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SUGAR CAMP COAL MINE EXPANSION
VIKING DISTRICT #2

ENVIRONMENTAL ASSESSMENT

Franklin and Hamilton Counties, Illinois

TENNESSEE VALLEY AUTHORITY

November 2018

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Symbols, Acronyms, Abbreviations and Glossary of Terms

Administrative Code	62 Ill. Adm. Code 2501 Abandoned Land Mines Regulations
CEQ	Council on Environmental Quality
CMM	Coal Mine Methane
DBH	Diameter at Breast Height
EA	Environmental Assessment
ENCA	Ewing-Northern Coal Acquisition
EO	Executive Order
FPPA	Federal Farmland Protection Policy Act
FWA	Fish and Wildlife Area
GHG	Greenhouse Gases
GHGRP	Greenhouse Gas Reporting Program
HDPE	High Density Polyethylene
IAC	Illinois Administrative Code
IBR	Incidental Boundary Revision
IDNR	Illinois Department of Natural Resources
IHPA	Illinois Historic Preservation Agency
ISGS	Illinois State Geological Survey
LRD	Land Reclamation Division
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHD	USGS National Hydrography Dataset
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OMM	Office of Mine and Minerals (IDNR)
OWR	Office of Water Resources (IDNR)
Project Area	The land area within overlapping boundaries of the shadow area and the surface effects area
RRA	Middle Fork Big Muddy River Resource Rich Area
SBR	Significant Boundary Revision
Surface Effects Area	The land where above-ground mine operations occur, including the bleeder shaft area and the utility corridor
SDPS	Surface Deformation Prediction System – Computer modeling software
Shadow Area	The land area where underground mine operations occur
TVA	Tennessee Valley Authority
UCM Application	Underground Coal Mine Application for surface coal mining and reclamation operations permit- underground operations
USACE	U.S. Department of Army, Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Proposed Action

Sugar Camp Energy, LLC (Sugar Camp) proposes to expand its mining operations of Tennessee Valley Authority (TVA)-owned coal reserves in Hamilton and Franklin counties, Illinois (Figure 1-1). The expansion area, known as Viking District #2, is approximately 2,255 acres. The expansion area, also known as "project area", consists of overlapping boundaries of a 2,250-acre underground shadow area and a 12-acre surface effects area (bleeder shaft area [5.3 acres] and utility corridor [6.6 acres]), hereafter collectively referred to as the project area. The entire bleeder shaft area and a portion of the utility corridor are located within the 2,250-acre shadow area. Approximately 5 acres of the utility corridor extend outside of the shadow area.

Sugar Camp has received a Surface Coal Mining and Reclamation Operations Permit – Underground Operations from the Illinois Department of Natural Resources (IDNR), Office of Mines and Minerals (OMM) – Land Reclamation Division (LRD) for the Viking District #2 shadow area as a portion of Significant Boundary Revision (SBR) No. 6 to underground coal mine (UCM) Permit No. 382 for Sugar Camp Mine No. 1. Sugar Camp has also received approval from IDNR for Incidental Boundary Revision (IBR) No. 90 to Permit No. 382 to construct the bleeder shaft area and utility corridor.

Under the proposal, coal would be extracted using room and pillar and continuous mining techniques during a development period. After entryways are developed, longwall mining and subsequent planned subsidence would begin. Surface activities to support the underground mining that would occur in the Viking District #2 area would be limited to construction of a bleeder shaft on approximately 5.3 acres of land and an approximate 6.6-acre utility corridor.

TVA owns the coal reserves beneath this project area and executed a coal lease agreement with Sugar Camp in July 2002 which allows Sugar Camp to mine these reserves. The purpose of this agreement is to facilitate the recovery of TVA coal resources in an environmentally sound manner. Under the terms of that agreement, Sugar Camp may not commence mining of TVA-owned coal reserves under a mining plan or any revision until completion of all environmental and cultural resource reviews required for compliance with applicable laws and regulations have been finalized. The proposed action is for TVA to approve the mining by Sugar Camp of the coal underlying the 2,250-acre shadow area, construction of a bleeder shaft, and installation of utilities illustrated in Figure 1-1.

1.2 Background

TVA is a federal corporation and instrumentality of the United States government, created in 1933 by an act of Congress to foster the social and economic well-being of the residents of the Tennessee Valley region. As part of its diversified energy strategy, TVA completed a series of land and coal mineral acquisitions from the 1960s through the mid-1980s that resulted in the coal ownership of two large coal reserve blocks in the southwestern section of the Illinois Basin. The first purchase took place in 1964, when TVA acquired 6,452 acres of coal reserves located northeast of Thompsonville in Franklin County, Illinois (the Franklin County Reserves), as a potential long-term fuel supply for its coal-fired power plants. In 1977, TVA acquired 6,547 acres of coal reserves near Dahlgren in Hamilton and Jefferson counties, Illinois (known as the Eads Reserves). Later, in 1988, TVA transferred land

containing the surface and coal seams within 150 feet of the surface of the Eads reserves to the State of Illinois, while retaining ownership of coal deeper than 150 feet.

The largest acquisitions of coal reserves took place between 1975 and 1984, when TVA acquired 51,960 acres of coal reserves between Ina, Benton, and McLeansboro in Franklin, Hamilton and Jefferson counties, Illinois (the Ewing-Northern or Ewing-Northern Coal Acquisition [ENCA] Reserves) which lies from 650 feet to more than 900 feet below ground (HMG 2018). Under the proposal, Sugar Camp would mine portions of the ENCA reserves. TVA does not own any surface estate within the project area. Figure 1-1 illustrates the area that would be mined under the proposal.

As of 2014, TVA owns coal reserves underlying 64,959 acres of land containing approximately 1.35 billion tons of Illinois No. 5 and No. 6 coal seams. TVA generally leases its mineral rights to private coal mining companies and receives royalties based on the amount of coal recovered under such lease agreements. In 2002, TVA leased Illinois Basin coalfield reserves to Sugar Camp with the condition that mining of TVA-owned coal may not begin without an appropriate environmental review by TVA. Sugar Camp's mine plan is subject to review and approval by the State of Illinois, which has regulatory authority delegated by the federal Office of Surface Mining Reclamation and Enforcement. In November 2017, Sugar Camp obtained approval from the State of Illinois to expand Sugar Camp Mine No. 1 by 37,791.9 acres, including the Viking District #2 area. The permit was approved as SBR No. 6 to Permit No. 382.

In early 2018, Sugar Camp began mining activities on portions of TVA-owned coal reserves in the Viking District #2 without first notifying TVA; therefore, TVA was unable to conduct appropriate environmental review of the activities prior to their beginning. After confirming that Sugar Camp was engaging in mining activities, TVA requested that Sugar Camp cease its activities to allow TVA to conduct the required environmental reviews. Sugar Camp did not cease its activities; thus, TVA has pursued legal means to compel Sugar Camp to stop its mining activities until TVA can conduct the necessary environmental review of the proposal. *TVA v. Sugar Camp Energy, LLC*., No. 3:18-cv-239 (E.D. Tenn. 2018). To date, Sugar Camp has conducted room and pillar mining activities in approximately 242 acres of the shadow area: 144 acres mined utilizing room and pillar methods and 98 acres mined utilizing longwall methods.

In fulfillment of TVA's responsibilities under the National Environmental Policy Act (NEPA), TVA has completed an Environmental Assessment (EA) of the proposed mining within the Viking District #2 shadow area of TVA-owned coal reserves in Illinois.

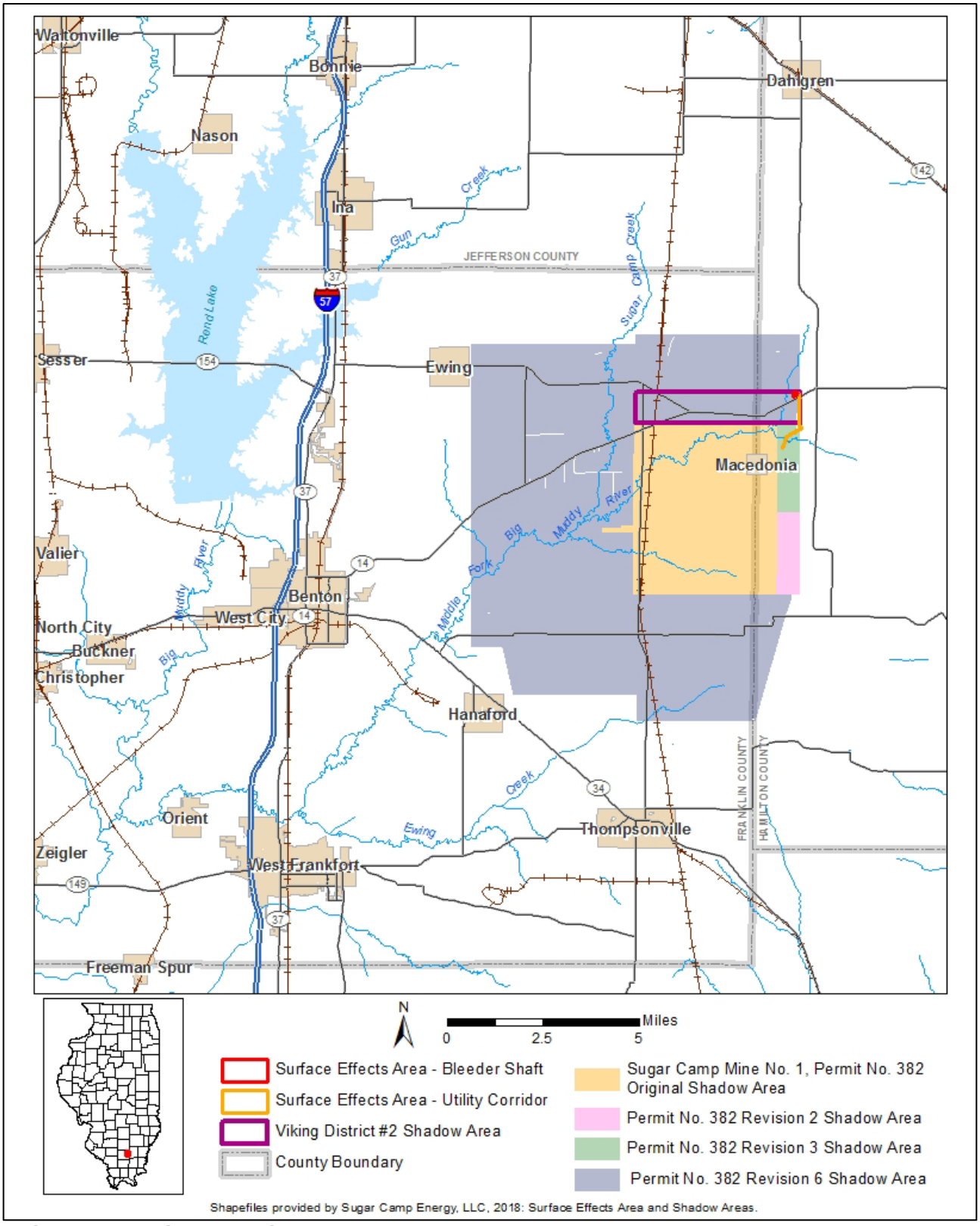

Figure 1-1 Project Location Map

1.3 Decision to be Made

The decision to be made is whether to approve or disapprove the mining and removal of TVA-owned coal by Sugar Camp based on the proposed mining plan for Sugar Camp Mine No. 1, Viking District #2. The activities associated with the mining plan include the following major items within the project area:

- Proposed Surface Effects Area – This area would include above ground features necessary to ventilate the coal mine, as well as underground water and power lines. The proposed surface effects area is approximately 12 acres in size and includes of a 5.3-acre bleeder shaft area and a 6.6-acre, 1.7-mile long utility corridor (Figure 1-2).

