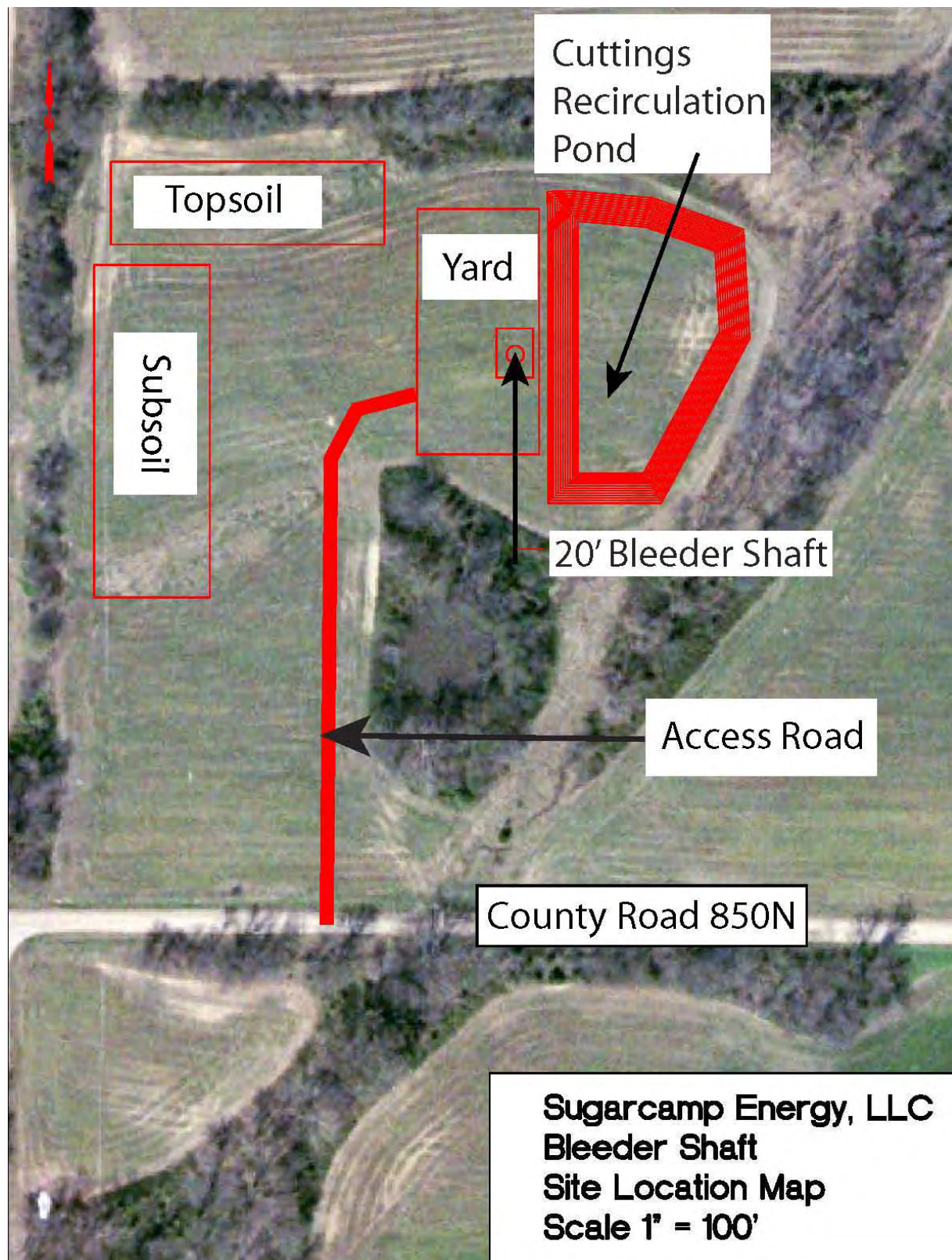
### 1.2. Other Pertinent Environmental Reviews or Documentation

Sugar Camp must obtain permits from other state and federal agencies for its proposed mine plan in addition to TVA's approval. These other agencies also require the completion of environmental reviews and public comment periods as part of their permit approval processes. The permits and approvals from other agencies involved in the authorization of Sugar Camp's mine plan include Mine Permit No. 382 (issued by the IDNR Land Reclamation Division in 2008; Appendix A). Sugar Camp was granted this permit for mining activities on 12,203 acres of land in both Franklin and Hamilton counties. This included approximately 1,790 acres of shadow area over TVA-owned coal. Several revisions made to this permit include:

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<sup>1</sup> Any reference to TVA coal lease property applies only to TVA's ownership of mineral rights to the underlying coal. TVA does not own the surface landrights.





**Figure 1-2. Proposed Plan for Bleeder Ventilation Shaft Installation on Land Overlying TVA-Owned Coal**

- Incidental Boundary Revision No. 1 to Mine Permit No. 382 (issued by the IDNR Land Reclamation Division in 2010) for 1.45 acres of land for road access on private property.
- Incidental Boundary Revision No. 2 to Mine Permit No. 382 (issued by the IDNR Land Reclamation Division in 2010) for 17 acres of surface disturbance for ventilation bleeder shaft installation overlying TVA-owned coal.
- Incidental Boundary Revision No. 3 to Mine Permit No. 382 (issued by the IDNR Land Reclamation Division in 2010) for 19 acres of shadow area over TVA-owned coal.
- Significant Boundary Revision No. 1 to Mine Permit No. 382 (currently in review by the IDNR Land Reclamation Division) for 817 acres of subsidence (e.g., shadow area) overlying TVA-owned coal. The boundaries of this permit include the 19 acres of shadow area previously approved in Incidental Boundary Revision No. 3. Additional revision to the permit on privately owned land includes Incidental Boundary Revision No. 1 to Mine Permit No. 382 (issued by the IDNR Land Reclamation Division in 2010) for 1.45 acres of land for road access on private property and Incidental Boundary Revision Nos. 4 and 5 to Mine Permit No. 382 for two concrete bore holes on private property.
- Section 401 Water Quality Certification (issued by the Illinois Environmental Protection Agency [IEPA] Bureau of Water in 2009) for the discharge of fill material and dredging in wetlands, Akin Creek, and Middle Fork Big Muddy River on the private property portion of Sugar Camp Mine No. 1 in Franklin County.
- National Pollutant Discharge Elimination System (NPDES) Permit (issued by the IEPA Bureau of Water in 2008) for point source discharge of pollutants into the Middle Fork Big Muddy River, Akin Creek, and two unnamed tributaries on the private property portion of Sugar Camp Mine No. 1 in Franklin County.
- Section 404 Permit (issued by the United States Army Corps of Engineers [USACE] in 2009) for dredge or fill activities in wetlands on the private property portion of Sugar Camp Mine No. 1 in Franklin County.
- United States Fish and Wildlife Service (USFWS) concurrence on the impact of federal actions on federally listed as threatened and endangered species.
- Illinois Historic Preservation Agency concurrence on the impact of federal actions on Illinois historic and archaeological sites.

### **1.3. The Public Comment and Scoping Process**

Public comments were received by the State of Illinois during the Section 401, NPDES, and Section 404 permitting processes. Comments included concerns about groundwater, water pollution, and the flooding of farmland.

The USACE held a public comment period for Sugar Camp's Section 404 application from May 16 to June 16, 2008. The IEPA held a public meeting on September 23, 2008, and a public comment period from September 23 to October 23, 2008, for Sugar Camp's NPDES

application. The IEPA also held a public meeting on August 6, 2009, and a public comment period from July 7 to September 8, 2009, for Sugar Camp's Section 401 Certification application. TVA's review of the transcripts from these meetings and agency responses provided information for the preparation of this EA.

Based on TVA's experience with completing EAs for other mining projects, the nature of the proposed action, public comments, agency comments and responses, and all other available information, the following potentially affected environmental resources were analyzed in this EA:

- Prime Farmland
- Floodplains
- Water Supply
- Groundwater
- Surface water
- Wetlands
- Air Quality
- Greenhouse Gases
- Wildlife
- Vegetation
- Aquatic Communities
- Natural Areas
- Transportation
- Utilities
- Socioeconomic Conditions and Environmental Justice
- Cultural Resources
- Noise

The proposed project area for this EA includes the 2,600 acres of land overlying TVA-owned coal that would be subsided, 5 acres of which already have surface disturbance.

With respect to the cumulative impacts analysis of aquatic communities, endangered and threatened species, natural areas, and wetlands, the study area for this EA includes both the land overlying TVA-owned coal and the private property portions of the Sugar Camp Mine No. 1.

Regarding the cumulative impacts analysis of air quality and greenhouse gases, the study area includes the land overlying TVA-owned coal and the private property portion of Sugar Camp Mine No. 1, as well as the rest of Illinois and the United States.

#### **1.4. Relevant Regulations and Statutes**

The following statutes and executive orders (EOs) are applicable to the proposed activities assessed in this environmental review.

##### **Federal Statutes**

- American Indian Religious Freedom Act (42 United States Code [USC] § 1996)
- Archaeological and Historic Preservation Act (16 USC §§ 469-469c)
- Archaeological Resources Protection Act (42 USC §§ 470aa-470mm)
- Clean Water Act (33 USC §§ 1251-1387)

- Endangered Species Act (16 USC §§ 1531-1599)
- Farmland Protection Policy Act (7 USC §§ 4201-4209)
- Fish and Wildlife Coordination Act (16 USC §§ 661-667e)
- Bald and Golden Eagle Protection Act (16 USC §§ 668a-d)
- Migratory Bird Treaty Act (16 USC §§ 703-712)
- Mine Safety and Health Act (30 USC §§ 801-962)
- National Environmental Policy Act (42 USC §§ 4321-4370h)
- National Historic Preservation Act (16 USC §§ 470-470x-6)
- Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.)
- Safe Drinking Water Act (42 USC §§ 300f to 300j-26)
- Surface Mining Control and Reclamation Act (30 USC §§ 1201 to 1328)

### **State Statutes**

- Illinois Surface Coal Mining Land Conservation and Reclamation Act (Chapter 225, Act 720)
- Illinois Environmental Protection Act (Chapter 415, Act 5, Title III)
- Illinois Endangered Species Protection Act (520 Illinois Compiled Statutes [ILCS] 10)
- Illinois Natural Areas Preservation Act (525 ILCS 30)
- Human Skeletal Remains Protection Act (20 ILCS 3440; 17 Illinois Accessibility Code [IAC] 4170)

### **Executive Orders**

- EO 11988 Floodplain Management
- EO 13112 Invasive Species
- EO 11990 Protection of Wetlands

## **1.5. Background on TVA Illinois Coal Lease Properties**

The timeline and management of TVA's Illinois coal reserve properties is summarized as follows:

- TVA obtained rights to coal reserves underneath 64,959 acres of land in Illinois between 1964 and 1984; these reserves (known as the Eads, Franklin, and Ewing-Northern Coal Acquisition [ENCA] reserves) contain about 1.35 billion tons of coal found within the Illinois Herrin No. 6 and Springfield No. 5 coal seams.
- In 1988, TVA transferred a portion of surface rights in the Eads reserves surface to the State of Illinois. This land is now part of the Ten Mile Creek State Fish and Wildlife Area.
- In July 2002, TVA leased its ENCA and Eads reserves to Illinois Fuel Company LLC.
- In August 2009, TVA consented to Illinois Fuel's assignment of the lease to Ruger Coal Company (Ruger) and to the mining of the leased coal reserves by Ruger's affiliate, Sugar Camp. Ruger is owned by Foresight Reserves LP, which is a subsidiary of the Cline Energy and Development Group. Although the lease ownership has changed hands, the original requirements for the lease have remained the same. As stated previously, no mining or related activities may occur

within the coal lease area until TVA has completed an environmental review and has approved Sugar Camp's mining plan.

- In 2010, Sugar Camp submitted a mine plan for a portion of the TVA-owned mineral rights in Hamilton County.

## **1.6. Background on Underground Mining Practices**

Longwall mining has been used in the United States since the 1960s. It is an efficient method for removing large, continuous blocks of underground coal (called longwall panels). Over 75 percent of the coal can usually be extracted from a longwall mine (World Coal 2009). Once the coal is removed, the underground mined-out areas are allowed to collapse in a monitored process referred to as "controlled subsidence." The amount of subsidence within a shadow area depends on the height and width of the mined longwall panel, the depth of the mine, and the type of rocks in the layers between the mine's ceiling and the earth's surface. Controlled subsidence is predictable and can be estimated during the engineering design of the mine.

### **Development of Longwall Mines**

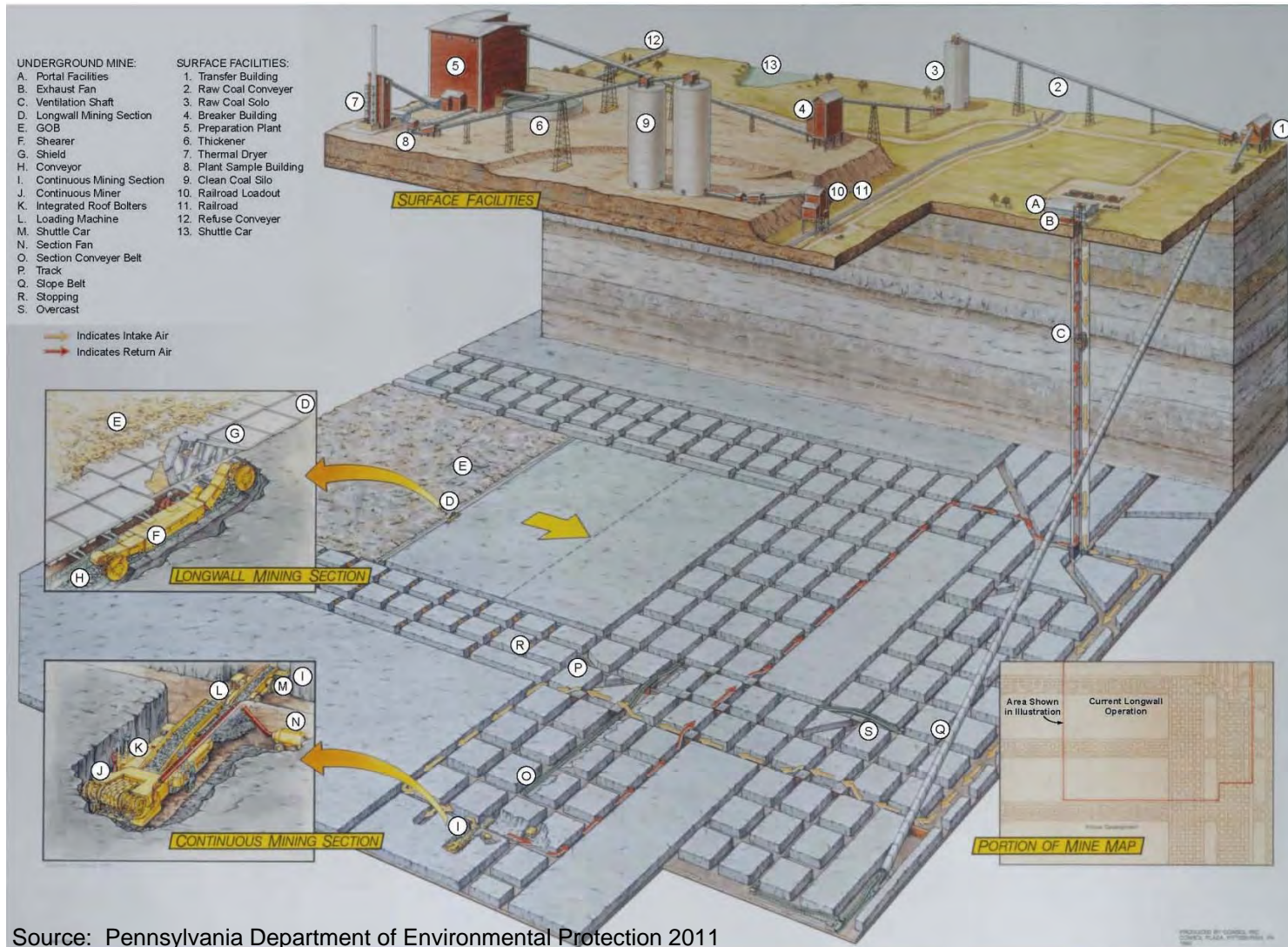
Longwall mines consist of two operational components: (1) surface facilities and (2) underground workings (Figure 1-3). Surface facilities, such as operations offices, mine entries, supply and coal storage areas, and laboratories, generally require an area of 300 to 500 acres in order to provide access to the mine (shafts and slopes) and all of the support services necessary for mining, processing, and transporting the coal. The surface facilities for Sugar Camp Mine No. 1 are located in Franklin County on private property.

The underground workings of a longwall mine can be thousands of acres in size and can extend for miles from the mine entrance. Underground workings consist of passageways and workspaces that equipment and miners occupy. Longwall mining and the associated underground workings for Sugar Camp Mine No. 1 are proposed to mine TVA-owned coal.

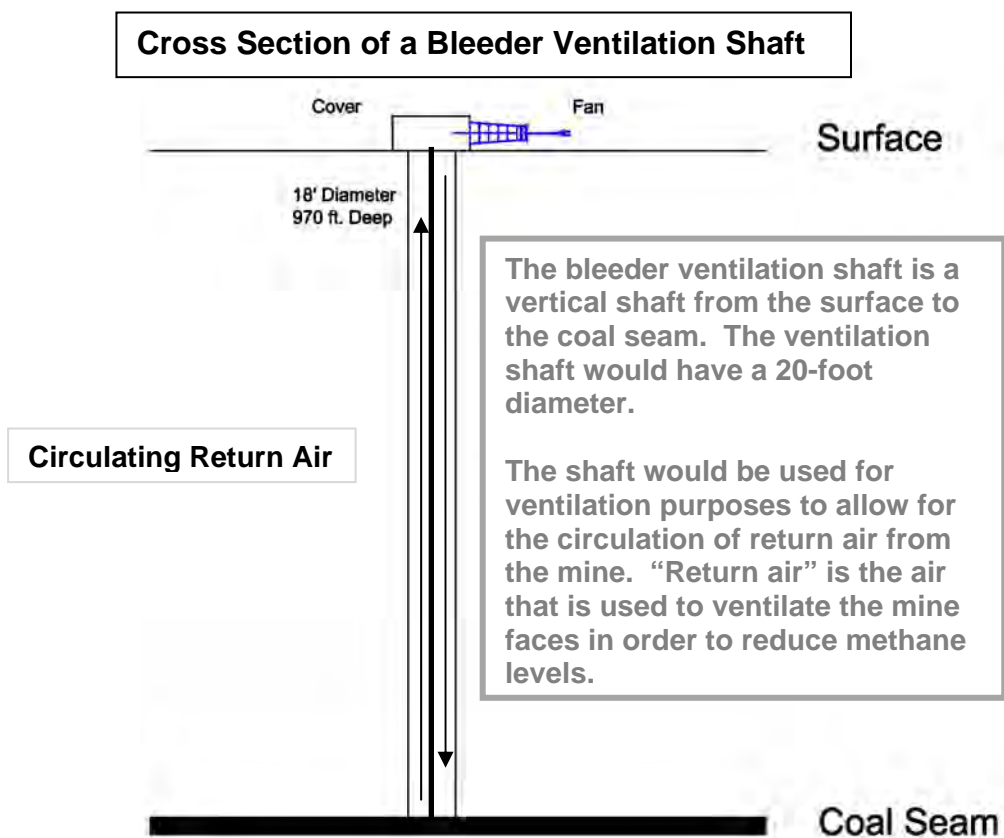
### ***Bleeder Ventilation Shafts***

A bleeder shaft is part of a ventilation system, which consists of entries, ventilation controls, and fans, that removes methane gas from mine areas. Bleeder shafts circulate clean air through the underground workings to eliminate accumulations of methane gas, and the methane-laden air is exhausted through the bleeder shaft (Figure 1-4). Fans are installed in the ventilation shaft to increase the rate of air circulation, which reduces the risk of explosions and fires. Methane in concentrations between 5 and 15 percent can be explosive (Kissell 2006). Safety regulations usually require that methane levels be kept lower than 1 percent for the health and safety of mine workers. One bleeder ventilation shaft is proposed on land overlying TVA-owned coal. According to Sugar Camp, the coal in this area of the southern Illinois field has low methane content.





**Figure 1-3. A Typical Longwall Mining Plan**



**Figure 1-4. Diagram of a Ventilation Bleeder Shaft**

## CHAPTER 2

### 2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

#### 2.1. The Alternatives

TVA is considering two alternatives—the No Action Alternative and the Action Alternative.

##### 2.1.1. *The No Action Alternative*

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan; therefore, underground mining would not occur on the TVA-owned coal. Conditions within the underlying TVA mineral rights property would not change, and no subsidence would occur aboveground. However, underground mining and subsidence would still occur on adjacent private property.

##### 2.1.2. *The Action Alternative*

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This plan includes approximately 2,600 acres of underground mining and subsidence on land overlying TVA-owned coal, and 5 acres of surface disturbance within a 17-acre area for the ventilation shaft installation (the surface disturbance would be within the shadow area). The proposed mine plan includes the underground longwall mining of six panels of coal within the Herrin No. 6 coal seam. Each longwall panel would be approximately 1,436 feet wide, 19,825 feet long, and 6 feet thick; the majority of each panel would be on private property (see Figure 2-1).

A ventilation bleeder shaft, a site entrance, and an access road to the ventilation shaft, in addition to soil piles, a laydown area, a drilling fluid recirculation pond, and two culverts associated with the access road, would be constructed off County Road 850N.

Following coal recovery, Sugar Camp would restore original drainage conditions and correct any damage that may have been caused by subsidence (e.g., cracks in building foundations or road surfaces, flooding from subsided streams). Drainage restoration would be accomplished through stream-dredging activities, which are subject to requirements under state law and under Section 404 of the Clean Water Act. TVA would review these stream-dredging activities in order to assess potential impacts on cultural resources. The goal of the drainage restoration is to return the land to the baseline conditions that existed prior to the start of coal recovery. These land uses include residential, wildlife habitat, cropland, and livestock grazing.

#### 2.2. Comparison of Alternatives

The Action Alternative would involve approximately 5 acres of surface disturbance for bleeder ventilation shaft construction and the subsidence of approximately 2,600 acres over TVA-owned coal. No TVA coal would be affected by the No Action Alternative. The effects of the No Action Alternative and the Action Alternative have been summarized in Table 2-1.





**Table 2-1. Comparison of the Action and No Action Alternatives' Environmental Effects on TVA Coal Lease Property**

Resource Area	Action Alternative	No Action Alternative
Prime Farmland	Less than 1 acre of prime farmland would be impacted by bleeder shaft construction.	No effect
Floodplains	Twenty-six hundred acres of land on TVA coal lease property would subside. Drainage would have to be mitigated.	No subsidence on TVA coal lease property would occur.
Groundwater	Aquifer levels would decrease because of subsidence. Any reduction in well water would have to be compensated for by Sugar Camp.	No effects
Surface Water	Siltation would increase in streams, caused by erosion from surface disturbance	No effect
Wetlands	Additional wetland area would be temporarily created until stream drainage repair.	No effect
Air Quality	Minor amounts of criteria pollutant emissions would be generated from construction vehicles and equipment.	No additional National Ambient Air Quality Standards emissions would be generated.
Greenhouse Gases	Methane would be released from the coal seam; emissions are under 25,000 tons per year	No methane would be released.
Wildlife	Five acres of surface would be disturbed. No trees would be removed during construction; therefore, the Indiana bat and piping plover would not be affected. Future environmental reviews would need to be conducted for subsidence drainage repair.	No effect
Vegetation	Five acres of surface would be disturbed. No trees would be removed during construction.	No effect
Aquatic Ecology	Surface disturbance would contribute to stream siltation.	No effect
Natural Areas	Nearby natural managed areas would be affected by groundwater hydrology changes caused by subsidence.	No effect
Transportation	Construction of connector road between bleeder shaft site and County Road 850N would occur. Subsidence occurring underneath local roads would require repair.	No effect
Utilities	Transmission lines and underground utilities would require repair after subsidence.	No effect
Socioeconomics	Temporary jobs would be created for bleeder shaft construction.	No effect
Cultural Resources	Archaeological sites and historic structures would subside within 2,600-acre shadow area. <ul style="list-style-type: none"> <li>No impact would occur on archaeological sites because of uniform sinking of surface layer.</li> <li>Impact on the Cutright house would be insignificant with presubsidence damage minimization efforts.</li> <li>Potential adverse impacts to the Flannigan Works Progress Administration [WPA] No. 5711 bridge would be caused by subsidence; a historic structure survey would be necessary.</li> </ul>	No effect
Noise	There would be a temporary increase of noise at the bleeder shaft construction site.	No effect

### **2.3. The Preferred Alternative**

TVA's Preferred Alternative is the Action Alternative. Under the Action Alternative, surface subsidence would occur on 2,600 acres overlying TVA-owned coal that would be mined. A ventilation shaft, an access road to the bleeder shaft off County Road 850N, and associated facilities would also be completed.

## CHAPTER 3

### 3.0 AFFECTED ENVIRONMENT

The project area's existing physical, biological, and cultural resources are described in this section. These resources could potentially be affected by the proposed underground mining. The proposed project area includes approximately 2,600 acres of land over TVA-owned coal in Hamilton County, Illinois. About 5 acres of land would have surface disturbance. The major impact on the land overlying TVA-owned coal would be the subsidence of approximately 2,600 acres of land. The effects of subsidence can be predicted based on the thickness of the coal seam to be mined (6 feet in the Sugar Camp Mine No. 1) and the structure of rock layers above the mine. Maximum subsidence of about 4.8 feet has been calculated for the Sugar Camp Mine. Computer modeling has indicated five areas of drainage on TVA-owned coal lease property that would likely need to be repaired (Appendix B).

TVA has evaluated the applicant's proposal and has determined that certain resources would not be affected due to the nature of the proposed actions. These resources include recreation, Wild and Scenic Rivers, the landscape viewshed, and navigation.

Resources that could potentially be affected by the proposed action that are considered further in this EA include the following: prime farmland, floodplains, water supply, groundwater, surface water, wetlands, air quality, greenhouse gas emissions, terrestrial wildlife, vegetation, aquatic communities, natural areas, transportation, utilities, socioeconomic conditions and environmental justice, cultural resources, and noise levels.

#### 3.1. Physical Characteristics

The project area is located in a rural section of southern Illinois. It contains a mix of agricultural, natural, and residential landscapes typical for the region. The area primarily contains isolated residences in unincorporated areas; the Macedonia Community is also within the proposed shadow area. The region is within the Big Muddy watershed, which drains into the Mississippi River. The project area occurs within the Southern Illinois Till Plain ecoregion, which is a subdivision of the Interior River Valleys and Hills Level III ecoregion (United States Environmental Protection Agency [USEPA] 2011a). The Interior River Valleys and Hills ecoregion is a glaciated transitional area between the more forested Ozark Highlands and the flatter, less divided, more extensively cropped, and much less forested Central Corn Belt Plains (Woods et al. 2006). Southern Illinois receives an average of 44 to 46 inches of precipitation a year; 12 to 16 of these inches are snowfall. Yearly temperature averages range from about 58 degrees Fahrenheit (°F) to 67°F (Angel 2008).

#### Topography

The proposed project lies in an area of rolling uplands with elevations ranging from 350 feet to 640 feet above mean sea level. The project area's soils and landforms were created by erosion of the bedrock and glacial deposits and were sculpted by the existing streams. Soils within the project area range from moderately drained (which support agriculture) to poorly drained (which support forested wetlands). Artificial drainage ditches have extended the agricultural land into areas that had previously been wetland. The Southern Illinois Till Plain ecoregion has flat to rolling till plains (large flat plains covered with rocks, silt, and gravel that were deposited by glaciers) that become more hilly to the south. Low moraines

(i.e., till plains with irregular topography covered in soil, boulders, and rocks deposited by a glacier) also occur in this area.

### **Geology and Soils**

The project is located in the southern portion of the Illinois Basin coalfield. The Herrin No. 6 coal seam, which would be mined in the proposed project, lies from 750 to more than 900 feet belowground. The Herrin No. 6 coal seam is part the Carbondale formation, which is of Middle Pennsylvanian age (300 to 318 million years old). The Pennsylvania System and several layers of shale and limestone (e.g., Anvil Shale, Brereton Limestone, Anna Shale, and Energy Shale) lie above the Herrin No. 6 coal seam. Unconsolidated glacial drift (rocks deposited by glaciers) lies above the Pennsylvania System. Soils in the area are approximately 20 feet thick. Claystone, sandy shale, and limestone lie under the coal seam.

Aquifers contained within these geologic formations are limited in size because high percentages of clay and porous sand and gravel beds do not create optimal conditions for retaining water.