- Proposed Mine Shadow Area – This area would be used for underground mining activities within a 2,250-acre underground area, also known as "shadow area," including the controlled subsidence (planned sinking of surface related to extraction of coal) of 1,861 acres above TVA-owned coal reserves, also known as the "subsidence area." Additional activities within the shadow area include development of the mine's underground workings (Figure 1-2).

The surface effects area and the shadow area comprise the project area, which is approximately 2,255 acres. The entire bleeder shaft area and a portion of the utility corridor are located within the 2,250-acre shadow area. Approximately 5 acres of the utility corridor are located outside of the shadow area, accounting for the 2,255-acre project area. Additional details of the proposed activities are provided in Section 2.1.2.

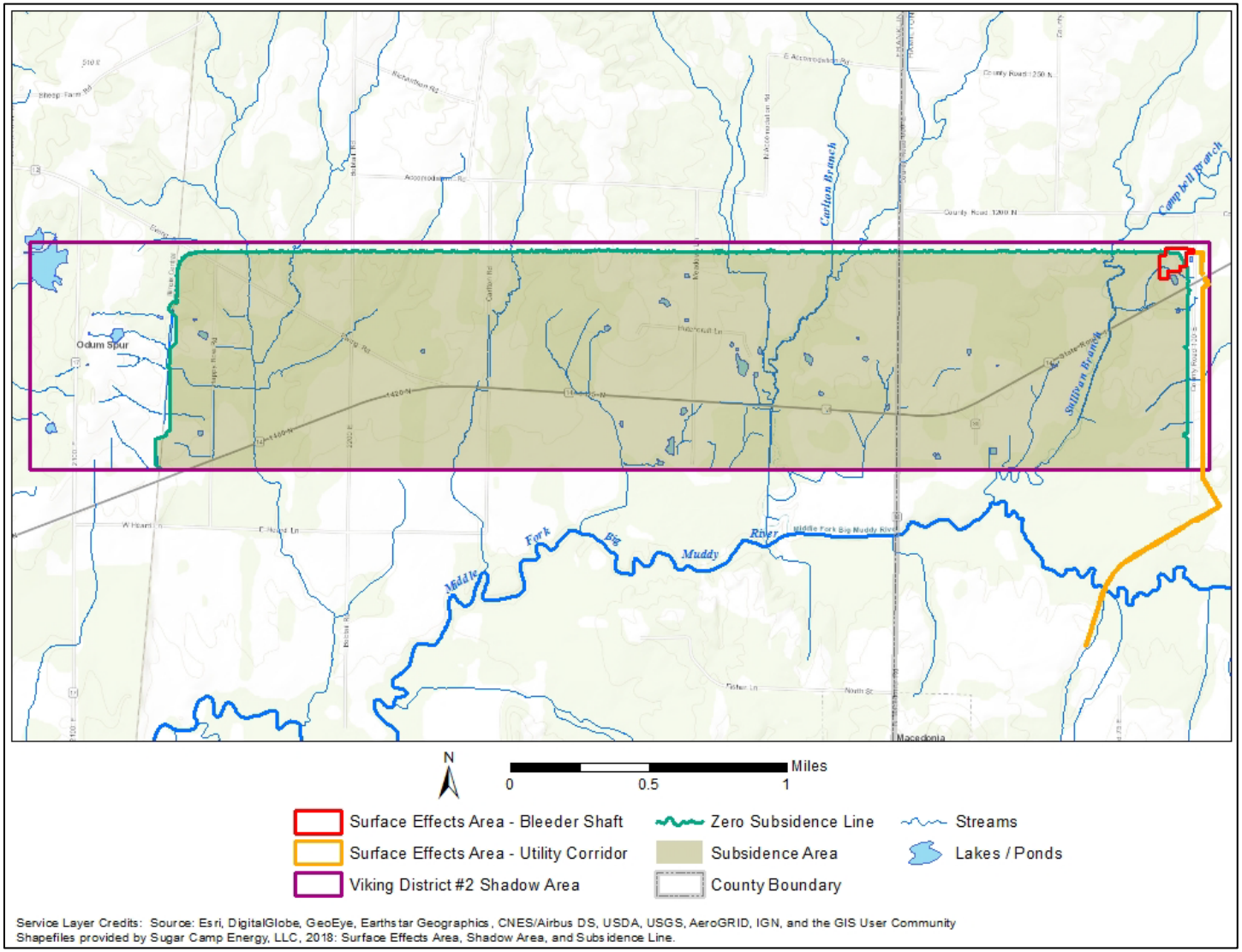

Figure 1-2 Project Area

1.4 Related Environmental Reviews

In 2008, Sugar Camp obtained a permit from the State of Illinois for underground longwall mining operations on approximately 12,103 acres in Franklin and Hamilton counties. In 2010, Sugar Camp applied to the state for a SBR of that permit to mine TVA-owned coal under an additional 817-acre area. The permit was issued in May 2010. In 2011, TVA prepared an EA to document the potential effects of Sugar Camp's proposed mining of TVA-owned coal underneath a 2,600-acre area for Sugar Camp Mine No. 1.

In November 2017, Sugar Camp obtained approval from the State of Illinois to expand Sugar Camp Mine No. 1 by 37,791.9 acres (approved as SBR No. 6 to Permit No. 382). Viking District #2 falls within this permit area. In July 2018, Sugar Camp obtained approval from the state for an IBR related to Viking District #2. TVA is reviewing underground and above ground mine operations for Viking District #2 with this environmental assessment; TVA will complete an Environmental Impact Statement to consider the 37,791.9-acre mine expansion.

A list of the environmental documents and information provided by Sugar Camp for Viking District #2, is provided below. Information from these documents has been utilized to prepare this environmental assessment.

- Application for Boundary Review. Sugar Camp Mine, Franklin and Hamilton County, Illinois. May 2018. Information in this document was extracted or revised by HMG Engineers from the SBR No. 6 Application for Permit No. 382 submitted by Sugar Camp to IDNR-OMM in 2017. Information includes, but is not limited to:
    - Underground Operations Plan,
    - Indiana Bat Survey and
    - Water Resources Analysis.

- IBR for Permit No. 382 – Viking Bleeder Shaft, Hamilton County, Illinois; Sugar Camp Mine No. 1 – Submitted to IDNR-OMM by Sugar Camp on May 15, 2018. The application includes, but is not limited to:
    - Surface Operations Plan,
    - Blast Plan,
    - Cultural Resources Survey and
    - Wetland and Stream Delineation Report.

1.5 Scope of the Environmental Assessment

Based on TVA's experience with conducting environmental reviews of mining projects, the nature of the proposed action, and other available information, the potential effects to the following resources are considered in this environmental review:

- Geology and Soils
- Floodplains
- Groundwater
- Surface Water
- Water Supply
- Wetlands
- Air Quality
- Greenhouse Gases
- Wildlife
- Migratory Birds
- Vegetation
- Invasive Species
- Aquatic Ecology
- Threatened and Endangered Species
- Natural Areas
- Transportation
- Utilities
- Socioeconomics and Environmental Justice
- Cultural Resources
- Noise Levels

1.6 Necessary Permits and Consultation

TVA would not be required to secure any permits to undertake the proposed action. All permits would be held by Sugar Camp.

1.6.1 Surface Coal Mining and Reclamation Operations Permit – Underground Operations

Sugar Camp has received permission from IDNR-OMM to conduct underground and above ground mining operations in the Viking District #2 shadow area as a portion of Significant Boundary Revision (SBR) No. 6 to underground coal mine (UCM) Permit No. 382 for Sugar Camp Mine No. 1. Sugar Camp also received approval from IDNR for Incidental Boundary Revision (IBR) No. 90 to Permit No. 382 to construct the bleeder shaft area and utility corridor.

During the permitting processes, Sugar Camp met the public participation requirements of 62 Illinois Administrative Code (IAC) 1773.13 and 1773.14. In obtaining SBR No. 6, notice was provided to the public in April 2017 and state and Federal agencies were provided copies of the permit application for review. An informal conference was held at the IDNR Field office in Benton, Illinois on June 21, 2017, with one organization providing comment. In obtaining IBR No. 90 to Permit No. 382, Sugar Camp provided public notice and opportunity for a public hearing; no hearing was requested and no comments were submitted to IDNR.

1.6.2 NPDES

A permit from the Illinois Environmental Protection Agency (IEPA) is needed for all construction projects that disturb more than one acre of land. Sugar Camp would apply for a general National Pollutant Discharge Elimination System (NPDES) permit prior to construction for operations within the surface effects area.

1.6.3 Illinois Joint Permit Application

1.6.3.1 Section 401 Water Quality Certification

This certification is coordinated through the IEPA Bureau of Water for the discharge of fill material and dredging in waters of the United States. Discharge of fill material and dredging in wetlands is not anticipated for disturbance in the surface effects area. Drainage correction activities in the shadow area that involve dredging would require additional

wetland surveys through the Section 404 permitting process but it is likely that a 401 certification would be granted automatically through this process.