The Illinois State Geologic Survey (ISGS) Illinois Oil and Gas Resources Internet Map Service indicates a major oil field is south of the town of McLeansboro in Hamilton County that extends into the project area. Oil and gas reserves in this area are located between 3,400 and 6,000 feet below the surface, which is far below the Herrin No. 6 seam of coal (700 to 1,000 feet below the surface). The general project area contains five abandoned and plugged oil and gas wells (ISGS 2011). These oil and gas wells would not be disturbed by mining activities.

#### **3.1.1. Prime Farmlands**

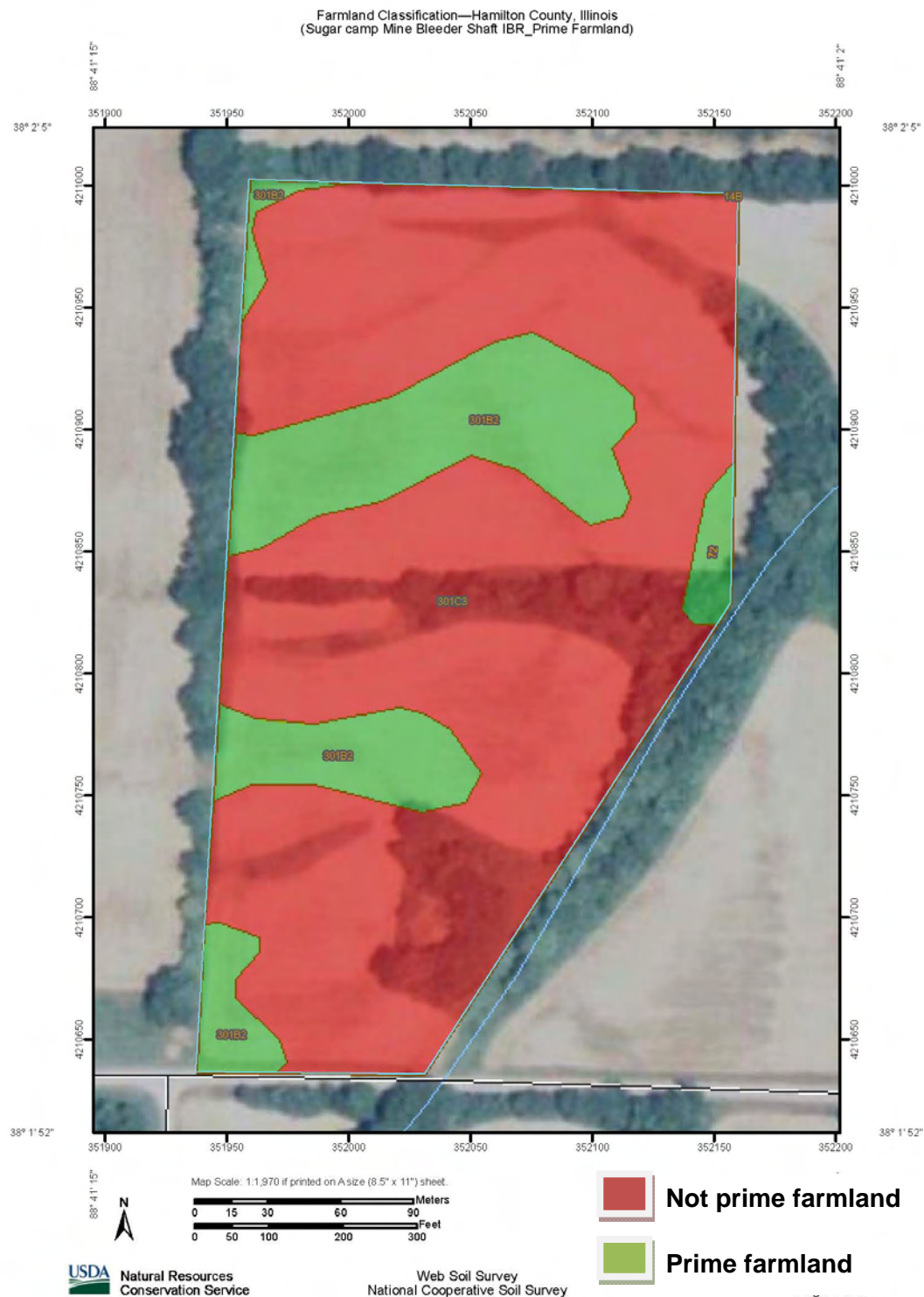
Prime farmland is largely determined by soil composition, rainfall, and climate. The major agricultural resources in this region include corn, sorghum, beans, and grains in addition to livestock such as horses, sheep, and cattle.

Prime farmland occurs within the proposed surface disturbance area on TVA-owned coal lease property where the bleeder shaft would be constructed (Figure 3-1). A small portion of this prime farmland (less than 1 acre) would be affected by the installation of the bleeder shaft, its associated connector road, and other facilities. Prime farmland also occurs within the proposed subsidence area over TVA-owned coal (Figure 3-2).

#### **3.1.2. Floodplains**

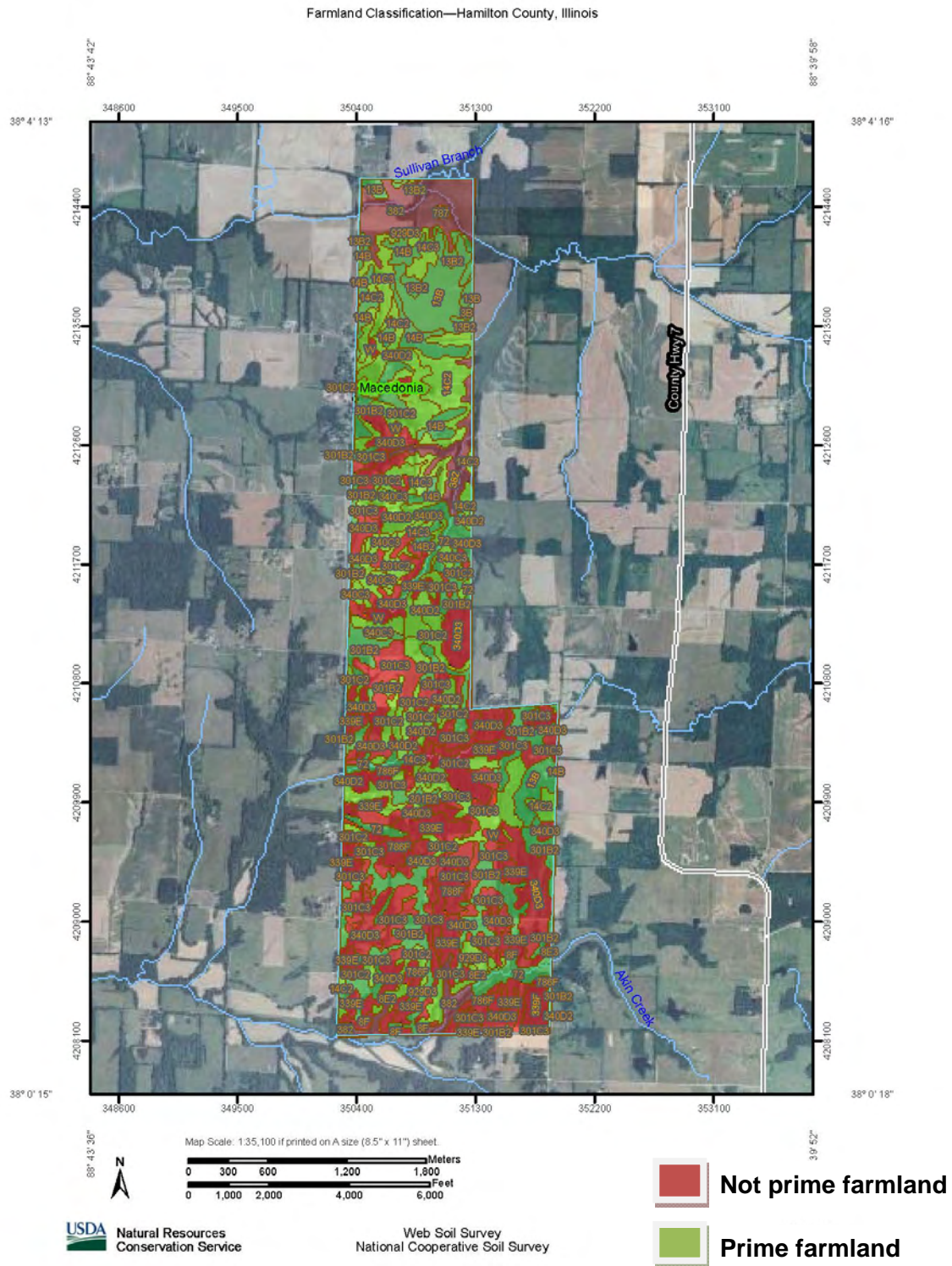
A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a 1 percent chance of flooding in any given year is known as the 100-year floodplain. Floodplains are important because they reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and support wetlands, fish, and wildlife. The Federal Emergency Management Agency (FEMA) publishes flood insurance rate maps that illustrate these 100-year floodplains. These maps indicate that the majority of the proposed subsidence area on TVA-owned coal lease property is outside of the 100-year floodplain. The most southern portion falls within the Akin Creek floodplain and the most northern portion falls within the Middle Fork Big Muddy River floodplain; the majority of streams overlying the TVA-owned coal are intermittent (FEMA 1990a; 1990b).





**Figure 3-1. Prime Farmland Within the Proposed Bleeder Shaft Construction Area**

# Sugar Camp Mine No. 1 Mine Plan Approval



**Figure 3-2. Prime Farmland Overlying the Proposed TVA-Owned Coal**

### **3.2. Water Resources**

Portions of the Middle Fork of the Big Muddy River and Akin Creek flow through the TVA mineral lease area, and several ponds and intermittent minor streams are within this area. Mining can affect water quality by increasing sedimentation, nutrient and pesticide loading, and acidic drainage (caused by increases in iron, nutrient loads, manganese, or total dissolved solids from the mined material and reclamation activities). Many of these impacts can be mitigated by using best management practices.

Mine reclamation would involve recontouring, drainage restoration, and revegetation of affected areas. Reclamation and revegetation would mitigate potential impacts on water resources from surface drainage, erosion, and sedimentation on the mine site and its vicinity. Ongoing water quality monitoring is a requirement of the mine permitting process.

The main water resource issues associated with the proposed Sugar Camp Mine No. 1 include concerns about changes in water quality and quantity caused by surface disturbance and subsidence. Groundwater and surface water quality and quantity can also affect wetlands. This section describes the potentially affected environment for groundwater, surface water, and wetlands.

#### **3.2.1. Water Supply**

Three residences on or bordering the land over TVA-owned coal indicated that they use a well as their primary water supply during the residential water use survey conducted by Sugar Camp. The majority of residents obtain their water supply from rural and municipal water systems. In addition to these bedrock domestic wells, a few shallow wells (cisterns) are present that are generally used for secondary uses (e.g., gardening, lawn watering, livestock watering). These cisterns collect water from both localized groundwater and surface water sources.

#### **3.2.2. Groundwater**

No major aquifers are known to occur in the area.

Local groundwater conditions were characterized from data included in the Sugar Camp Mine plan application. The TVA-owned coal included in Mine Permit No. 382 lies within the same general soils and geologic environment. Groundwater samples had acceptable concentrations of total dissolved solids, sulfates, and chlorides; groundwater samples also contained moderate iron concentration and alkalinity (Illinois Department of Health 2011; Sugar Camp 2007).

Sugar Camp is not proposing to use groundwater for its mining activities. The mining company is still required, however, to monitor groundwater quality in order to assess any changes in groundwater quality that may be caused by subsidence or mining activities.

#### **3.2.3. Surface Water**

Surface water is defined as water flowing through a defined watercourse (for instance, creeks, rivers, and streams), or stored within a reservoir, pond, or lake. The surface water bodies within the mine area primarily include Akin Creek, Middle Fork of the Big Muddy River, man-made freshwater ponds, and USACE jurisdictional wetlands. Additional information on area streams is presented below in Section 3.4.3.

### **3.2.4. Wetlands**

Wetlands are areas that are flooded or inundated by water frequently and for long enough periods to support vegetation adapted to saturated soil conditions, such as marshes, swamps, and bogs. Wetlands provide habitat for fish and wildlife, reduce flooding by retaining water, and improve water quality through filtering capabilities. Wetlands are protected by the Clean Water Act and EO 11990 Protection of Wetlands, which requires federal agencies to minimize the destruction, loss, or degradation of wetlands.

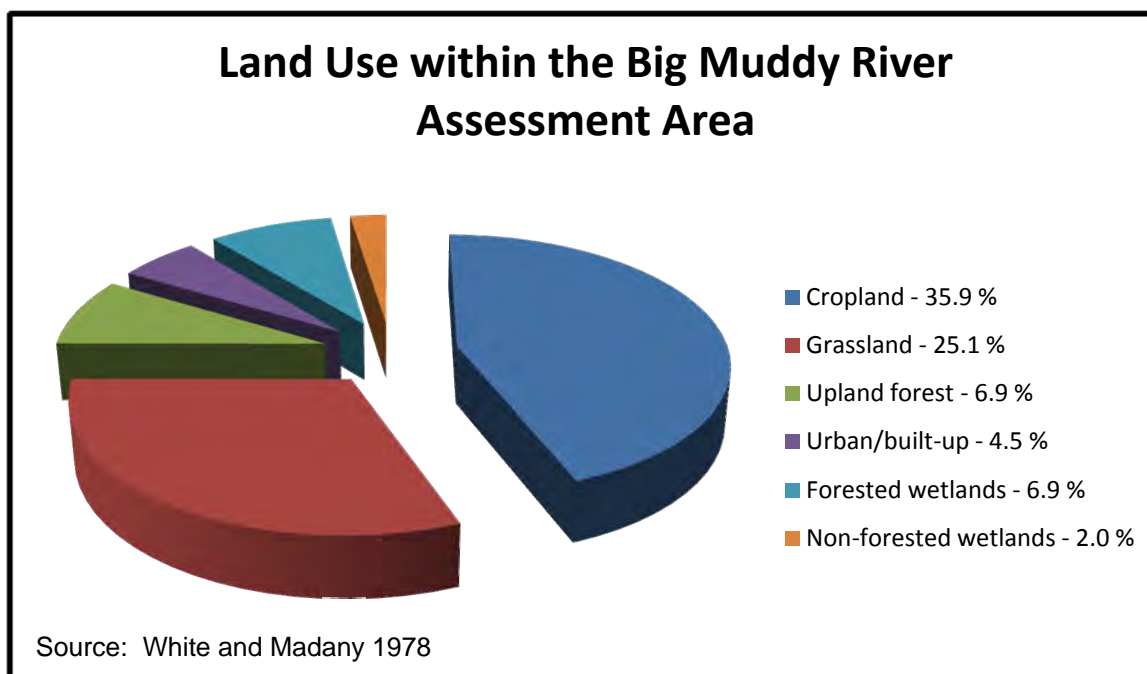
The National Wetlands Inventory indicates that a 0.2-acre freshwater pond occurs within the bleeder shaft construction area. It is a man-made, semipermanently flooded palustrine wetland with an unconsolidated bottom on an intermittent stream tributary of Akin Creek (USFWS 2010). Forty-three wetland areas occur within the proposed shadow area over TVA-owned coal (USFWS 2011a). Three freshwater forested/shrub wetland areas total 15.9 acres; 40 freshwater ponds (many of them man-made) total 26.8 acres (Appendix C).