1.6.3.2 Section 404 Permit

This permit is a requirement for dredge or fill activities in waters of the U.S., including wetlands, on the private property portion of Viking District #2. It is coordinated through the United States Army Corps of Engineers (USACE). Discharge of fill material and dredging in waters of the U.S. is not anticipated for disturbance in the surface effects area. Drainage correction activities in the shadow area that involve dredging would require additional stream and wetland surveys through the Section 404 permitting process.

1.6.3.3 IDNR Permits

IDNR permits are required for dams, for any construction within a public body of water, and for construction within floodways. These permits are coordinated by the IDNR-Office of Water Resources (OWR). Certain floodway or floodplain construction activities may be authorized by a Statewide or Regional Permit. Statewide Permit No. 8 authorizes the construction of underground pipeline and utility crossings which have insignificant impact on those factors under the jurisdiction of the (IDNR/OWR).

IDNR does not regulate construction near the edge of the floodplain if the obstructions will not cause a significant increase in flood heights. The bleeder shaft area is located at the edge of both the 100-year and 500-year floodplain (see Figure 3-4). IDNR does not regulate construction activities in the floodways of streams draining less than ten square miles. The bleeder shaft area is located in the floodplain of Campbell Branch, which drains five square miles. Additionally, no floodways are delineated on Campbell Branch or Sullivan Branch.

1.6.4 Consultation Requirements

1.6.4.1 United States Fish and Wildlife Service (USFWS) and IDNR

Concurrence on the impact of federal actions on state and federally-listed threatened and endangered species by USFWS and IDNR was obtained.

1.6.4.2 Illinois State Historic Preservation Office (SHPO)

Concurrence on the impact of federal actions on Illinois historic and archaeological sites by SHPO was obtained. The concurrence letter is included in Appendix A.

1.6.4.3 Federally Recognized Tribal Governments

Pursuant to 36 CFR Part 800.3(f)(2), TVA consulted with the following federally recognized Indian tribes regarding properties within the proposed project's area of potential effect that may have religious and cultural significance to them and eligible for listing in the National Register of Historic Places: Absentee Shawnee Tribe of Oklahoma, Chippewa Cree Tribe of the Rocky Boy's Reservation, Citizen Potawatomi Nation, Eastern Shawnee Tribe of Oklahoma, Forest County Potawatomi Nation, Ho-Chunk Tribe of Wisconsin, Kaw Nation, Keweenaw Bay Indian Community, Kickapoo Tribe of Oklahoma, Kickapoo Tribe of Kansas, Lac Vieux Desert Band of Lake Superior Chippewa Indians, Menominee Indian Tribe of Wisconsin, Miami Tribe of Oklahoma, Osage Nation of Oklahoma, Ottawa Tribe of Oklahoma, Ponca Tribe of Oklahoma, Ponca Tribe of Nebraska, Pokagon Band of

Potawatomi Indians, Peoria Tribe of Indians in Oklahoma, Prairie Band of Potawatomi Nation, Quapaw Tribe of Oklahoma, Red Lake Band of Chippewa Indians of Minnesota, Sac and Fox Tribe of the Mississippi in Iowa, Sac and Fox Nation of Missouri in Kansas and Nebraska, the Sac and Fox Nation of Oklahoma, Shawnee Tribe, United Keetoowah Band of Cherokee Indians, Winnebago Tribe of Nebraska, and the Wyandotte Nation.

TVA received comments from one tribe, the Osage Nation, which expressed agreement with TVA's findings. The Osage Nation letter is included in Appendix A.

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CHAPTER 2 - ALTERNATIVES

2.1 Description of Alternatives

Two alternatives were evaluated, the No Action Alternative and the Action Alternative. The alternatives are described below.

2.1.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed Viking District #2 mining plan in the SBR and IBR applications for the 2,255-acre project area. Sugar Camp would not conduct additional mining operations in the Viking District #2. This would not obtain value for federal mineral resources and therefore would not fulfill the purpose and need for the proposed project.

2.1.2 Alternative B – Action Alternative

Under the Action Alternative, TVA would approve the Viking District #2 mining plan as submitted by Sugar Camp in the SBR and IBR applications. According to the IDNR-approved plan, Sugar Camp would be permitted by TVA to mine within a 2,250-acre shadow area and construct surface features within a 12-acre surface effects area for mine operations such as construction of a bleeder shaft and installation of a utility corridor. The application also includes Sugar Camp's proposed reclamation plan, which addresses restoring the land to approved pre-mining conditions when mining operations are concluded. Each of these items is further described in the following paragraphs.

2.1.2.1 Surface Effects Area (above ground development)

The mine plan includes the construction of a bleeder shaft and installation of a utility corridor. These planned activities would temporarily disturb approximately 12 acres of surface lands. Table 2-1 indicates the proposed acres for development in the surface effects area. Figure 2-1 displays the proposed location of the major surface effects items.

The estimated termination date for Viking District #2 operations is 2023 and the estimated termination date for Sugar Camp Mine No. 1 operations is 2045. The termination date is an estimate and would be updated every five years as required by the IDNR-OMM mine permitting process. Actual mining durations can vary based on actual annual production achieved. While coal extraction would occur via room and pillar and continuous mining techniques during the initial development period, the longwall mining and associated planned subsidence is not anticipated to begin until 2019. The rate of coal mine development can vary based on progress to get to the desired coal seam depth.

Table 2-1 Proposed Development for the Surface Effects Area

Surface Effects Area Development	Acres	Percent of Surface Effects Area
Shaft Cuttings Stockpile	1.0	8.4%
Soil Stockpiles	0.5	4.2%
Surfaced Area	2.0	16.8%
Undeveloped Area	1.8	15.1%
Utility Corridor	6.6	55.5%

As shown below in Figure 2-1, Sugar Camp proposes to install one 16-foot diameter bleeder shaft (900 feet deep) with a concrete pad (approximately 2,430 square feet in size and four feet thick), two 16-inch (900 feet deep) steel lined boreholes with concrete pads, two 12-inch (900 feet deep) steel lined utility boreholes with concrete pads, a transformer with a concrete pad, a compressor station, and a crib plant with associated facilities. Two (25'x25'x10') temporary drill pits would be used during the construction of the turbine and utility boreholes. The drill site would be gravel with 8 inches of crusher-run gravel.

Sugar Camp also proposes to install utility lines extending south from the bleeder shaft site to a location approximately 1.7 miles away. A high density polyethylene (HDPE) 12-inch water line and power lines would be installed and buried a minimum of four feet deep within the utility corridor. The utility lines would be installed within 100 feet of the outside right-of-way of a public road (State Route 14 and County Road 100 E). During reclamation, the lines would be capped/disconnected and left in place.

Removal of topsoil would occur immediately following any necessary vegetation clearing for construction. Topsoil material would be removed and placed in a stockpile for future reclamation. Excavated consolidated material would be utilized for road and parking area base construction or placed in a stockpile for future reclamation. Soil storage stockpiles would be situated on stable sites outside of drainage ways to minimize soil erosion. Sugar Camp would seed soil stockpiles with grasses, legumes, and small grain cover crops to minimize susceptibility to excessive water and wind erosion.

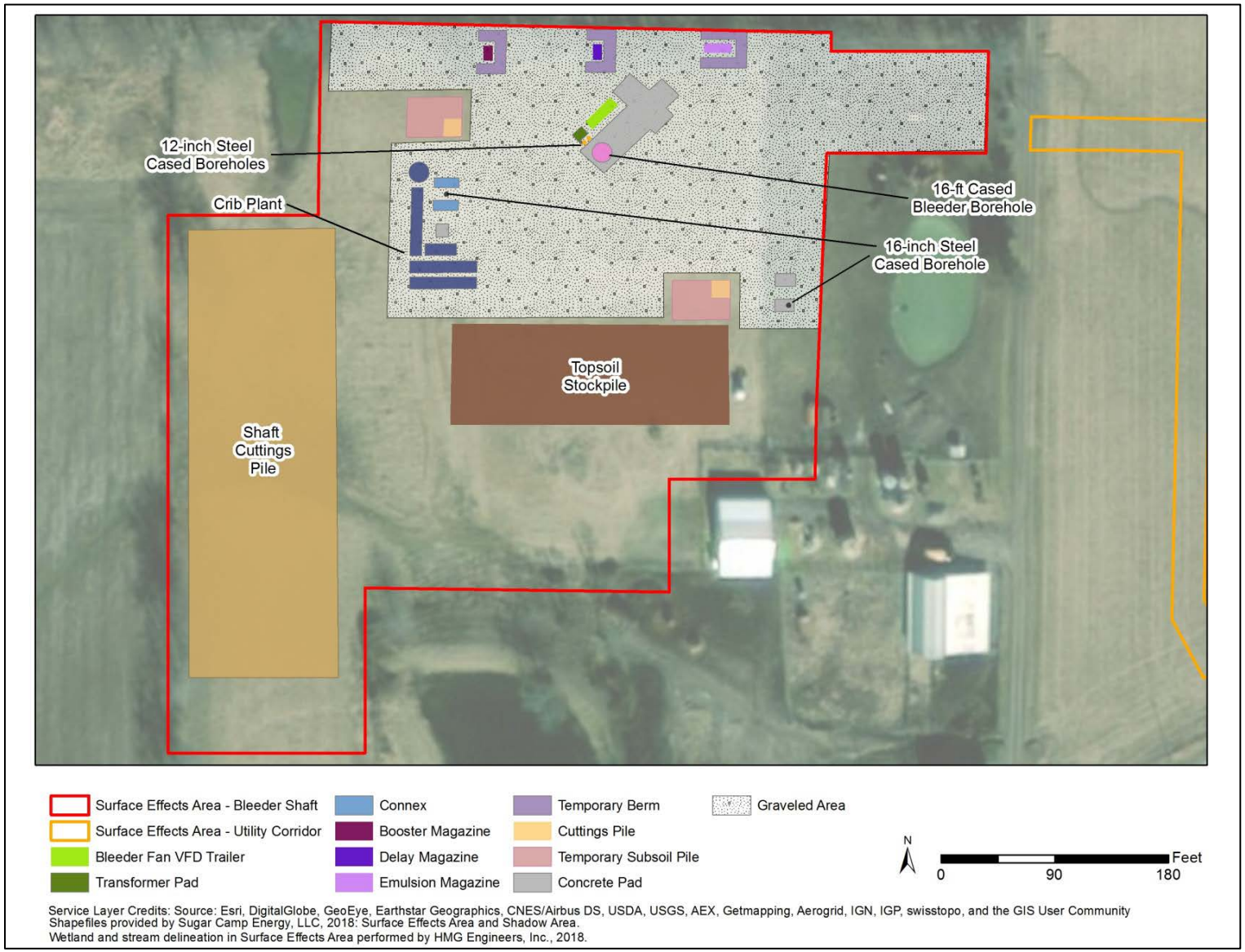

Figure 2-1 Select Surface Facility Features Proposed for Viking District #2

2.1.2.2 Shadow Area (underground mining)

According to the U.S. Department of Energy, coal is the largest domestically produced energy source in America. Approximately 60 percent of the coal mined in the world is extracted by underground mining methods. Two primary types of underground mining methods are room and pillar and longwall mining. Sugar Camp proposes both methods within the 2,250-acre shadow area for Viking District #2.