Intermittent stream channels traverse through the mine area's forest stands and shelterbelts. These wooded channels, along with seasonal surface water runoff, are the hydrological source for many of the wetlands in the project area. Other watercourses were created through man-made agricultural ditches. Many of these ditches created small palustrine scrub-shrub wetland pockets lined with willows and reed canary grass. There are several areas where large wetlands and open water habitat have been created to enhance waterfowl habitat. In addition, many farms or homes have man-made ponds that serve as wildlife drinking water sources and aquatic habitat.

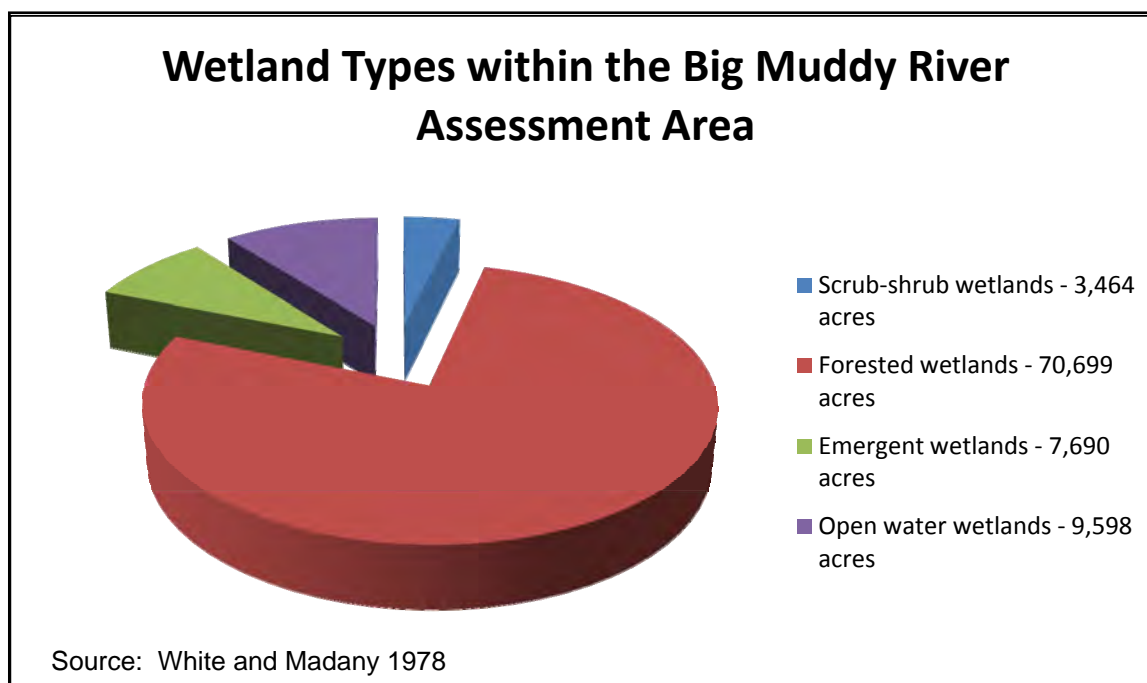
According to land use/land cover data compiled by the United States Geological Survey, wetlands comprise 4.6 percent of the total land use within this ecoregion (Karstensen 2008). Wetland habitats are more common within the smaller Big Muddy River watershed. Based on the Land Cover of Illinois Database (Illinois Geographic Information System) and the Illinois Wetlands Inventory, a current estimate of wetland for the Big Muddy River Assessment Area is 100,195.5 acres, or almost 9 percent of the assessment area (Figure 3-3). Only about 415 acres of this has remained in high-quality condition. The acreage in high-quality condition is divided between a shrub swamp-pond (410 acres) located at Campbell Lake and a natural pond (5 acres) at Capp Pond Natural Area (IDNR 2001).

Wetland habitat types in the Big Muddy River assessment area include forested wetlands (floodplain forests), emergent wetlands such as marsh, seep, and sedge meadows, and scrub-shrub wetlands such as shrub swamps (Figure 3-4).

Current threats to wetlands within the region include altered hydrology resulting in increased or reduced flooding, increased siltation from cultivated uplands, runoff from urban pavement and roadway deicing salts, grazing, and invasion of nonnative species.



**Figure 3-3. Land Use and Wetlands Within the Project Area**



**Figure 3-4. Wetland Types in the Mine Area**

### 3.3. Atmospheric Conditions

#### 3.3.1. Air Quality

USEPA has established national air quality monitoring called National Ambient Air Quality Standards (NAAQS). There are six air pollutants, called “criteria” pollutants that are of



particular concern. They include particulate matter, sulfur dioxide, ozone, nitrogen dioxide, lead, and carbon monoxide. Particulate matter has two standards—one for particulate matter less than 2.5 microns in diameter size (PM<sub>2.5</sub>) and one for particulate matter less than 10 microns in diameter size (PM<sub>10</sub>). The Clean Air Act requires states to establish monitoring programs for these NAAQS and to determine existing areas of attainment (regions where these pollutant levels are at or below the established NAAQS levels) and nonattainment (regions where these pollutant levels are above the established NAAQS levels). Hamilton and Franklin counties are currently in attainment status for all NAAQS pollutants. Construction equipment emissions and associated activities can contribute to NAAQS pollutant levels.

### **3.3.2. Greenhouse Gases**

Greenhouse gases are chemical compounds in the atmosphere that trap heat and can affect the earth's energy balance. Methane is a greenhouse gas that has both man-made and natural sources and is 21 to 23 times more powerful in its ability to trap heat within the earth's atmosphere than carbon dioxide (CO<sub>2</sub>) (USEPA 2011b). One source of methane is coalification (the formation of coal in the earth). After the methane is formed, it remains within coal seams until the coal encasing the methane is fractured and exposed. Coal mining releases this methane. Although the methane is formed naturally, it is considered a man-made source because the methane would have remained within the coal seam if it had not been exposed for mining.

Coal mining is one of the largest sources of man-made methane emissions in the United States (USEPA 2011c); this includes surface and underground mining as well as abandoned mines. Underground mine-related activities accounted for 75 percent of the total U.S. methane emissions in 2008 (USEPA 2010).

The USEPA has released guidelines for the proposed reporting of greenhouse gases (USEPA 2009). The Council on Environmental Quality (CEQ) has released draft guidance on when and how federal agencies should consider greenhouse gas emissions and climate change in the NEPA process. The draft guidance includes a presumptive effects threshold of 25,000 metric tons of CO<sub>2</sub> equivalent emissions from an action (CEQ 2010). Measurements of CO<sub>2</sub> equivalent emissions are used to compare different greenhouse gases' abilities to retain heat, by using CO<sub>2</sub> as a comparison tool (USEPA 2011d).

### **3.4. Biological Environment**

Subsidence from underground mining and surface disturbance for surface facilities has the potential to impact biological resources.

Terrestrial habitats within the Sugar Camp Mine No. 1 area in Franklin and Hamilton counties are characterized by a heavily fragmented landscape dominated by early successional habitat. Based on recent aerial imagery, this early successional habitat is interspersed with forested fragments, riparian zones associated with tributaries of the Big Muddy and Saline rivers, ponds, as well as a few scattered residences.

#### **3.4.1. Wildlife**

Early successional habitats in the project area include fields (e.g., pastures and hayfields) and cultivated row crops. With the exception of those bird species able to either subsist on crops (e.g., American crow, ring-necked pheasant) or to nest among them (e.g., horned lark, killdeer), relatively few bird species are able to use monocultural cropland habitat (e.g.,

corn, soybeans, wheat). Many types of reptiles, amphibians, mammals, and birds are found in the forested habitats in this area (IDNR 2001) (see Appendix D).

The Big and Little Muddy rivers and some of their tributaries contain most of the best remaining bottomland forest habitat left in the region. Small, rock-bottomed streams, which course through areas of upland forest, provide habitat for many species of mammals, reptiles, amphibians, and Neotropical breeding birds in the region.

There is an abundance of farm ponds, strip mine ponds, and lakes scattered throughout the Big Muddy Watershed, and most are the remnants of previous coal mining operations (IDNR 2001). Killdeer and spotted sandpipers occasionally breed around lakes, ponds, and impoundments, especially in old strip-mined areas. Birds nest along these ponds, especially those with gradual shorelines and some emergent vegetation (e.g., cattails) along the edge. Warblers and orioles will frequently nest and forage along tree lined edges of ponds and lakes in the area. Several species of amphibians and reptiles can be found in small farm ponds (Appendix D).

Some terrestrial species can live in residential areas (Appendix D). This community is not found outside of human-altered landscapes (IDNR 2001).

### **Migratory Birds**

TVA is subject to EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), which directs federal agencies to take certain actions to further implement the Migratory Bird Treaty Act. This act prohibits “by any means or manner to pursue, hunt, take, capture [or] kill” any migratory birds except as permitted by regulations issued by the USFWS.

The project area is within the boundaries of the Big Muddy River watershed, which lies within a major avian flight corridor. The Mississippi River is immediately to the west, and the Ohio River is 25 to 40 miles to the east of the project area. For this reason, the Big Muddy River watershed is optimally situated for major influxes of migrating birds. These migratory birds include water birds that are attracted to flooded fields and large lakes in the area. Migratory breeding birds such as flycatchers, vireos, warblers, tanagers, and orioles also use this type of habitat. There are no large bodies of water to serve as breeding sites for these bird species on land overlying the TVA-owned coal.

#### **3.4.2. Vegetation**

Southern Illinois was once covered by a mosaic of oak-hickory forests and bluestem prairies, but now more than 80 percent of the area has been converted to agricultural lands. Soybeans, corn, and wheat are the primary crops, and forests are now largely confined to side slopes and river bottoms that are unsuitable for farming (Woods et al. 2006).

Oak-hickory forests are common on well-drained, nearly level uplands (Woods et. al 2006) (see Appendix E). Mesic tall-grass prairies are found in a mosaic pattern with the oak-hickory forest (Appendix E). Flatwood forests can be found on nearly level, clay-rich soils of poorly drained uplands (Appendix E). Two globally rare flatwoods terrestrial plant communities are found in this region:

1. The **Pin Oak - Post Oak Lowland Flatwoods** bottomland community occurs on terrace “flats” and is thought to have less than 20 occurrences within southwest Indiana, southern Illinois, and southeast Missouri (Appendix E). Severe floods

caused by dams may have eliminated post oak from most occurrences of this community. These lowland flatwoods have been classified by NatureServe (2010) as having a vulnerable to imperiled global conservation status.

2. The **Post Oak Flatwoods** community has fewer than 50 occurrences throughout its range. Twenty-three of these occurrences are from Illinois, Indiana, Missouri, and Kentucky. Some occurrences have been destroyed or degraded by clearing and selective logging, and some have been degraded by grazing. This community's vegetation contains a dominant tree layer with an average canopy cover of 80 percent or more (NatureServe 2010) (see Appendix E). Trees may be stunted due to the unfavorable soil conditions. These flatwoods have been classified by NatureServe as having a vulnerable to imperiled global conservation status (NatureServe 2010).

Within the footprint of the project, most of the upland forested areas are heavily fragmented. The largest continuous blocks of forest are associated with the bottomland along the Middle Fork of the Big Muddy River. Most of the forested woodlots range in size from 10 to 100 acres. No uncommon or rare plant communities are present within the project area.

### **Invasive Plants**

Agricultural land use has extensively altered the native vegetation of this region; consequently, invasive species occur throughout the property. EO 13112 (Invasive Species) defines an invasive species as "any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem; and whose introduction does or is likely to cause economic or environmental harm or harm to human health" (USDA 2007). Invasive plants include species of trees, shrubs, vines, grasses, ferns, and forbs. Some have been introduced into this country accidentally, but most were brought here as ornamentals or for livestock forage. These robust plants arrived without their natural predators of insects and diseases that tend to keep native plants in natural balance. According to Morse et al. (2004), invasive species are the second-leading threat to imperiled native species.

According to the Illinois Department of Agriculture (2002), the Illinois Noxious Weed Law designated the following noxious weeds as being capable of spreading (Section 220.200):

- Marijuana
- Canada thistle
- Perennial sowthistle
- Musk thistle
- Perennial members of the sorghum genus with rhizomes, including Johnson grass
- Kudzu

Kudzu, Johnson grass, and musk thistle are known to occur in Franklin and Hamilton counties (Eddmaps 2010). The Illinois Noxious Weed Law provides guidance on the proper way to move and clean equipment that is exposed to these noxious weeds (Section 220.230; Illinois Department of Agriculture 2002).

### **3.4.3. Aquatic Ecology**

Several streams, including the Middle Fork of the Big Muddy River and Akin Branch, occur within the vicinity of TVA-owned coal. The State of Illinois mining permit approval process



includes requirements for the monitoring of fish and wildlife resources in the permit area and in adjacent areas, both before and after project implementation, in order to establish the effects of the project on aquatic resources (62 Illinois Administrative Code 1784.21(a)) (IDNR 2008)..

Alliance Consulting Inc. (2011) conducted aquatic monitoring from August 25 to September 3, 2009, to assess the premining status of aquatic populations and water quality. The surveys included water quality measurements, stream habitat assessment, seine hauls, and electro-fishing within 17 separate reaches on eight different streams on both TVA-owned coal lease and private property (Alliance Consulting Inc. 2011). The proposed project includes 3,438 feet of streamside impacts on the Middle Fork of the Big Muddy River and 3,020 feet on Akin Creek on private property. An additional 1,952 feet on three unnamed tributaries to Akin Creek could not be sampled because they were dry during the survey period.