Room and pillar mining involves the extraction of coal in a grid-like pattern in which portions of the coal seam are left intact to support the roof of the mine. The series of parallel areas in which coal is extracted are called ‘entries’. Room and pillar mining was completed under approximately 144 acres of land to develop main entries for the longwall portions of the mine and for certain other areas that would not be longwall mined. Main entries would typically be on 120-foot centers with a 20-foot maximum entry and cross cut width. For other areas to be conventionally mined, entry and cross cut spacing would be 100 feet by 100 feet, with entry and crosscut width of 20 foot maximum. The referenced dimensions for conventional mining are based on site-specific strength values for coal pillars and floor for an adequate factor of safety for roof stability and to prevent unplanned subsidence.

Longwall mining involves the full extraction of coal from a section of the seam or ‘face’ using mechanical shearers. Longwall mining creates an almost complete extraction of the coal reserve, which allows the overburden to subside (sink) in a controlled and predictable manner. The area of mining within this planned subsidence is defined as a “longwall panel.” The longwall panels are typically 1,000 to 1,500 feet in width and can be multiple miles in length. The longwall process results in a “planned subsidence” of surface areas within the shadow area. Longwall mining machinery includes hydraulic roof supports (shields), a conveyor system, and a coal shearer. A cut of the longwall panel is made by the shearer and is transported by the conveyor system. The shields are advanced as the shearer cuts the coal to allow for a safe workspace for the miners. The removal of the coal sequentially allows the overburden to fill the void with a resultant movement of the surface. This movement is predictable, uniform and minimizes damage to surface structures as mining progresses. Figure 2-1a displays features commonly associated with longwall mining.

According to Sugar Camp's proposal, three longwall panels would be mined during mining operations. To date, mining is complete on approximately 98 acres. Sugar Camp would continue mining until 2022. Figure 2-2 outlines the location of the panels and underground workings in the mine plan. Updates to the mining plan and schedule would be included in the permit renewal which takes place every five years.

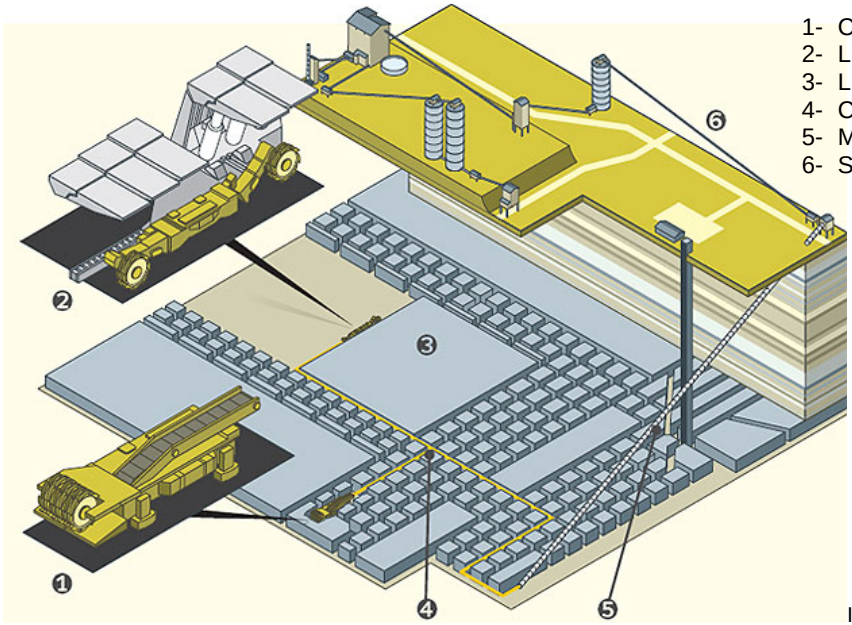

Figure 2-1a Typical Longwall Mine Layout

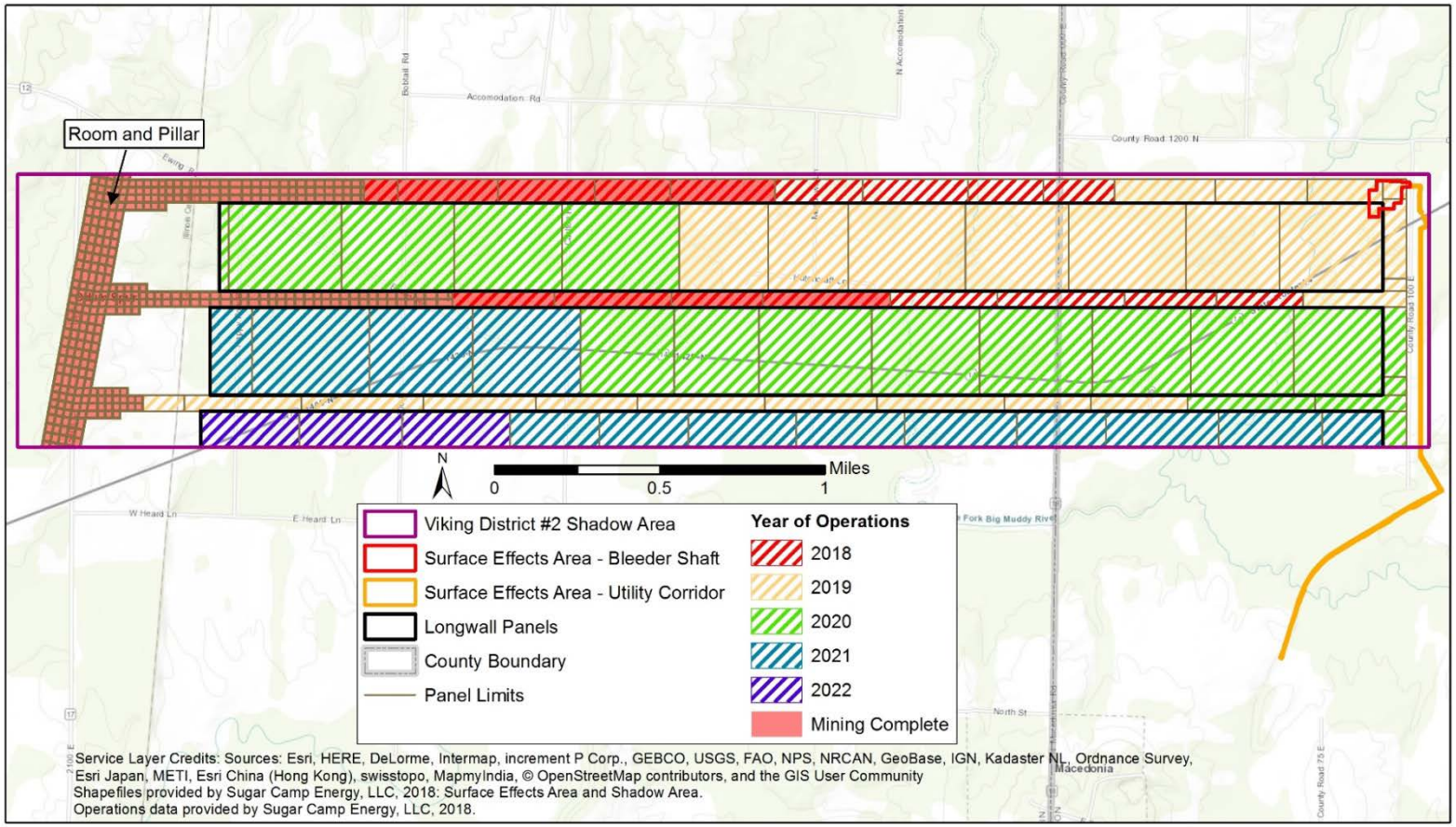

Figure 2-2 Location of Underground Panels and Year of Operations Proposed for Viking District #2

Within the 2,250 acre project shadow area, an estimated 1,861 acres would subside with a predicted maximum subsidence of 5.3 feet. Table 2-2 describes the details of areas proposed for underground mining. The portion of the shadow area that would not subside allows for equipment and necessary "underground workings" space. For longwall mining, continuous miner units are used to drive the entryways around the perimeter of the defined longwall panels. These non-subsided entryways provide access for workers, ventilation, and mining equipment. No subsidence is anticipated above the entryways since the percent extraction is small and only allows for worker and equipment access.

Table 2-2 Description of Proposed Underground Mining Activity by Area

Planned Subsidence			
Classification	**Acres**	**Percent (%) of Total Shadow Area**	**Comments**
Shadow Area projected to subside	1,861	82.7%	Any area of planned subsidence related to extraction of coal within the shadow area.
Shadow Area projected not to subside	389	17.3%	Any area within the shadow area where there is no planned subsidence.
Total Shadow Area	2,250	100%	Identifies the maximum limits of any underground mining activity as proposed in the Mine Application.

2.1.2.3 Post-Mining Reclamation

The UCM application requires detailed restoration plans for surface effects and subsided areas. When permanent cessation of operations occurs, final reclamation of the project area would commence immediately and be completed by Sugar Camp in accordance with the approved reclamation plan and the permit conditions developed in accordance with Chapter I, IAC 1817.62. The timeframes and limits established in 62 IAC 1817.01 and 1817.113 govern the reclamation activities. If variances or extensions are necessary, timely requests would be made to IDNR-OMM for approval. While actual mining durations can vary, Sugar Camp estimates that the reclamation for Sugar Camp Mine No. 1 would begin in 2045. Reclamation for the Viking District #2 is proposed to occur in 2023. The post-mining land use for the project area would remain the same as the pre-mining conditions (see Figure 3-1).