Marginally healthy to healthy fish communities were found at these locations. Many of the survey locations had a fair amount of diversity in fish species, but did not have many intolerant species. Intolerant species indicate higher water quality and habitat (in other words, intolerant species are “intolerant” of poor conditions). Many of the streams were heavily impacted by siltation and had low oxygen levels, which are typical problems of agriculturally impacted streams.

#### **3.4.4. *Threatened and Endangered Species***

Species listed as endangered or threatened at the federal level are protected under the Endangered Species Act, which is administered by the USFWS. The Illinois Endangered Species Protection Board determines which plant and animal species are threatened or endangered in the state and advises IDNR on conservation efforts for those species. The Illinois Endangered Species Protection Act prohibits any person to possess, take, transport, sell, offer for sale, give, or otherwise dispose of any animal or the product thereof of any animal that occurs on the Illinois list.

A review of information available from the Illinois Natural Heritage Database for Franklin, Hamilton, and Jefferson counties indicated that 10 state-listed and two federally listed species have been documented in these counties and, thus, potentially occur in the project area (Table 3-1).

The northern population of the copperbelly water snake was included in a conservation agreement by the USFWS in 1997. The population range includes Ohio, Michigan, Illinois, Kentucky, and Indiana (NatureServe 2010). IDNR entered into this conservation agreement for the species with other stakeholders and agencies. The agreement prohibited take of this species (IAC Title 17, Chapter I, Subchapter B, Part 880). Take is considered any activity that may result in injury, harassment, or death of a threatened or endangered species or destruction or modification of its habitat. Although the conservation agreement expired in 2001, the take of this species is still prohibited for many actions, including coalmining activities, in a number of counties in Illinois, including Hamilton County (Fowler 2004).

**Table 3-1. Endangered and Threatened Species Documented in Franklin, Hamilton, and Jefferson Counties and Potentially Occurring Within the Sugar Camp Mine No. 1 Area**

Common Name	Scientific Name	County	Federal Status	State Status
Birds Little blue heron	<i>Egretta caerulea</i>	Franklin	-	Endangered
Piping plover	<i>Charadrius melodus</i>	Franklin <sup>1</sup> , Jefferson <sup>1</sup>	Endangered	Endangered <sup>2</sup>
Loggerhead shrike	<i>Lanius ludovicianus</i>	Jefferson	-	Endangered
Barn owl	<i>Tyto alba</i>	Franklin, Hamilton	-	Endangered
Plants Black cohosh	<i>Cimicifuga racemosa</i>	Franklin, Hamilton	-	Endangered
Green trillium	<i>Trillium viride</i>	Franklin, Hamilton	-	Endangered
American snowbell	<i>Styrax americanus</i>	Franklin, Hamilton	-	Threatened
Fish River redhorse	<i>Moxostoma carinatum</i>	Franklin, Hamilton, Jefferson	-	Endangered
Mammals Indiana bat	<i>Myotis sodalis</i>	Franklin, Hamilton <sup>1</sup> , Jefferson <sup>1</sup>	Endangered	Endangered
Marsh rice rat	<i>Oryzomys palustris</i>	Franklin, Hamilton	-	Threatened
Reptiles River cooter	<i>Pseudemys concinna</i>	Franklin, Jefferson	-	Endangered
Ornate Box Turtle	<i>Terrapene ornata</i>	Franklin	-	Threatened
Copperbelly Water Snake	<i>Nerodia erythrogaster neglecta</i>	Hamilton	Conservation Agreement	

Source: Illinois Natural Heritage Database 2010

<sup>1</sup> Source: USFWS 2011b<sup>2</sup>Not documented by IDNR as occurring in Franklin or Hamilton counties

Copperbelly water snakes are usually found near bottomland forests and shrub swamps in wooded and permanently wet areas such as oxbows, sloughs, brushy ditches, and floodplain woods. Even though this species is associated with water, it also spends considerable time away from water in the terrestrial, forested part of its habitat.

Copperbellies emerge from hibernation sites in early spring and migrate through wooded or vegetated corridors to wetland areas. When woodland swamps begin to dry in late spring or early summer, they again disperse and move through wooded or vegetated corridors to their summer habitat areas, which are usually forest and forest edges. By late fall, individuals seek out hibernation sites, mostly in upland areas above flood and ponding levels. Coal mining, drainage and damming of wetlands, channelization, diversion of streams and rivers, and development of upland habitat have disrupted and fragmented the snake's distribution (USFWS 2011c). Based on review of aerial imagery and current land use, suitable habitat for this species within the project area is likely very limited.

#### 3.4.4.1. Terrestrial Animals

No federally listed species have been found within the proposed project area in Hamilton County. The Indiana bat, however, potentially occurs within the proposed project area because potential habitat occurs statewide (USFWS 2011d). A second federally listed species, piping plover, may occur in Franklin, Hamilton, and Jefferson counties during migration.

If federally or state-listed as endangered or threatened species or their habitats may be impacted by a project, surveys of the project area and adjacent areas are required by the State of Illinois (62 Illinois Administrative Code 1784.21(a)) (IDNR 2008).

Indiana bats hibernate in caves and abandoned mines during winter. During summer, this species roosts under loose tree bark, as well as in cracks and crevices, and forages in and along the canopy of riparian and upland forests. The bats generally travel less than 3 miles from their roost to forage, and foraging area size varies greatly from 15 to over 7,000 acres (Sparks et al. 2004). The Indiana bat is a long-lived species (up to 20 years) and is believed to return to the same roost tree area, travel corridors, and foraging sites year after year (Sparks et al. 2004).

Female Indiana bats roost together in maternal colonies during the summer to rear their young. These colonies are found in forested areas. Suitable summer habitat (such as upland and bottomland forests and woods near streams) for the Indiana bat occurs within the project area. Indiana bats have suffered population losses in recent years because of tree loss, pesticides, human disturbance, the collapse or flooding of cave hibernation sites, and a disease known as “white nose syndrome” that compromises bat immune systems (USFWS 2011e).

Bat surveys were conducted within the proposed project area by Alliance Consulting to determine whether Indiana bats occur within the Sugar Camp Mine No. 1 area (Alliance Consulting Inc. 2010a). The TVA-owned coal lease property was included in these surveys. Survey methodology was based upon USFWS Bat Recovery Team guidelines and was developed in consultation with IDNR and USFWS (Alliance Consulting Inc. 2010a). Nine mist net sample locations occurred on TVA-owned coal lease property; 90 sample locations were on adjacent private property. A total of 176 mist nets were deployed at 98 sample sites from June 9 to August 7, 2010. Eastern pipistrelles, eastern red bats, big brown bats, evening bats, and Indiana bats were caught during the surveys (Alliance Consulting Inc. 2010a). No Indiana bats were captured on land over TVA-owned coal during the surveys (Appendix F).

Three female Indiana bats were caught on private property. These were the first records of Indiana bats being caught in Franklin County. The females were lactating, which indicated the presence of at least one nearby maternity colony. Radio transmitters were placed on all three bats prior to release, and they were tracked for the next 16 days to determine roost tree locations. Nine roost trees were identified along Akin Creek, Sugar Camp Creek, and the Big Muddy River on private property on the west side of the mine near Rend Lake, but none of the roost trees were located on TVA-owned coal lease property (Alliance Consulting Inc. 2010a).

Piping plover is a species of shorebird that is highly mobile, making long-distance migrations between breeding and wintering habitats. Breeding habitats include Atlantic coastal beaches, mud flats, and sand flats, and Great Lakes sand and gravel shorelines

(Gaines and Ryan 1988). Nonbreeding habitats exist along the Atlantic and Gulf of Mexico coastlines. There are three discrete breeding populations in the United States and Canada listed as threatened. Approximately 75 percent of their annual life cycle is spent either undergoing migration or on their wintering grounds. In Illinois, mudflats associated with lakes, ponds, impoundments, rivers and larger streams, and wetlands may provide potentially suitable stopover habitat for this species during migration (IDNR 2001). Suitable habitat for piping plover is not available in the TVA-owned coal lease property.

The marsh rice rat can be found in permanent or intermittent wetlands with upward growing nonwoody vegetation, such as reedgrass (*Phragmites australis*), which is abundant in southern Illinois. Such habitats typically exist as small, isolated patches that cannot support large populations. IDNR has previously indicated that ideal habitat may exist in the TVA-owned coal lease property area along the Big Muddy River bottom (TVA 2006). The marsh rice rat is a state-listed as threatened species due to the loss of its wetland habitat (Alliance Consulting Inc. 2009). Alliance conducted surveys to determine whether marsh rice rats lived within the project area. About 420 baited live traps were set throughout the proposed project area (on both private property and land overlying TVA-owned coal) along the major tributaries where there would be the highest likelihood of marsh rice rat occurrence. No marsh rice rats or other federally or state-listed species were caught during the survey (Alliance Consulting Inc. 2009).

The barn owl is a state-listed as endangered species, and it is also listed as a species in greatest need of conservation in the *Illinois Wildlife Action Plan* (IDNR 2005). This species is primarily found in hay/pasture, wet meadow, and shallow marshes, as well as in woodlands, where it can forage for prey. The barn owl also inhabits silos, barns, grain bins, and abandoned buildings (Walk et al. 2010). Barn owls were formerly much more widespread in areas of cropland, especially where there were grassland areas (e.g., hayfields, pasturelands) nearby (IDNR 2001). No structures or barn owl habitat would be removed on land overlying TVA-owned coal.

The little blue heron is most commonly associated with wetlands, streams, lakes, and reservoirs (University of Illinois 2009). Pesticides and wetland draining are primary threats to this species (University of Illinois 2009). No wetlands would be removed on TVA-owned coal lease property.

The loggerhead shrike is associated with grassland habitats of the Big Muddy River watershed, where it is known to breed and nest among spiny hedgerows. The species also utilizes open, savannahlike areas for foraging and occasionally is observed in cropland along hedgerows and treerows. Studies on loggerhead shrikes, including areas within the Big Muddy River Watershed, have shown that agricultural pesticides are likely to have contributed to the decline of this bird species in Illinois (IDNR 2001). A small portion of habitat suitable for this species would be removed for bleeder ventilation shaft construction.

The river cooter is a turtle that prefers oxbows and backwaters of large lakes, rivers, and reservoirs. The Illinois Natural History Survey indicates there has been a verified sighting of the river cooter in Franklin County as recently as 1980; however, the IDNR indicates that ideal habitat area is west of Interstate 57 in the Gun Creek arm of Rend Lake (TVA 2006). This habitat is not found on land overlying TVA-owned coal.

The ornate box turtle is found in prairies and open fields (University of Illinois 2009). Specimens were collected by the University of Illinois in Franklin County prior to 1980 (University of Illinois 2009); they have not been found in Hamilton County.

#### **3.4.4.2. Plants**

A review of the Illinois Natural Heritage Database by County (IDNR 2011) and the USFWS (2011b) list of federally listed as endangered, threatened, proposed, or candidate species for Illinois counties reported one listed plant (American snowbell) from Hamilton County and two listed plants (black cohosh and green trillium) from Franklin County (Table 3-1).

American snowbell is an understory shrub that grows in wooded floodplains, swamps, boggy slopes, and hammocks, usually in sandy or peaty soils. Green trillium can be found in rich woods, bluffs, and rocky hillsides with some limestone outcrops, and black cohosh occurs in moist, mixed deciduous forests, wooded slopes, ravines, creek margins, thickets, moist meadowlands, forest margins, and especially mountainous terrain. According to Paul Marcum (Illinois Natural History Survey, personal communication, March 10, 2011), green trillium has not been seen in Franklin County since 1982.

No federally listed plant species are known to occur within Franklin or Hamilton counties (USFWS 2011b). Mead's milkweed has been reported from tall grass prairie areas of Saline County (adjacent to the southern border of Hamilton County) and small whorled pogonia and Price's potato bean are listed from Randolph County (west of the project area along the Mississippi River). Price's potato bean no longer exists in Illinois, and habitat to support small whorled pogonia is not present in or around the action area.

#### **3.4.4.3. Aquatic Species**

No federally listed aquatic animal species are known from the project area. The river herring is known to occur in Franklin, Hamilton, and Jefferson counties and within a 10-mile radius of the proposed Sugar Camp Mine No. 1. The river herring is a large fish that prefers clear large creeks and rivers. It can sometimes be found in natural lakes and reservoirs. Adults are generally found in moderate to swift current over clean gravel, boulders, and rubble, or in deep, fast current portions of pools (NatureServe 2010).

#### **3.4.5. Natural Areas**

Natural areas include managed areas, ecologically significant sites, and Nationwide Rivers Inventory streams. This section addresses natural areas that are on, immediately adjacent to, or within 10 miles of the project area.

The Middle Fork Big Muddy River Resource Rich Area (RRA) surrounds the proposed project site. The Ten Mile Creek State Fish and Wildlife Area is within 3 miles of the proposed project site. A portion of this wildlife area was transferred from TVA to the State of Illinois after surface mining reclamation. No Wild and Scenic Rivers or Nationwide Rivers Inventory streams are located within 3 miles of the proposed project site.

Middle Fork Big Muddy River RRA is located in Franklin, Hamilton, and Jefferson counties. The proposed mine plan is located within this 114,908-acre watershed area. This RRA is recognized by the IDNR for its resources, including large tracts of forest, a 22-acre portion of the Ten Mile Creek State Fish and Wildlife Area, a 388-acre bottomland/swamp forest, owned and managed by the Freeman Coal Company, and several other smaller bottomland forest/swamps.

Ten Mile Creek State Fish and Wildlife Area is located in Jefferson and Hamilton counties, approximately 3 miles northeast of the proposed mine area. This 5,820-acre area is managed by IDNR and is divided into four management units. Several of these units, which are utilized for hunting and wildlife management, are reclaimed mining sites.

There are 10 additional natural areas located near (3 to 10 miles away) the proposed mine area. These include Rend Lake State Fish and Wildlife Area, Wayne Fitzgerald State Recreation Area, Pyramid State Recreation Area, Giant City State Park, Dolan Lake State Fish and Wildlife Area, Bell Rive Railroad Prairie Natural Heritage Landmark, Thompsonville Lake, McCleansboro Lake, Lake Moses, and West Frankfort City Lake and Reservoir.