Sugar Camp would backfill and seal mine openings, such as the bleeder shaft and boreholes, in accordance with pertinent state and federal regulations. The six boreholes would be permanently sealed within 60 days of inactivity. The bleeder shaft and any boreholes would be plugged from top to bottom according to all MSHA and IDNR regulatory standards after they are no longer needed. Any steel casings would be cut off three feet below natural soil level and the void filled with subsoil, and then covered with topsoil, mulched and seeded. Shaft holes would be filled with stockpile shaft material/rip rap and have at least one foot concrete reinforced cap. All utility boreholes would be plugged and

filled with neat cement. The shaft would be surveyed and the Hamilton County Courthouse would be notified as required by Operator Memorandum 00-01.

Upon completion of the active mining operation, reclamation operations would commence. All rough grading would be completed within 180 days following the removal of all facilities. Final grading, including root medium placement, topsoil placement, and temporary crop cover would be completed within 12 months of the completion of the active mining operation. Upon completion of reclamation and the first normal period for favorable planting or farming conditions, pasture land would be seeded and returned to its pre-mine condition. Topsoil would be distributed over the site evenly. Sugar Camp would accomplish backfilling and re-grading procedures by using scrapers, dozers, loaders, and/or trucks to grade the disturbed areas and to re-distribute the stored subsoil and topsoil. Soil materials required for the reclamation effort would be obtained from stockpiled soils removed prior to disturbance by the mining operations. Topsoil and subsoil would be redistributed throughout the permitted area in a method that would allow for proper soil depth placement and minimize soil compaction. The minimization of soil compaction would allow for a better root medium and promote plant growth. In the surface effects area, topsoil depth would be the approximate thickness of pre-mining conditions.

All the area affected by the installation of surface facilities would be final-graded to the approximate original contour. In permitted areas adjacent to undisturbed areas, re-grading would be blended with the adjacent undisturbed grades. Methods to deter erosion of the reclaimed area would include, but not be limited to, the use of terraces, ditches, hay bales, silt fence, vegetation, erosion control matting, and/or riprap.

Soil replacement and vegetation establishment are dictated by seasonal weather conditions. Soil placement would generally be accomplished during the drier months of the year to avoid undesirable compaction. Grading and construction and the removal or renovation of water and erosion control structures would likely occur between April 1 and November 15 as this is a typical growing season and would result in the best opportunity to control runoff. This time schedule would allow for revegetation and mulching of the disturbed areas. Unforeseen situations may require that structures be constructed during adverse weather conditions. If this should occur, a temporary vegetation seed mixture would be used until the area can be seeded with a permanent seed mixture. The same time schedule of April 1 through November 15 would be used for the removal and/or renovation of structures. Prior to this type of work being conducted, approval would be received from the appropriate regulatory agencies. Agencies involved would be dictated by the location of work and particular resource in need of protection, but may include IDNR, IEPA, USFWS, IHPA, and USACE. Work would be performed in accordance with accepted engineering and conservation practices. Upon completion of grading activities, areas would be stabilized using cover crops, as stated below, and/or by applying mulch. The approved species would then be seeded to provide vegetative cover in accordance with the post-mining land use.

In accordance with its IDNR mining permit, Sugar Camp would restore the original drainage conditions and correct any damage that may have been caused by subsidence (e.g., cracks in building foundations, road surfaces, or ponding of water from subsided streams). Drainage restoration would be accomplished through stream-dredging activities, which are subject to requirements under state law, and Sections 401 and 404 of the Clean Water Act. The goal of the drainage restoration is to return the land to the baseline conditions that existed prior to the start of coal recovery.

Longwall mining results in predictable and uniform subsidence patterns. Pre-subsidence contours have been documented by aerial mapping. This mapping provides a basis to determine the extent of subsidence to the lands. Any impacts that may impair the value or use of the lands would be mitigated to insure the land reaches a condition capable of maintaining the value and reasonable foreseeable uses which it was capable of supporting prior to subsidence. Primary methods would include restoration of drainage by small cut and fill operations and filling of cracks which fail to close on their own, utilizing soil or limestone materials.

A pre-subsidence survey would be pursued on structures prior to subsidence occurring. This survey would include photographic and sketched documentation of the condition of the structures in a pre-subsidence condition. The survey would be performed by a person trained and experienced in performing such surveys. A report would be generated including a description of the structure including photographs and documentation of the physical condition of the structure. A copy would be provided to the structure owner and any comments to the survey would be addressed.

After subsidence has occurred, a post subsidence survey would be performed in the same manner and procedures as the pre-subsidence survey. Any changes to the structures due to subsidence would be noted and would provide a basis to determine the extent of material damage to the structures.

2.2 Identification of Mitigation Measures

Sugar Camp mining operations would be carried out in compliance with 62 IAC 1700-1850, which specifies a comprehensive set of environmental protection measures for the control of adverse ecological impacts resulting from coal mining.

Included are considerations for air, water, acid and toxic materials, soils, landform, vegetation, etc., in both spatial and temporal capacities. As such, general protective measures for all environmental values are inherent within the regulatory program. The expanse of mining and mining-related disturbances would be limited to that acreage necessary for conducting mining operations in compliance with the applicable land reclamation regulatory requirements. Disturbances to sites not required for mining or mining-related activities would be held to a minimum.

IDNR-OMM would require Sugar Camp to implement best management practices and mitigation to minimize potential adverse environmental effects throughout the project area as conditions of their mine permit. Additional mitigation requirements not listed below may arise, such as measures related to cultural resources that have not yet been identified.

Permit conditions would be enforced by the State of Illinois; TVA does not regulate the mining activities of Sugar Camp. Anticipated State of Illinois mitigation measures include:

1. The implementation of sediment and erosion control practices (e.g., silt fences, straw, mulch, or 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, or establishment of riparian zone buffer zones).
3. The repair of any damage to buildings or other structures caused by subsidence.

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 until the groundwater is restored.
6. The repair of any damage to roads caused by subsidence.
7. The repair of any drainage alteration caused by subsidence.
8. The compensatory mitigation of wetlands and streams impacted by subsidence, if necessary. This condition would also be enforced by the USACE.
9. The repair of any damage to utilities caused by subsidence.

Although TVA does not regulate Sugar Camp's mining activities, TVA can impose mitigation measures to minimize adverse impacts resulting from allowing Sugar Camp to mine TVA coal. TVA identified two additional measures relating to floodplains:

1. Sugar Camp must prepare an evacuation plan for the bleeder shaft area, to address the relocation of all portable flood-damageable surface equipment (including the mobile crib plant) outside of the floodplain in the event of a flood. In addition, Sugar Camp must construct boreholes and shafts such that they are flood-proof to or above the 500-year flood elevation at the bleeder shaft area. With these measures, the proposed action would comply with Executive Order (EO) 11988 (Floodplain Management) and there would be no significant impacts to floodplains and their natural and beneficial values.
2. TVA requires that Sugar Camp adhere to the coal lease agreement requirements, as applicable.

IDNR would require Sugar Camp to submit quarterly progress reports detailing mining, monitoring, and mitigation activities as a permit condition. TVA can verify Sugar Camp's adherence to the commitments of this EA by obtaining copies of quarterly progress reports.

2.3 Comparison of Alternatives

Under the No Action Alternative, TVA would not approve the mining of TVA-owned coal reserves located under the project area. Sugar Camp would not be able to extract the coal. Thus, no potential environmental effects related to mining would be anticipated for the project area.

2.4 Preferred Alternative

TVA's preferred alternative is the Action Alternative. Under the Action Alternative, TVA-owned coal resources would be extracted by Sugar Camp. Surface subsidence would occur over the TVA-owned coal area proposed to be mined, which is estimated at approximately 1,861 acres. This alternative would also include the development of approximately 12 acres for surface operations. After mining is complete, the project area would be restored to pre-mining conditions. Table 2-3 lists potential impacts associated with the Action Alternative.

Table 2-3 Summary of Potential Impacts for the Action Alternative

Resource Area	Potential Impacts From Proposed Action Alternative
Geology and Soils	Some prime farmland or farmland of statewide importance would be temporarily affected by subsidence related drainage issues until drainage is restored to pre-mine condition. Less than six acres of prime farmland or farmland of statewide importance would be temporarily affected in the surface effects area until is restored to pre-mine condition.
Floodplains	A total of 352 acres of the shadow area, 2.5 acres of the bleeder shaft area and 1.5 acres of the utility corridor are within the 100-year floodplain. Impacts to surface water drainage (and thus flooding) would be mitigated by Sugar Camp in accordance with its IDNR mining permit. Disturbance in the surface effects area would be temporary. Following mining, the surface effects area would be returned to its pre-construction condition and the original ground contour restored.
Groundwater	Aquifer level impacts to domestic wells in the project area may occur. Any reduction in well water would be compensated for by Sugar Camp. Five wells are present in the project area.
Surface Water	No streams will be impacted by surface disturbance. Temporary impacts would include ponded water in subsided areas. Siltation may temporarily increase in streams, caused by erosion from surface disturbance and subsidence. Drainage patterns would be restored to pre-mine conditions, resulting in no permanent impacts to streams in the project area.
Wetlands	Wetlands may be temporarily impacted by subsidence in the project area until stream drainage repair is completed.
Air Quality	Minor amounts of criteria pollutant emissions would be generated from vehicles and equipment during construction, operation and reclamation of the mine. Most would be limited to the surface effects area and surrounding area.
Greenhouse Gases	Methane would be released from the coal seam in the project area, greenhouse gases would be released as a result of combustion of the coal, and minor levels will be emitted as a result of operation of fuel burning mobile equipment; new direct emissions were estimated to be 793,000 Metric Tons of Carbon Dioxide equivalent (MTCO2e) per year.
Wildlife	Potential habitat would be temporarily impacted by disturbance within or adjacent to the surface effects area. Potential exists for temporary subsidence related impacts across 1,861 acres, such as habitat disturbance prior to restoring pre-mining conditions. Wildlife may temporarily benefit from additional areas of ponded water due to subsidence.
Vegetation	Approximately 12 acres of vegetation would be disturbed in the surface effects area. Removal of trees is not expected. No loss of vegetation would occur post reclamation. Insignificant impacts are expected due to subsidence.
Aquatic Ecology	Insignificant impacts are expected due to subsidence in the project area.
Natural Areas	Nearby natural managed areas may be affected by groundwater hydrology changes caused by subsidence. No major impacts are expected.
Transportation	Subsidence occurring underneath local roads would require repair and cause temporary impacts. Increased traffic would occur during construction of the bleeder shaft.
Utilities	Transmission lines and underground utilities would require repair after subsidence.
Socioeconomics	Temporary jobs may be created for construction of the bleeder shaft and installation of utilities. Jobs would also be created or maintained (from other ceased mine operations) for operation of the mine during an estimated four year period. No permanent or negative impacts would occur.
Cultural Resources	No impacts to cultural resources are expected.
Noise	There would be a temporary increase of noise during construction and reclamation adjacent to the surface effects area. Noise increases throughout the project area would be negligible.

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CHAPTER 3 – AFFECTED ENVIRONMENT

The project area's pre-mine physical, biological, and cultural resources are described in this section. As stated in section 1.2, the surface effects area and the shadow area comprise a "project area" that is approximately 2,255 acres of land in Franklin and Hamilton counties, Illinois. The approximate 12-acre surface effects area is located partially within the shadow area and consists of the 5.3-acre bleeder shaft area and the 6.6-acre, 1.7-mile utility corridor (Figure 1-2). TVA owns all coal reserves within the project area and does not own any surface lands within the project area.

TVA has evaluated the Action Alternative 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 view shed, and navigation. Resources that could potentially be affected by the proposed underground mining or associated surface disturbance are considered further in this EA and include: 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 lies within rolling uplands with elevations ranging from approximately 430 feet to 500 feet above mean sea level. The 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 wetlands). Artificial drainage ditches have extended the agricultural land into areas that were previously wetland. The project area is located within the Southern Illinois Till Plain ecoregion, which has flat to rolling till plains (large flat plains covered with rocks, silt, and gravel that were deposited by glaciers) that become hillier 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.

The project area is dominated by agricultural land used for crop and livestock production and natural areas used for fish and wildlife management. Additional land uses in the area include residential, industrial/commercial and developed water resources.

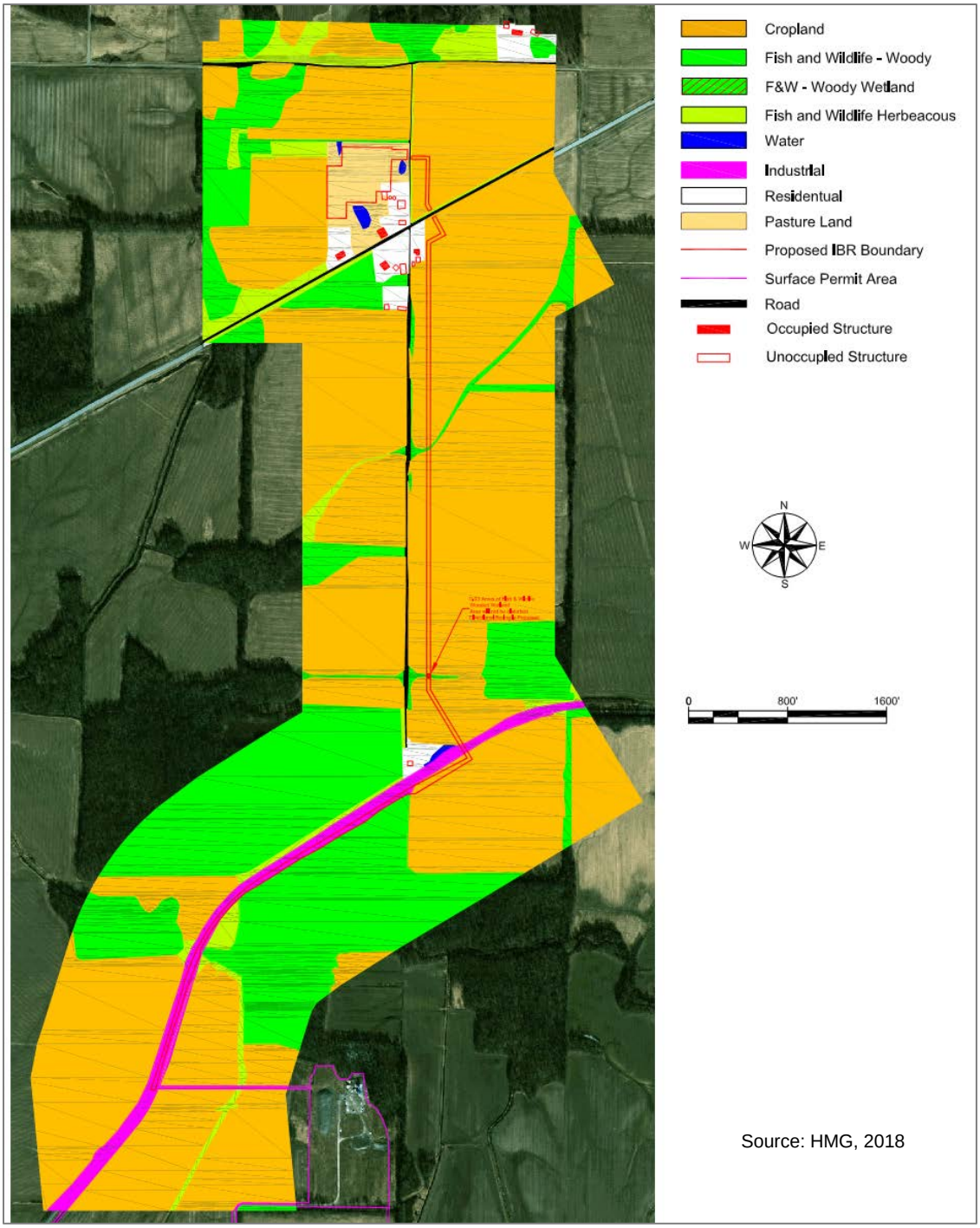


Figure 3-1 Pre Mine and Post Mine Land Use Map for the Surface Effects Area

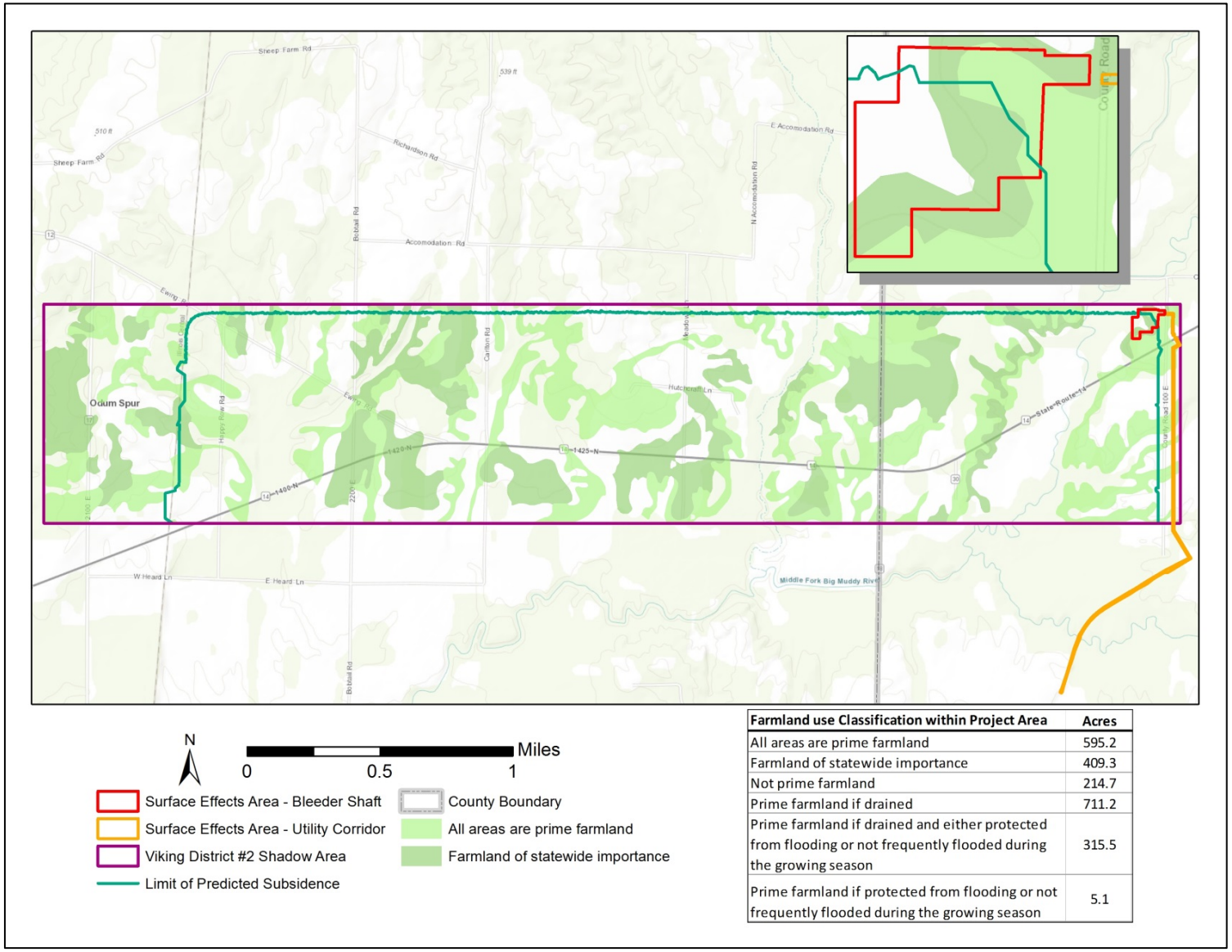
3.1.1 Geology and Soils

The project area is located in the southern portion of the Illinois Basin coalfield. The Herrin No. 6 coal seam, which is proposed to be mined, lies from 650 feet to more than 900 feet below ground. The Herrin No. 6 coal seam is part of the Carbondale formation, which is of Middle Pennsylvanian age (300 to 318 million years old). Claystone, sandy shale, and limestone lie under the coal seam. 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.

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. There are no recorded major aquifers in the project area. The Pennsylvanian sandstones and limestones may be considered as minor aquifers with low permeability and porosity and are highly mineralized. Yields are low in the range of one to ten gallons per minute (HMG 2018). Use of these resources would be minimal due to depth from the surface and the requirement for deep wells. Additional details regarding aquifers are provided in the groundwater discussion.

A total of 32 soil units are mapped within the project area, including silt loams, silty clay loams and clay loams. A portion of the soils within the project area are designated as prime farmland. The term “prime farmland” is a designation assigned by the U.S. Department of Agriculture (USDA) defining land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for such uses. Similarly, farmland of statewide importance is land other than prime farmland or unique farmland that is also highly productive. Based on soils data obtained from the USDA Geospatial Data Gateway, approximately 1,004 acres (approximately 45%) of the project area is designated as prime farmland or farmland of statewide importance. Less than six acres (approximately 67%) within the surface effects area is designated as prime farmland or farmland of statewide importance. Figure 3-2 illustrates the prime farmland within the project area.