### **3.5. Transportation**

There are approximately 4 miles of local roads located within the project area. Most of these roads are unpaved, but are maintained in good condition. Roads could be affected by mine-related traffic and subsidence. The following roads in Hamilton County could be affected by the proposed project on land over TVA-owned coal:

- County Road 1000N
- County Road 875N
- County Road 850N
- County Road 800N
- County Road 100E
- County Road 750N
- Macedonia Road

### **3.6. Utilities**

Subsidence could affect aboveground transmission lines as well as belowground utilities. The State of Illinois requires mining companies to obtain agreements with utility companies, road authorities, rail lines, and buried pipeline companies to prevent or minimize subsidence damages as a condition of the mine permit (IDNR 2008). Utility and infrastructure-related companies within the project area include:

- Canadian National Railroad
- Farm Bureau Oil Company
- Hamilton County Highway Department
- Franklin County Highway Department
- Akin Water District
- Macedonia Water System
- Hamilton County Telephone Cooperative
- Southeastern Illinois Electric Cooperative
- Wayne-White Counties Electric Cooperative
- Dahlgren Gas Company

### **3.7. Socioeconomic Conditions and Environmental Justice**

Southern Illinois has traditionally had a large coal mining industry because of the rich mineral resources within the Illinois Coal Basin. Hamilton and Franklin counties have a large coal mining industry because of their location within the Illinois Coal Basin. The proposed mining would occur in Hamilton County, near its border with Franklin County.

The sites that would be mined are located in Census Tracts 9732 and 9733 in Hamilton County. Census Tract 412 in Franklin County is immediately adjacent to the west.

Both Franklin and Hamilton counties had relatively low per capita income levels in 2008, at \$27,091 and \$29,753, respectively (Bureau of Economic Analysis 2011). In contrast, per capita income in the state was \$42,540, and nationwide, it was \$40,166.

The minority populations are small in these areas (Table 3-2) (United States Census Bureau 2011a). County minority shares are only slightly larger (3.1 percent of total population in Franklin County and 2.6 percent in Hamilton County), and these are well below the state level of 36.3 percent. The poverty level over the 2005-2009 period was 11.4 percent in Hamilton County and 18.3 percent in Franklin County (United States Census Bureau 2011b). Levels of poverty were lower in the affected Census Tracts (Table 3-2). All three tracts had lower poverty levels than the state, at 12.4 percent, and the nation, at 13.5 percent.

**Table 3-2. Demographics Within Project Area**

County	Tract No.	No. of Residents	% Minorities	% Poverty
Hamilton	9732	2465	1.9	7.1
Hamilton	9733	2784	2.4	10.9
Franklin	412	3750	2.4	10.2

### **3.8. Cultural Resources**

Under Section 106 of the National Historic Preservation Act, federal agencies are required to assess the impact of their actions on historic properties. Some examples of historic properties include houses, bridges, battlefields, Native American sites of which many of are now considered to be archaeological sites. If a historic property is found to be important to a local community, to a region, or to the nation at large, it can be placed on a list called the National Register of Historic Places. This is a list of historic properties that are deemed worthy of preserving for the future.

#### **Archaeology**

Native Americans occupied southern Illinois for over 12,000 years (Evans et. al 1997). Fertile river floodplains and rich hunting grounds supported a lifestyle that transitioned from nomadic to agricultural. Remnants of these lifestyles, or archaeological sites, can still be found today and can be studied scientifically.

An interagency agreement between the Illinois Department of Mines and Minerals [IDMM] and the Illinois Historic Preservation Agency has established that subsidence, in general, does not affect archaeological sites (IDMM 1994). However, surface-disturbing activities to correct drainage patterns altered by subsidence could impact archaeological sites.

No archaeological sites are present within the area proposed for bleeder ventilation shaft installation. However, archaeological sites are likely to exist within the shadow area over TVA-owned coal because of the proximity to streams (Appendix G).



### **Historic Structures**

Nineteenth-century European-American immigrants built many of the farmsteads within the project area. Subsequent modern development has caused the alteration or removal of many of these farmstead structures. As a result, few farmsteads in the area have historic integrity of design, setting, materials, feeling, and/or association (Muller 1986; Schroder 2004).

Subsidence can affect structures by causing cracks or shifts in building foundations. The State of Illinois requires mining companies to conduct presubsidence surveys of structures, as requested by the structures' owners, to assess damage caused by subsidence. Structures can be braced before subsidence to minimize damage and can be repaired afterward. Sugar Camp is required by the State of Illinois to repair or compensate owners for structural damage caused by subsidence.

One house and one culvert within the TVA coal lease area may be eligible for listing on the National Register of Historic Places. No known cemeteries occur on land over the TVA-owned coal.

### **Sites of Religious Significance**

Federal agencies are required to consult with Native American tribes that may have significant religious or cultural resources in a project region. The tribes that may have interest in this region include:

- Peoria Tribe of Indians of Oklahoma
- Absentee Shawnee Tribe of Oklahoma
- Shawnee Tribe
- Eastern Shawnee Tribe of Oklahoma
- Miami Tribe of Oklahoma
- Sac and Fox Nation of Missouri in Kansas and Nebraska
- Sac and Fox Tribe of the Mississippi in Iowa
- Sac and Fox Nation of Oklahoma
- Osage Nation of Oklahoma

No tribes indicated any areas of particular religious significance or importance within the proposed project area (Appendix H).

### **3.9. Noise Levels**

The proposed bleeder shaft site is approximately 500 feet north of County Road 850N. The closest residences are about 2,000 feet to the north and to the west of the project site. Residences and traffic on the county road could potentially hear noise generated by the project.

## CHAPTER 4

### 4.0 ENVIRONMENTAL CONSEQUENCES

The potential effects of implementing the Action Alternative and the No Action Alternative are described below for each resource area. The portion of the proposed mine plan on private property lies within Franklin County. The impacts to private property are considered in the cumulative impact assessment for biological resources and greenhouse gas emissions. Subsidence would affect several resource areas. The effects of subsidence can be predicted given the thickness of the coal seam to be mined (6 feet in the Sugar Camp Mine No. 1) and the structure of rock layers above the mine. Maximum subsidence of about 4.8 feet has been calculated for the Sugar Camp Mine. Computer modeling has indicated five areas of drainage on land over TVA-owned coal that would likely need to be repaired (Appendix B).

#### 4.1. Physical Environment

##### 4.1.1. *Prime Farmlands*

##### **The No Action Alternative**

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects to prime and unique farmland would occur because of this alternative.

##### **Action Alternative**

Under the Action Alternative, TVA would approve Sugar Camp's mining plan, and Sugar Camp would conduct longwall mining on approximately 2,600 acres of TVA's coal reserves and construct a bleeder shaft. The proposed site entrance and access road to the planned bleeder shaft off County Road 850N would affect prime farmland resources. However, less than 1 acre of prime farmland would be used for storage of soil materials from the shaft. Storage piles could be easily removed; the impact would therefore be insignificant to prime farmland resources.

Planned subsidence is part of Sugar Camp's proposed mining operations plan for the 2,600 acres of land over TVA-owned coal. Subsidence could possibly affect prime and unique farmland resources through changes in surface drainage patterns and the subsequent change in the internal moisture status of the soils. Currently, 13 percent of the soils are classified as "somewhat poorly drained." However, possible changes in drainage patterns due to subsidence within the area of TVA's coal reserves are expected to be minimal. This is due largely to the relief within the landscape and the fact that current and future drainage would continue to run in an east to west orientation, which would be parallel with proposed panel patterns.

The IDNR mining permitting process requires coal companies to reestablish drainage patterns and stream profiles affected by mining activities. Topsoil removed during surface-disturbing activities would be replaced with an 8-inch thick layer of topsoil during reclamation (Sugar Camp 2007). Sugar Camp is required to compensate landowners for any temporary crop loss from impaired drainage and any permanent crop loss due to the alteration or installation of waterways (IDNR 2008).

The IDNR Land Reclamation Division ensures that active coal mining operations are properly reclaimed, thereby assuring the restoration of lands affected by mining (including subsidence) to productive uses. IDNR inspects all active coal mining sites to ensure

reclamation standards are met and that approved reclamation plans are followed. Additionally, IDNR responds to citizen complaints through investigation and inspections. It is the mining company's responsibility to correct all impaired surface drainage in a timely manner as well as to compensate farmers for crop loss until repairs are completed. Some prime and unique farmland can be lost in the process of correcting drainage problems, but that impact is generally insignificant.

### **Cumulative Impacts**

Subsidence could occur on about 2,600 acres of land over TVA-owned coal. Subsidence-related changes in drainage patterns on prime farmland areas would be corrected to restore these to premining conditions. Agricultural activities could continue on subsided land during underground longwall mining, and less than 1 acre of prime farmland in the bleeder ventilation shaft construction area would experience surface disturbance. This loss of 1 acre of prime farmland would not constitute a significant cumulative impact to prime farmlands.

#### **4.1.2. Floodplains**

As a federal agency, TVA is subject to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "...to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (United States Water Resources Council 1978). The EO is not intended to prohibit floodplain development in all cases, but rather, to create a consistent government policy against such development under most circumstances. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative. As a part of the permitting approval process with the State of Illinois, drainage must be corrected as the land subsides in order to restore floodplains to premining conditions.

### **No Action Alternative**

Under the No Action Alternative, the proposed underground longwall mining operations and associated subsidence would not occur. Therefore, there would be no direct, indirect, or cumulative impacts to floodplains because there would be no physical changes to the current conditions found within the local floodplains due to this action.

### **Action Alternative**

The proposed underground longwall mining would occur on about 2,600 acres of TVA-owned coal, and subsidence on the overlying land could affect all 2,600 acres. Subsidence from underground mining could increase the size of floodplains due to the decrease in surface elevation. In addition, flood depths in existing floodplain areas could increase. Sugar Camp is required to correct any drainage changes caused by subsidence and repair any damage that may be caused by subsidence-induced flooding as a condition of the mine permit. Construction of berms and/or dredging in advance of planned subsidence would protect land, dwellings, and structures within potential flooding areas (IDNR 2008). These drainage mitigation activities would undergo additional environmental reviews by the USACE, IEPA, and the IDNR Bureau of Water Resources prior to the grant of approval for the drainage activities. The project would comply with EO 11988 with the implementation of these mitigation measures.

The only surface activities associated with the underground mining would be the construction of the bleeder ventilation shaft, which would be located outside the 100-year floodplain, and the road access modifications, which could result in construction in the

floodplain. Consistent with EO 11988, road construction is considered a repetitive action that would not result in significant impacts.

### **Cumulative Impacts**

Subsidence could occur on about 2,600 acres of land over TVA-owned coal. However, no other impacts to floodplains in this area are anticipated at this time. In accordance with the mining permit, adverse effects to floodplain areas from subsidence would be corrected, and these areas would be restored to premining conditions. Therefore, no significant cumulative impacts to floodplains are anticipated.

## **4.2. Water Resources**

### **4.2.1. Water Supply**

#### **No Action Alternative**

Under the No Action Alternative, no changes would occur from TVA action that would affect the availability of residential well water within the mine area.

#### **Action Alternative**

Subsidence could cause either an increased or a decreased flow to residential well water, depending on how the rock layers fracture. No major aquifers exist within the mine area. As a condition of the mining permit, any decrease in water quality or quantity would have to be corrected by Sugar Camp, and adequate clean water would have to be supplied to the parties affected until the correction was made. Potential effects to water supplies or availability would be minor under the Action Alternative with mitigation.

The water level in shallow wells may be impacted by subsidence, but the chance of this type of impact is low because of the depth of the Herrin No. 6 coal seam (IDNR 2008) and the rapid water level recovery in shallow water wells after subsidence (Booth and Spande 1991).

Sugar Camp is required to promptly replace any drinking, domestic, or residential water supply that becomes contaminated or interrupted by mining activities (62 Illinois Administrative Code 1817.41(j)) (IDNR 2008). All wells that do not have a specific agreement in place to address postsubsidence water supply issues must be monitored by Sugar Camp to obtain adequate seasonal data sufficiently in advance of any potential impacts due to subsidence (IDNR 2008).

### **Cumulative Impacts**

Subsidence on the private property portion of the proposed mine area, as well as subsidence over TVA coal, could affect the availability of residential well water on land over TVA-owned coal, depending on how the rock layers fracture. However, there are no major aquifers known in the area, which limits residential well water use in this area. Most residences are connected to public water systems. Therefore, the contribution of any subsidence-related effects to water supplies occurring on the land over TVA-owned coal would be a minor and insignificant cumulative impact.

### **4.2.2. Groundwater**

#### **No Action Alternative**

No changes would occur to groundwater flow within the TVA-owned coal area under the No Action Alternative.

### **Action Alternative**

Subsidence could cause either an increased or a decreased flow to groundwater hydrology, depending on how the rock layers fracture. Sugar Camp would be required to test groundwater quality periodically, as well as correct any change in groundwater hydrology, as part of the state permitting requirements.

Groundwater can be affected by underground mining activities. Subsidence can either cut off groundwater flow by the compression of rock layers or cause increased groundwater flow because the rock layers are fractured, giving water more passages to move through (Owili-Eger 1983). In some cases, originally poor (water quality and quantity) aquifers can improve after mining because of this increased groundwater flow (Booth and Spande 1991).

### **Cumulative Impacts**

Subsidence on the private property portion, as well as subsidence over TVA coal, could affect the flow of groundwater on TVA-owned coal lease property, depending on how the rock layers fracture. However, no major aquifers exist in the area, so the fracturing of rock layers during subsidence would not likely cause a large change in underground hydrologic patterns. Therefore, the changes in groundwater characteristics on the TVA-owned coal portion would be a minor contribution to the potential changes in local groundwater quality.

#### **4.2.3. Surface Water**

##### **No Action Alternative**

No changes to surface water quality or drainage patterns would occur within the TVA-owned coal lease property under the No Action Alternative.

##### **Action Alternative**

The construction of the surface facilities for the Sugar Camp Mine No. 1 bleeder ventilation shaft would result in temporary increases of sediment loading to streams leaving the proposed project area. However, these increases would be minor and would occur only during initial construction activities while sediment and surface water best management practice systems were being installed. This change in sediment contribution would be insignificant and would be substantially reduced by sediment control methods. No other impacts to water quality for waters of the United States are anticipated. As a condition of the mining permit, Sugar Camp must return water flow patterns to presubsidence patterns through stream mitigation activities.

Subsidence can affect surface water by altering drainage patterns. Sugar Camp is required by the State of Illinois to repair any drainage changes caused by mining activities. No point sources of pollution or removal of existing surface water features would occur on TVA-owned coal lease property. Existing surface water features may require future modifications for drainage repair; these modifications would undergo further environmental review as required by the State of Illinois and USACE.

### **Cumulative Impacts**

Surface water in this region has been impacted by agriculture, residential development, and mining activities. The State of Illinois requires Sugar Camp to test surface water quality periodically as a condition of the permit. Stream drainage patterns would be returned to presubsidence conditions through stream alteration mitigation measures. The cumulative effects of the actions on TVA-owned coal lease property to local surface water quality would be insignificant with the implementation of best management practices.

#### **4.2.4. Wetlands**

##### **No Action Alternative**

Under this alternative, no longwall mining would occur on the 2,600 acres of TVA-owned coal lease property. Thus, there would be no effects to wetlands under the No Action Alternative.

##### **Action Alternative**

Impacts to wetlands associated with the Action Alternative would be due to the construction of the bleeder shaft and the subsidence that would occur on 2,600 acres of the TVA-owned coal lease property. This would include the permanent loss of the 0.22-acre freshwater pond on the bleeder shaft site and potential changes to the 42.7 acres of wetlands (Appendix C) present within the subsidence area.

Initial subsidence and changes in groundwater and subsurface flow could create increased wetland vegetation in new areas of standing water. After landscape recontouring, the flow would largely be restored to premining conditions.

Potential impacts related to subsidence include changes in hydrology, plant communities, and hydroperiod (i.e., the length of time that there is standing water at a specific location). A study of mining subsidence and its effects on wetlands in southern Illinois by Nawrot et al. (2003) indicated subsidence could produce diverse wetland communities with increased habitat value. The study found that there was an increase in the number of isolated depressional wetlands after subsidence, but the habitat value in shoreline zones of lakes and impoundments generally decreased after subsidence.

Initial subsidence and changes in groundwater and subsurface flow could create increased wetland vegetation in new areas of standing water (Nawrot et al. 2003). As a part of the permitting approval process with the State of Illinois, drainage must be corrected as the land subsided in order to restore floodplains back to premining conditions. After landscape recontouring, the flow would largely be restored to premining conditions, and the newly created wetland could decrease.

Other than the direct loss of the 0.22-acre wetland in the bleeder shaft construction area, wetland impacts due to subsidence would be mainly associated with changes and conversion of wetland types and locations. These impacts would be confined to 0.04 percent of the overall wetland acreage within the Big Muddy River RRA. This level of impact is considered insignificant.

##### **Cumulative Impacts**

Over 12,000 acres of land would subside over the life of the mine. This could affect up to 508 acres of wetlands, as indicated by National Wetland Inventory maps. This is 0.52 percent of the overall wetland acreage within the Big Muddy River RRA. Long-term data indicate an increase in wetland acreage associated with longwall mining and the associated subsidence (Nawrot et al. 2003). Other mines in the area may remove wetlands within the Big Muddy River RRA during the installation of surface facilities. The Illinois Department of Transportation manages the Sugar Camp Creek Wetland and Stream Mitigation Bank within the Big Muddy River RRA, which consists of 126 acres of restored and created wetlands along Sugar Camp Creek (Illinois Department of Transportation 2009). The contribution of the actions on TVA-owned coal lease property (affecting 0.04 percent of overall wetland acreage) to overall impacts to wetlands within the Big Muddy River RRA would be insignificant.

### **4.3. Atmospheric Conditions**

#### **4.3.1. Air Quality**

##### **No Action Alternative**

No impacts to air quality would occur from the TVA action because no mining on TVA property would occur under the No Action Alternative.

##### **Action Alternative**

Construction equipment at the bleeder shaft construction site would cause temporary small increases in criteria pollutant emissions from vehicle and equipment operation. Maximum emission value estimations were calculated (Appendix I) assuming the use of a drill rig, an excavator, a loader/backhoe, and a bulldozer 8 hours a day, 260 days total for site preparation and drilling operations. A maximum of 0.14 tons of volatile organic compounds, 0.58 ton of carbon monoxide, 1.35 tons of nitrous oxides, 0.12 ton of particulate matter 10 microns or smaller, 0.12 ton of particulate matter 2.5 microns or smaller, 0.17 ton of sulfur oxides, and 126.83 tons of CO<sub>2</sub> would potentially be generated by the construction equipment. Fugitive dust emissions would be generated by surface disturbance; these emissions would be insignificant with the implementation of best management practices (e.g., wetting the roads before use to reduce fugitive dust emissions). The operation of underground mining equipment could also contribute to pollutant emissions. In order to maintain safe levels of pollutants within the mine workings, safety regulations require the use of filters on diesel-powered mining equipment to minimize diesel exhaust emissions on most underground diesel machinery. Other equipment is electrically powered and does not contribute directly to emission levels.

##### **Cumulative Impacts**

Hamilton and Franklin counties are currently in attainment for all NAAQS pollutants; Illinois has two nonattainment areas (the Chicago area in northern Illinois and the Metro-East Saint Louis area in southwestern Illinois). The marginal addition of construction equipment emissions to the county totals is unlikely to change these statuses. Therefore, the cumulative impact of the proposed construction on TVA-owned coal lease property to local air quality would be insignificant.

#### **4.3.2. Greenhouse Gases**

Six longwall panels have been proposed in this mine plan. Given the proposed dimensions of the longwall panels (approximately 1,440 feet wide, 19,830 feet long, and 6 feet high), the average density of bituminous coal, and the average methane content of Illinois Basin coal seams, the estimated methane emissions from the proposed project can be calculated (University of Kentucky 2006; USEPA 2009; USEPA 2010) (see Appendix I).

Assuming that state and national coal mining methane emissions remain constant for the duration of the proposed seven-year mining plan except for the addition of Sugar Camp emissions, the contribution of the proposed Sugar Camp Mine No. 1 plan to state and national total methane emissions can also be calculated.

In Illinois, underground mines, surface mines, and postmining activities resulted in 7,759 million cubic feet of methane emissions for 2008 (USEPA 2010). This number represents about 4.6 percent of the total coal mining emissions for that year for the United States (USEPA 2010) (see Appendix I).



### No Action Alternative

Under the No Action Alternative, there would be no direct or indirect impacts to air quality caused by the project because there would be no physical changes in the project area.

### Action Alternative

The underground longwall mining and subsidence of about 2,600 acres would occur on TVA-owned coal lease property, in addition to the continued mining on adjacent, private land under the Action Alternative. The estimated greenhouse gas emissions associated with the Sugar Camp bleeder shaft project are well below 25,000 tons CO<sub>2</sub> equivalent per year; emissions above this threshold require additional detailed analysis (Table 4-1). No significant impact to the regional climate would be associated with the installation and construction of the proposed project.

**Table 4-1. Estimated Methane Emissions From Proposed Mining of TVA Coal**

Year	Coal Total (square feet)	Annual Emissions		
		Total Methane (cubic feet)	Metric tons CO <sub>2</sub> Equivalent	U.S. tons CO <sub>2</sub> Equivalent
2	743027.7	11845457.6	4791.5	5281.7
3	546756.2	8716468.8	3525.8	3886.5
4	140193.9	2234992.0	904.1	996.5
5	112155.1	1787993.6	723.2	797.2
6	56077.6	893996.8	361.6	398.6
7	0	0	0	0

Coal thickness = 6 feet

Methane per ton of Illinois Basin coal = 64.3 cubic feet (USEPA 2010)

Weight of bituminous coal per acre-foot = 1,800 tons

1 acre-foot = 43,560 cubic feet

### Cumulative Impacts

The proposed project would contribute from 0 to 0.15 percent of the total Illinois mining methane emissions and from 0 to 0.01 percent of total United States mining methane emissions. These levels are considered an insignificant contribution to statewide methane emissions (Appendix I).

## 4.4. Biological Environment

The effects of adopting and implementing the Action Alternative and the No Action Alternative are discussed according to each resource area. The portion of the proposed mine plan on private property lies within Franklin County. The impacts to private property were considered in the cumulative impact assessment for this proposed project.

### 4.4.1. Wildlife

#### No Action Alternative

There would be no impacts to wildlife and wildlife habitats from adopting the No Action Alternative because no mining on TVA property would occur. Terrestrial wildlife could be impacted by mining activities on the private property portion of Sugar Camp Mine No. 1.

### **Action Alternative**

The majority of the 5-acre area where surface activity would take place (i.e., construction of the bleeder shaft facility) has already been disturbed (maintained as a cultivated field), and the species most likely present are those associated with early-successional, regularly disturbed habitat. Any wildlife present within the site at the time of construction activities may temporarily disperse to nearby areas, but they would return to the project area at the completion of construction activities.

There is currently no evidence that longwall subsidence would affect the surface usage of habitat by, or productivity of, wildlife, migratory birds, or the copperbelly water snake within the proposed site. Any effects resulting from mining would be subject to mitigation under Sugar Camp's integrated fish and wildlife habitat reclamation plan; the impacts to terrestrial wildlife would be insignificant after mitigation.

### **Cumulative Impacts**

Wildlife habitat in this area has already been altered by agricultural and residential development. The cumulative impacts of TVA's action would be insignificant with the implementation of Sugar Camp's fish and wildlife habitat reclamation plan.

#### **4.4.2. Vegetation**

##### **No Action Alternative**

There would be no impacts to plants or plant habitats under the No Action Alternative because no mining on TVA property would occur. Vegetation could be impacted by mining activities on the private property portion of Sugar Camp Mine No. 1.

##### **Action Alternative**

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. Some disturbance of existing plant communities would occur in areas designated for the installation of the bleeder shaft, laydown areas, soil piles, and access road. No significant impacts to vegetation within the mine footprint are anticipated because no uncommon terrestrial plant communities or otherwise unusual vegetation occurs on the lands to be disturbed under the proposed Action Alternative.

Construction activities at the bleeder shaft site could result in soil disturbances that could potentially be a vector for the introduction of invasive species or could facilitate the movement of Illinois regulated noxious weeds (Johnson grass, kudzu, and musk thistle). As long as protocols as set forth by the Illinois Noxious Weed Law-Section 220.230 are followed for the cleaning of equipment and clothing, then movement of these species can be avoided, and TVA would fulfill its obligations for compliance of EO 13112, Invasive Species.

##### **Cumulative Impacts**

Vegetation in this area has been significantly altered by agricultural and residential development. Subsidence would cause vegetation on approximately 12,000 acres to subside also; depending on how the rock layers fracture, root masses could be impacted, which could cause some of the vegetation to die off. About 0.1 percent of the land included in the Sugar Camp Mine No. 1 plan would have surface disturbance for construction; a much larger percentage could be disturbed during postsubsidence drainage mitigation activities. Surface-disturbed areas would be revegetated with noninvasive species. The cumulative effect of TVA's action on vegetation would be insignificant.

#### **4.4.3. Aquatic Ecology**

##### **No Action Alternative**

There would be no impacts to aquatic species from implementation of this alternative because no mining on TVA property would occur.

##### **Action Alternative**

Under the Action Alternative, aquatic life could be affected by the alteration of habitat conditions within the stream and changes to riparian conditions due to surface subsidence. These impacts could result in increased erosion and siltation, loss of in-stream habitat, and increased stream temperatures. Siltation has a detrimental effect on many aquatic animals adapted to riverine environments. Turbidity caused by suspended sediment can negatively impact spawning and feeding success of many fish species (Sutherland et al. 2002).

Impacts to streams or other watercourses would be subject to Sugar Camp's mitigation plan for reestablishing the premining drainage patterns by grading and/or dredging areas of trapped or standing water. With implementation of these remediation and mitigation activities, direct impacts to aquatic life in these streams would be minimized.

##### **Cumulative Impacts**

As stated previously, streams in this area have already been impacted by agricultural uses, residential development, and mining activities. Because the region's streams are already impacted and mitigation activities would minimize erosion in the project area potentially caused by implementing the Action Alternative, TVA's action would contribute insignificant cumulative effects to aquatic life.

#### **4.4.4. Threatened and Endangered Species**

The USFWS determined that coal mining and reclamation operations are not likely to jeopardize the continued existence of any threatened, endangered, or proposed species or result in modification of designated or proposed critical habitats if operations are conducted in accordance with properly implemented regulatory programs (USFWS 1999; 30 Code of Federal Regulations (CFR) 816.97 and 817.97).

##### **No Action Alternative**

No threatened or endangered species would be affected under the No Action Alternative, because no mining of TVA-owned coal would occur.

##### **Action Alternative**

The Action Alternative would not likely adversely affect populations of the federally listed Indiana bat; it would also not affect populations of the other federally listed species, piping plover.

Suitable habitat for the Indiana bat, occurs within the proposed project area although there have not been any documented observations of Indiana bats within Hamilton County (USFWS 2011d). The three captured Indiana bat females were the first recorded occurrences within Franklin County.

No trees would be removed for the construction of the bleeder ventilation shaft. However, suitable Indiana bat roost trees may need to be removed in order to correct stream drainage that was altered by subsidence on land overlying TVA-owned coal. If trees have to be removed, they may only be removed during winter months when summer maternal

bat colonies are not present. In order to avoid impacts to Indiana bats present in the area during the summer months when they roost in trees, Sugar Camp's mining permit requires that any timber removal associated with mining activities take place between September 30 and April 1.

A Final Indiana Bat Protection and Enhancement Plan and Annual Monitoring Study Plan, designed to monitor potential impacts to this species that may result from the project's activities, was approved by the USFWS on January 14, 2011. This plan includes yearly monitoring of Indiana bat populations and habitat for five years, the installation of a minimum of 15 bat boxes within the floodplain vicinity of known roost tree areas, and annual bat box maintenance. In addition, the plan proposes to girdle trees within the project area to create future roost trees if there are not enough dead trees larger than 9 inches in diameter that the bats can use to roost. Furthermore, tree removal would be restricted to wintertime when bats are hibernating elsewhere (Alliance Consulting Inc. 2010b). Trees that would be removed in the dredged stream-reshaping areas would be replanted with at least six trees per dredged area. Replanted trees would be selected from a list of trees that Indiana bats prefer (the bats roost underneath bark, so exfoliating bark tree species are optimal, such as maples, hickories, ashes, oaks, or elms) (Alliance Consulting Inc. 2010b). Implementation of the plan would ensure that mining activities of Revised Permit No. 382 does not adversely affect populations of the Indiana bat.

The Action Alternative would also not adversely affect populations of any state-listed species, including aquatic, terrestrial animal, or plant species.

The state-listed river redhorse was not documented during sampling efforts conducted in August and September 2009 by Alliance Consulting Inc. Suitable habitat for the state-listed river redhorse is not believed to occur within the project area. Therefore, no impacts to the state-listed fish are expected to occur.