The Federal Farmland Protection Policy Act (FPPA) is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to non-agricultural uses. It assures that to the extent possible federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. The FPPA does not authorize the Federal Government to regulate the use of private or non-federal land or, in any way affect the property rights of owners. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land. Surface mining, where restoration to pre-mining agricultural use is planned, is not subject to FPPA (USDA 2018). As noted previously, TVA does not own any surface area within the proposed operations of Viking District #2.



Farmland use Classification within Project Area	Acres
All areas are prime farmland	595.2
Farmland of statewide importance	409.3
Not prime farmland	214.7
Prime farmland if drained	711.2
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	315.5
Prime farmland if protected from flooding or not frequently flooded during the growing season	5.1

Figure 3-2 Prime Farmland within the Project Area

3.1.2 Floodplains

Floodplains are the relatively level lands along streams and rivers that are subject to periodic flooding. The area subject to a one-percent chance of flooding in any given year is normally called the 100-year or 1-percent-annual-chance floodplain. EO 11988 requires federal agencies to evaluate the potential effects of proposed actions within the 100-year floodplain on natural and beneficial floodplain values, along with alternatives that would reduce or eliminate such effects.

Three large floodplain areas exist on the eastern side of the project area (see Figure 3-3 and 3-4). They are associated with Carlton Branch, Sullivan Branch, and the Middle Fork Big Muddy River. A small portion of the Campbell Branch floodplain, a tributary to the Sullivan Branch, extends into the bleeder shaft area. In addition to the 100-year floodplain, the 500-year floodplain (also known as the 0.2-percent-annual-chance floodplain) was mapped to show the extent of the Campbell Branch floodplain into the bleeder shaft area. The utility corridor crosses the Middle Fork Big Muddy River floodplain. The 100-year floodplain covers approximately 352 acres within the project area, including 2.5 acres within the bleeder shaft area and 1.5 acres within the utility corridor. Subsidence would occur under most of the 352 acres of floodplain. Sugar Camp Creek is located in the western portion of the project area, as well as several unnamed tributaries to Sullivan Branch and Middle Fork Big Muddy River.

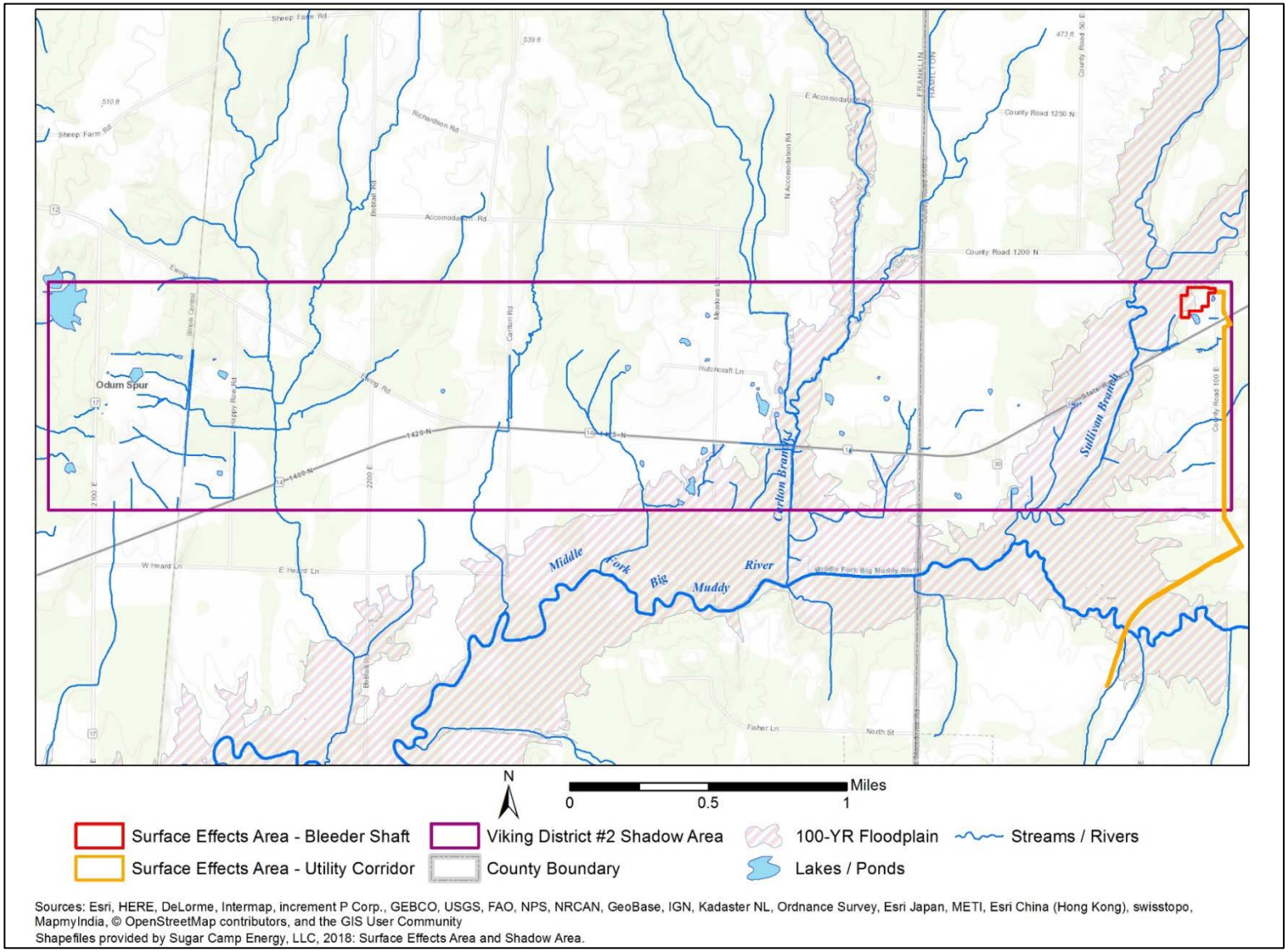


Figure 3-3 Floodplains within the Project Area

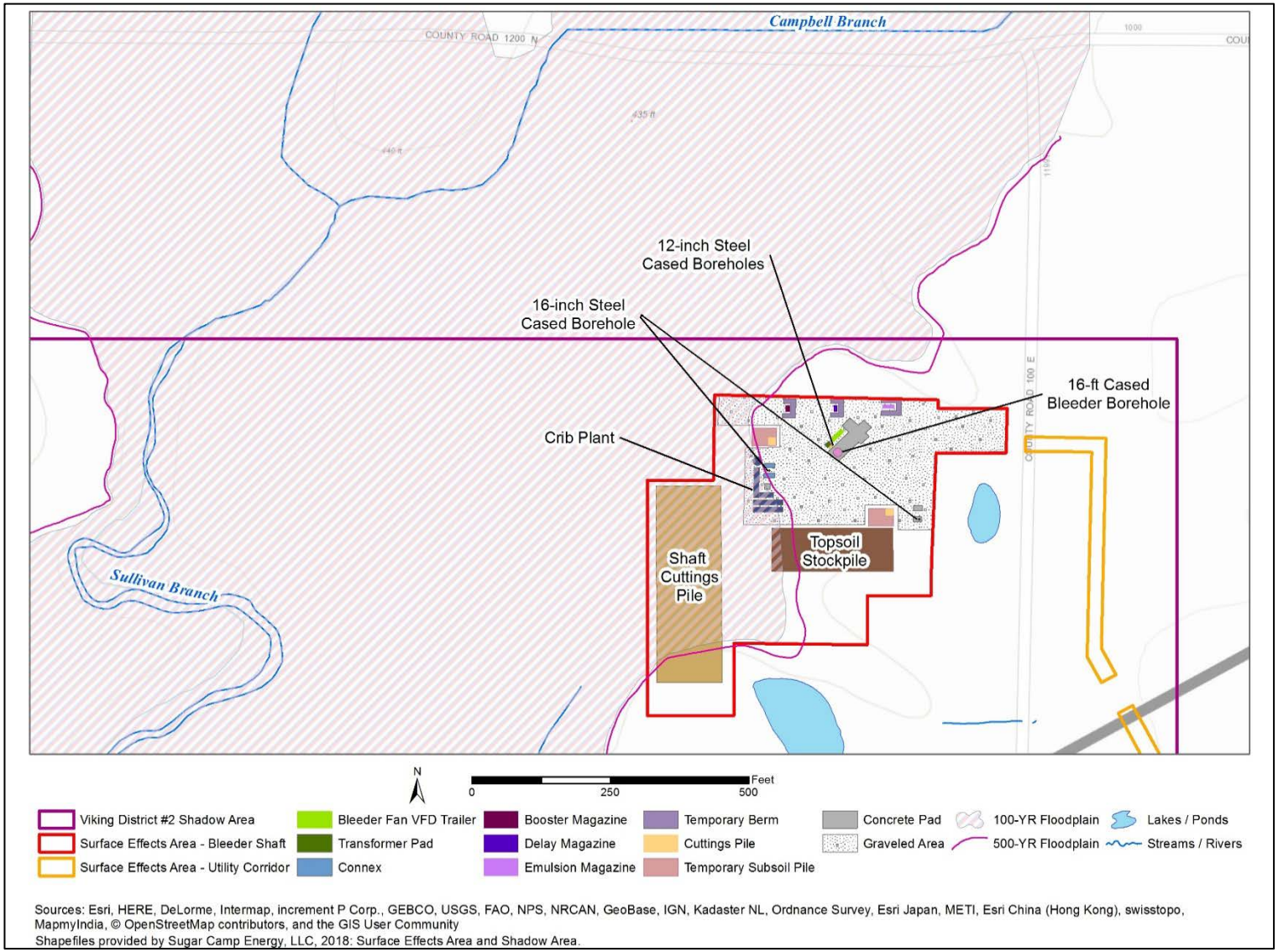


Figure 3-4 Floodplains within Bleeder Shaft Area

3.2 Water Resources

This section describes the potentially affected environment for groundwater, surface water, water supplies, and wetlands. Water resources were identified using a combination of the U.S. Geological Survey (USGS) topographic maps, aerial photographs, USDA soil surveys, USGS National Hydrography Dataset (NHD) digital data, the USFWS National Wetlands Inventory (NWI), literature references, onsite observations and mail surveys administered by Sugar Camp.