As a condition of the mining permit, Sugar Camp is required to correct any potential changes in water flow that can occur because of subsidence. No wetlands would be removed by the proposed project on TVA-owned coal lease property. Any stream-reshaping activities would require additional wetland surveys through the Section 404 permitting process. These surveys would identify any populations of endangered species that would need to be avoided. Therefore, the state-listed marsh rice rat, little blue heron, and river cooter would not be significantly affected by the construction of the bleeder shaft or by the subsequent subsidence.

No buildings would be removed by the proposed project on TVA-owned coal lease property. Any trees that may have to be removed during stream-reshaping activities would be replanted. Therefore, the barn owl, which roosts in trees and buildings, would not be affected by the construction of the bleeder shaft or the proposed subsidence.

The surface area to be affected by establishment of a bleeder shaft and use of an access road is relatively small and would occur in an already disturbed area where suitable habitat for ornate box turtle and loggerhead shrike is, at best, minimal and marginal. Therefore, impacts to these species are not expected to occur as a result of the proposed actions.

No threatened or endangered plant species would be affected by the Action Alternative because no habitat for listed species occurs within the project area.

### **Cumulative Impacts**

The project area has already been disturbed and modified for agricultural uses. No trees would be removed for bleeder shaft construction, and any trees that would have to be removed for stream drainage corrections would be replaced. Because the region's habitat has already been disturbed and habitat potentially removed during stream drainage corrections would be replaced, TVA's action would be an insignificant contribution to the overall impacts on populations of threatened or endangered species.

#### **4.4.5. Natural Areas**

##### **No Action Alternative**

There would be no impacts to natural areas under the No Action Alternative because no mining on TVA property would occur.

##### **Action Alternative**

The Middle Fork of the Big Muddy River RRA surrounds the TVA-owned and non-TVA coal proposed to be mined by Sugar Camp. The Freeman Coal Company Forest Natural Area is located within the RRA at the southern end of the RRA watershed boundary, several miles from the current and proposed mining activities. Potential direct impacts to the RRA from subsidence could include changes in stream and drainage patterns, which could indirectly affect swamp and wetland functions of the bottomland and floodplain forests.

Because future mining activities within the project area would require the restoration of altered streams and drainage patterns to premining conditions, impacts to hydrologic functions that support the RRA would be avoided or minimized. Because there are existing streams and tributaries not affected by subsidence that support the hydrologic functions of the RRA, no further impacts to portions of Middle Fork of the Big Muddy River RRA and the Freeman Coal Company Forest that are within the boundaries of the RRA are anticipated.

Due to the distance of Ten Mile Creek State Fish and Wildlife Area from the proposed project site (3 miles), no direct or indirect impacts to this natural area are anticipated. The natural areas of Rend Lake State Fish and Wildlife Area, Wayne Fitzgerald State Recreation Area, Pyramid State Recreation Area, Giant City State Park, Dolan Lake State Fish and Wildlife Area, Bell Rive Railroad Prairie Natural Heritage Landmark, Thompsonville Lake, McCleansboro Lake, Lake Moses, and West Frankfort City Lake and Reservoir are located a sufficient distance away (3.1 to 10.0 miles) from the proposed project site to avoid effects from the proposed mining. Therefore, no direct or indirect impacts are anticipated.

### **Cumulative Impacts**

Potential cumulative effects over time to the Middle Fork Big Muddy River RRA would depend on the extent and severity of mine subsidence-related changes to bedrock and soil that directly impact surface water and groundwater. Mining efforts under Mine Permit No. 382 would occur over the span of seven years. Other future mining operations may eventually occur in the vicinity of the proposed project over time and could further impact hydrologic functions that support features of the RRA or affect other natural areas. Natural areas in the surrounding region could be affected by changes in groundwater hydrology caused by subsidence on TVA-owned coal lease property. Impacts to water resources or natural areas over time because of future additional mining operations, however, are difficult to determine. No cumulative impacts to natural areas are foreseeable because of the proposed action within the time and geographic bounds of this project.

The size of the TVA-owned property that would be subsided, as well as its distance from natural managed areas, indicates that the contribution of subsidence on TVA property to this potential effect would likely be insignificant.

#### **4.5. Transportation**

##### **No Action Alternative**

No increases in traffic or subsidence of roads on TVA-owned coal lease property would occur under the No Action Alternative.

##### **Action Alternative**

There would be a temporary slight increase in traffic on County Road 850N during the construction of the site entrance and access road to the bleeder shaft on TVA-owned coal lease property. After the construction was completed, there would be a continued insignificant increase in traffic (about one car per month) on County Road 850N for routine ventilation shaft air quality monitoring.

Longwall mining below state and local roads is common in southern Illinois and is addressed in Sugar Camp's IDNR Mine Permit. Sugar Camp would be required to monitor the roadway section as the longwall panel passes underneath it, and temporary corrective measures (e.g., minor regrading, pavement patches) would have to be implemented to maintain a safe roadway. Once the entire subsidence event had passed, Sugar Camp would restore the road to presubsidence conditions. Subsidence on unpaved roads is easier to address with temporary regrades than on paved roads, which require constant patching of the asphalt surface.

Several county roads on TVA-owned coal lease property would be subsided, and Sugar Camp would repair any damages caused by the subsidence. An insignificant increase of traffic associated with routine ventilation shaft air quality testing would occur on County Road 850N.

##### **Cumulative Impacts**

County roads in both Franklin and Hamilton counties would subside because of the underground mining activities. Any damage would be repaired by Sugar Camp. An increase of traffic on private property could occur that is associated with worker commutes to the mine entrance and surface facilities. Cumulative impacts on transportation from the TVA action would be insignificant with the implementation of road repairs.

#### **4.6. Utilities**

##### **No Action Alternative**

No utilities on TVA-owned coal lease property would be affected under the No Action Alternative because there would be essentially no change from the current situation.

##### **Action Alternative**

Utilities within the 2,600-acre shadow area on TVA-owned coal lease property would be affected. Sugar Camp is required by IDNR to inform utility companies well in advance of subsidence to adequately prepare for subsidence effects. Sugar Camp is also required to repair any damage caused by its mining activities. The effects of the proposed project on utilities would therefore be insignificant after preventive planning with utility companies and subsequent repair.

### **Cumulative Impacts**

Cumulative impacts from the proposed mining on TVA-owned coal lease property would be insignificant after preventive planning with utility companies and subsequent repair, as required by the state mine permitting process.

## **4.7. Socioeconomic Conditions and Environmental Justice**

### **No Action Alternative**

Under the No Action Alternative, there would be no effect on socioeconomic or environmental justice conditions caused by the TVA action because no mining of TVA-owned coal would occur. Jobs would be generated by mining of the coal not owned by TVA.

### **Action Alternative**

No additional workers at the Sugar Camp Mine No. 1 would be hired as a result of the longwall mining on the TVA-owned coal lease property. Up to 15 workers would be employed to drill the bleeder shaft during a one-year period; six other workers would be hired for bleeder shaft site development, and five workers would be employed to install power to the ventilation shaft. These jobs may not create new local job opportunities because of the technical engineering skills needed for drilling the bleeder shaft (i.e., an experienced crew may be brought in from outside the county). The area included in the proposed mine plan has a small, widely dispersed population. The affected census tracts have a smaller percentage of people living under the poverty level and smaller minority populations than the state averages. Income levels in these tracts are lower than the state average, which is typical for rural, mining areas. The proposed action would not disproportionately affect low-income or minority populations.

### **Cumulative Impacts**

As many as 350 jobs will be created for mining the private property portion of the Sugar Camp Mine No. 1. No additional jobs would be created for underground mining on the TVA-owned coal lease property portion. However, additional jobs would be created for bleeder ventilation shaft construction. This would be about 4 percent of the total Sugar Camp-related jobs, which would be an insignificant increase.

## **4.8. Cultural Resources**

### **No Action Alternative**

There would be no effect to historic structures or archaeological sites on TVA-owned coal lease property because no mining on TVA property would occur. Historic structures and archaeological sites on private property could be impacted by mining activities.

### **Action Alternative**

Subsidence is not anticipated to directly affect archaeological sites because the ground would drop gradually and uniformly, carrying the archaeological resources with it. An underlying clay layer provides a relatively plastic cushion, resulting in minimal damage to the surface. Subsidence could cause ponding near streams and inundate previously dry archaeological sites. These sites would be restored to previous dry conditions by postsubsidence stream restoration efforts.

Stream restoration activities to alleviate ponding could potentially affect archaeological sites. Stream restoration often occurs in areas with a high probability of archaeological site areas. Restoration involves additional ground-disturbing activities such as dredging. These



stream restoration activities may require an archaeological investigation prior to disturbance. Those archaeological investigations would establish the presence or absence of significant resources, and a plan would be developed for avoidance or data collection.

No archaeological resources would be affected by surface disturbance at the proposed bleeder ventilation shaft location.

Two structures (a house and a culvert) on land overlying TVA-owned coal may be eligible for listing in the National Register of Historic Places. The two structures would be evaluated to determine if they are eligible for the National Register of Historic Places. If found to be eligible, the culvert may be adversely impacted by subsidence because of its fragile, damaged state; therefore, the culvert would undergo a Historic American Engineering Record documentation to detail its condition prior to subsidence (Appendix G). If found to be eligible, the Cutright house would be reinforced structurally prior to subsidence in order to minimize damage. These documentation and protective measures have been documented in a memorandum of agreement between TVA and the Illinois State Historic Preservation Officer (SHPO). With the implementation of the memorandum of agreement, the potential adverse effects to the two structures caused by the proposed mining of TVA coal have been resolved.

#### **Cumulative Impacts**

No other activities potentially affecting cultural resources within the mine footprint are known at this time. Archaeological sites, cemeteries, and historic structures would subside on about 12,000 acres of land in Hamilton and Franklin counties as a result of implementing Mine Permit No. 382. Sugar Camp is required to repair any damage to historic structures caused by subsidence (for instance, cemetery headstone movement or cracks in building foundations); archaeological sites are not anticipated to be affected by subsidence. Thus, cumulative impacts to cultural resources from the TVA action would be insignificant with the implementation of historic structure repairs.

### **4.9. Noise Levels**

#### **No Action Alternative**

There would be no noise impacts from the TVA action because no mining on TVA property would occur. Mining activities on private property and from mine-related road traffic would generate noise.

#### **Action Alternative**

A Frontier-Kemper 350MT Blind Drilling System would be used to complete the bleeder shaft. Noise decreases by 6 decibels (dB) with every doubling of distance from a noise-generating source. Assuming that the drill and other associated construction equipment would have a noise level of 110 dB (equivalent to a jackhammer), noise at the two nearest residences (approximately 2,000 feet or more away from the bleeder shaft) would be less than 56 dB. This level is less than ambient noise within a business or commercial area, but louder than ambient noise in a rural setting, i.e., about 42 dB (The Engineering Toolbox 2011). Commuters passing on County Road 850N could hear industrial-level noise (less than 86 dB) during the time of drilling. These noise levels would end after completion of the shaft drilling and are considered temporary and insignificant. Noise would also be generated by fans installed within the ventilation shaft; some of this noise would be shielded by the vent housing, as well as by surrounding topography and vegetation. Fans installed at the shaft opening could be heard from surrounding

residences. This noise would be constant for the lifetime of mining operations. Commuters passing on County Road 850N and nearby residences could hear noise generated by the ventilation fans, which would likely be louder than rural ambient noise but within typical noise levels (less than 67 dB, A-weighted) for residential areas, and is therefore considered insignificant.

### **Cumulative Impacts**

Noise is generated by county road traffic and agricultural machinery in this region. The bleeder ventilation construction noise would be temporary and insignificant and would end after the shaft drilling is completed. Thus, this construction noise would not pose a significant long-term or cumulative contribution to local noise levels.

### **4.10. Summary of Commitments and Proposed Mitigation Measures**

The State of Illinois requires Sugar Camp to implement best management practices and mitigation measures in order to compensate for potential adverse environmental effects as conditions of Mine Permit No. 382. These conditions are enforced by the State of Illinois; TVA does not regulate them. These State of Illinois mitigation measures include:

1. The implementation of erosion-control practices (e.g., silt fences, straw, mulch, vegetative cover) and fugitive dust minimization (e.g., wetting roads prior to heavy use).
2. The implementation of water quality protection measures (e.g., sediment pond treatment, water quality monitoring, establishment of riparian zone buffer zones).
3. The repair of any damage to buildings or other structures on land overlying TVA-owned coal.
4. The minimization of invasive species transmission per the requirements of the Illinois Noxious Weed Law.
5. Compensation for any interruption to well water quality or quantity caused by subsidence on land over TVA-owned coal until the groundwater is restored.
6. The repair of any damage to roads on land overlying TVA-owned coal caused by subsidence.
7. The repair of any drainage alteration caused by subsidence on land overlying TVA-owned coal.
8. The implementation of the Sugar Camp Indiana Bat Protection and Enhancement Plan.

A memorandum of agreement between TVA and the Illinois SHPO specifies mitigation measures for the potential adverse effects to the WPA culvert on land over TVA-owned coal. These commitments include the requirements that:

1. Prior to subsidence, the Cutright House and the WPA. No. 5711 culvert would be evaluated for eligibility for listing in the National Register of Historic Places.

2. If eligible, the house would be protected by stabilization prior to subsidence according to a stabilization plan agreed upon in writing by the SHPO.
3. After subsidence, the house would be restored to its condition prior to stabilization, in consultation with the SHPO.
4. If eligible, the culvert would be recorded by an approved historic structure survey.

As additional conditions of mining plan approval, TVA requires that Sugar Camp:

1. Adhere to the memorandum of agreement requirements.
2. Include TVA-owned coal lease property in Indiana Bat Protection and Enhancement Plan activities, including mist net surveys, tree removal restrictions, and tree species replacement guidelines.

IDNR requires Sugar Camp to submit quarterly progress reports detailing mining, monitoring, and mitigation activities as a condition of Mine Permit No. 382. TVA can verify Sugar Camp's adherence to the commitments of this EA by obtaining copies of these quarterly progress reports.

## CHAPTER 5

### 5.0 LIST OF PREPARERS

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Involvement:	Cultural Resources



## **CHAPTER 6**

### **6.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES ARE SENT**

#### **Federal Agencies**

United States Army Corps of Engineers – St. Louis District

United States Fish and Wildlife Service – Rock Island Ecological Services Office

#### **State Agencies**

Illinois Department of Natural Resources – Land Reclamation Division

Illinois Environmental Protection Agency

#### **Individuals and Organizations**

Sugar Camp Energy LLC

Johnson City, Illinois

Ruger Coal Company LLC

Beckley, West Virginia

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## CHAPTER 7

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