3.2.1 Groundwater

The project area is located in the glaciated upland area of northeastern Franklin County and western Hamilton County. It is situated at the headwaters of the major drainage systems of the region. In this area, no specific geologic unit has been identified as a major surficial aquifer. According to Illinois State Geological Survey (ISGS) Circular 212, Groundwater Geology in Southern Illinois, the thickest unconsolidated material in Franklin County is in the Big Muddy River Valley, west of the project area. For Hamilton County the Circular reads similarly, with reference to construction in valley fills of larger streams. Across both counties, the glacial deposits are generally thin and are not water-yielding. Minor scattered sand and gravel surficial aquifers with potential surficial sources in the Middle Fork Big Muddy River Valley and its larger tributaries, such as Sugar Camp Creek, Ewing Creek, Akin Creek, and Jordan Creek, do exist.

Surficial aquifers do produce some low-yield water supplies as documented by the several shallow, large-diameter wells reported in the residential well questionnaires. Nearly all these wells, however, presently serve as supplementary supplies with nearly all residents with such wells reporting public water supplies as their primary drinking water sources (HMG 2018).

Pennsylvanian sandstones in the northern and southeastern portions of Franklin County and western portion of Hamilton County can usually provide sufficient water for individual domestic supplies. Yields from wells completed in these formations are usually less than 10 gallons per minute with common yields of less than 5 gallons per minute. The low permeability of the Pennsylvanian System rocks cause the water in the deeper formations to be highly mineralized. Therefore, some deeper bedrock aquifers may contain water of unsatisfactory quality without treatment and, generally, are not developed. Recharge to these bedrock aquifers is primarily from precipitation which percolates into and through the overlying unconsolidated materials. Recharge primarily takes place at outcrop areas for the various bedrock units. A minor buried bedrock aquifer associated with Pennsylvanian sandstone in the depth range of 200 to 360 feet below ground surface is utilized as a water source for domestic and farm use in the area. This aquifer is locally known as “white sandstone” and is reported to provide high quality water in quantities sufficient for domestic and farm use. Yields of less than 5,000 gallons per day are generally reported for domestic wells finished in these formations (HMG 2018). Based on well questionnaire responses, it is estimated that 5 wells within and adjacent to the project area are finished within this aquifer.

3.2.2 Surface Water

Surface water is described as water flowing through a defined watercourse (e.g., rivers, streams or creeks with a defined bed and bank), or stored within a reservoir, pond or lake. Surface water streams are classified as perennial, intermittent or ephemeral depending on the usual level of flow of the water conveyance. The project area lies within three sub basins of the Big Muddy River watershed: Sugar Camp Creek (HUC 071401060402), Carlton Branch-Middle Fork Big Muddy River (HUC 071401060403), and Sullivan Branch-Middle Fork Big Muddy River (HUC 071401060401). The Sugar Camp Creek and Sullivan Branch-Middle Fork Big Muddy River sub-basin watersheds cover a small portion of the west and east sides of the project area, respectively.

Three named streams, Carlton Branch, Sullivan Branch, and Middle Fork Big Muddy River as well as multiple unnamed tributaries and unnamed creeks flow through the project area (Table 3-1 and Figure 3-3). Neither Carlton Branch, Sullivan Branch, nor the unnamed tributaries in the project area are listed on the 303d list of impaired waters (IEPA 2018). However, the Middle Fork Big Muddy River is listed on the 303d list of impaired waters. The Middle Fork Big Muddy River is impaired for chloride, iron, mercury, and sedimentation/ siltation (IEPA 2018). Per a wetland and stream delineation of the surface effects area, two unnamed tributaries to the Sullivan Branch, the Middle Fork Big Muddy River, and an unnamed tributary to the Middle Fork Big Muddy River cross the utility corridor (HMG 2018). No streams or wetlands were identified within the bleeder shaft area.

Table 3-1 Named Streams within the Project Area

Named Waterbody	Shadow Area	Surface Effects Area (Utility Corridor)
Carlton Branch	X	
Sullivan Branch	X	
Middle Fork Big Muddy River	X	X

A physical ground survey of the project area conducted during the UCM application process, as well as the review of aerial photographs of the area, indicate the potential for the presence of one impoundment (a body of water formed by a dam) of 20 acre-feet capacity or more in the northwest corner of the project area. The 20 acre-feet capacity is estimated based on a surface area of approximately four acres or larger and a five foot depth. No subsidence is planned in this area.

3.2.3 Water Supply

The project area is served by public utility water by the Macedonia Water System, the Ewing-Ina Water Commission, Hamilton Rural Water District, and the Akin Water District. The source of the water supply for these Water Districts is Rend Lake, located approximately ten miles west of the project area. The other known public water supply sources within ten miles of the project area are the Rend Lake Inter-City Water System and the Corinth Water District.

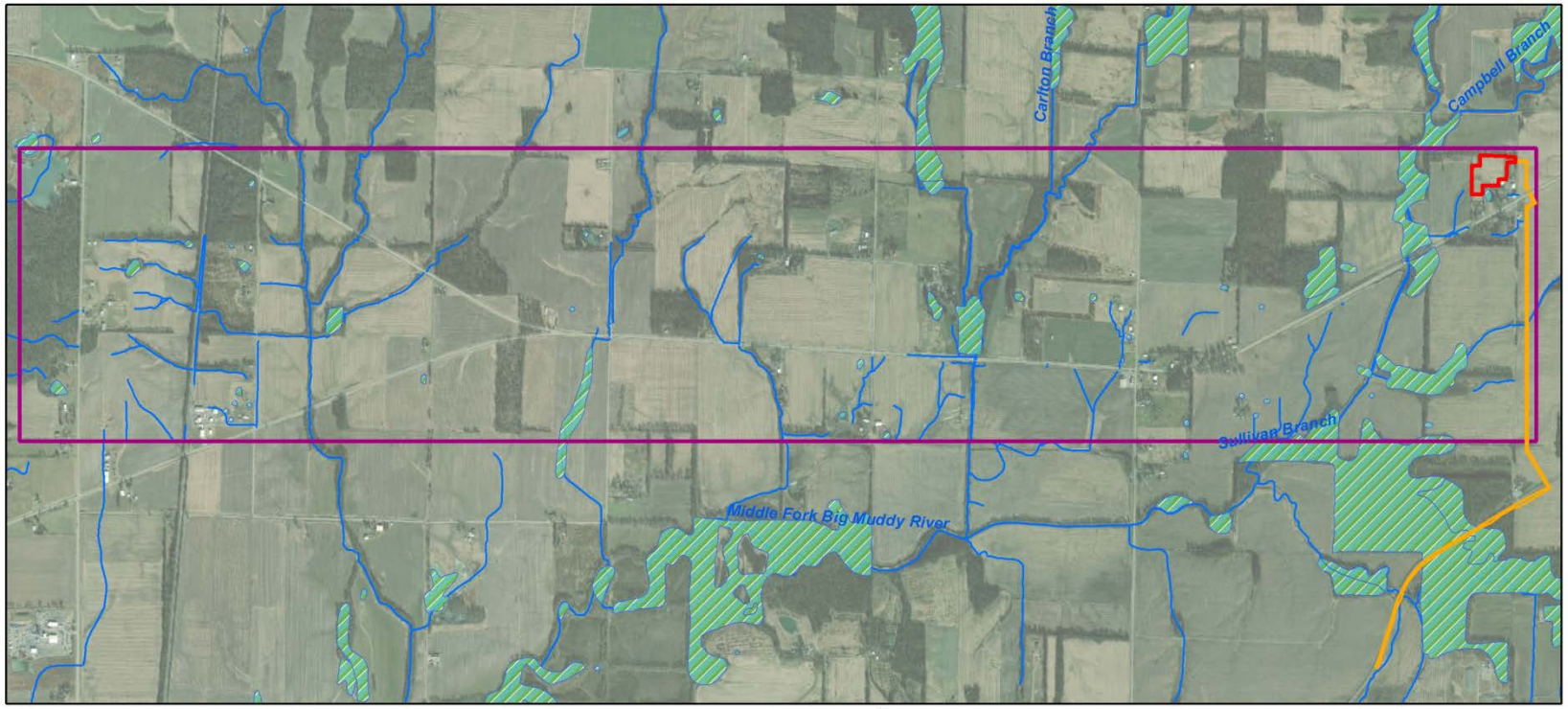
Domestic well surveys were conducted by Sugar Camp for the project area in 2017. There were 5 wells reported to be used for household or drinking water and a total of 23 wells or cisterns reported to be used for livestock, gardening or agricultural uses (HMG 2018).

3.2.4 Wetlands

Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, mud flats, and natural ponds. Executive Order (EO) 11990 (Protection of Wetlands) directs federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In addition, activities in wetlands are regulated under the Clean Water Act and various state water quality protection regulations.

The NWI mapping is produced by the USFWS and provides information on the characteristics, extent, and status of the nation's wetlands and deepwater habitats. NWI mapping is broad scale, providing approximate locations of wetlands one acre or larger. NWI data was obtained from the USFWS online wetland mapper. NWI data indicate that there are approximately 51.8 acres of forested wetlands, 1.1 acres of scrub/shrub wetlands, 8.4 acres of emergent wetlands, 7.5 acres of ponds within the project area (USFWS 2014). Wetlands types and boundaries are illustrated below in Figures 3-5 and 3-6.

A wetland and stream delineation was conducted for the surface effects area in 2018. Two forested wetlands, totaling 0.6 acre, were delineated within the utility corridor. As shown in Figure 3-5, the utility corridor would bisect a large forested/scrub wetland (W2). After the wetland delineation, the utility corridor was shifted toward the railroad in order to avoid impacts to W2. W1 will be bored under. No wetlands were delineated in the bleeder shaft area (HMG 2018).



Project Area		
Wetland Type	Frequency	Acres
Emergent Wetlands	10	8.4
Forested Wetlands	10	57.4
Scrub/Shrub Wetlands	1	1.1
Freshwater Ponds	27	7.5

Surface Effects Area		
Wetland Type	Frequency	Acres
Forested Wetlands	2	0.6

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Shapefiles provided by Sugar Camp Energy, LLC, 2018: Surface Effects Area and Shadow Area.

Figure 3-5 Wetlands within the Project Area

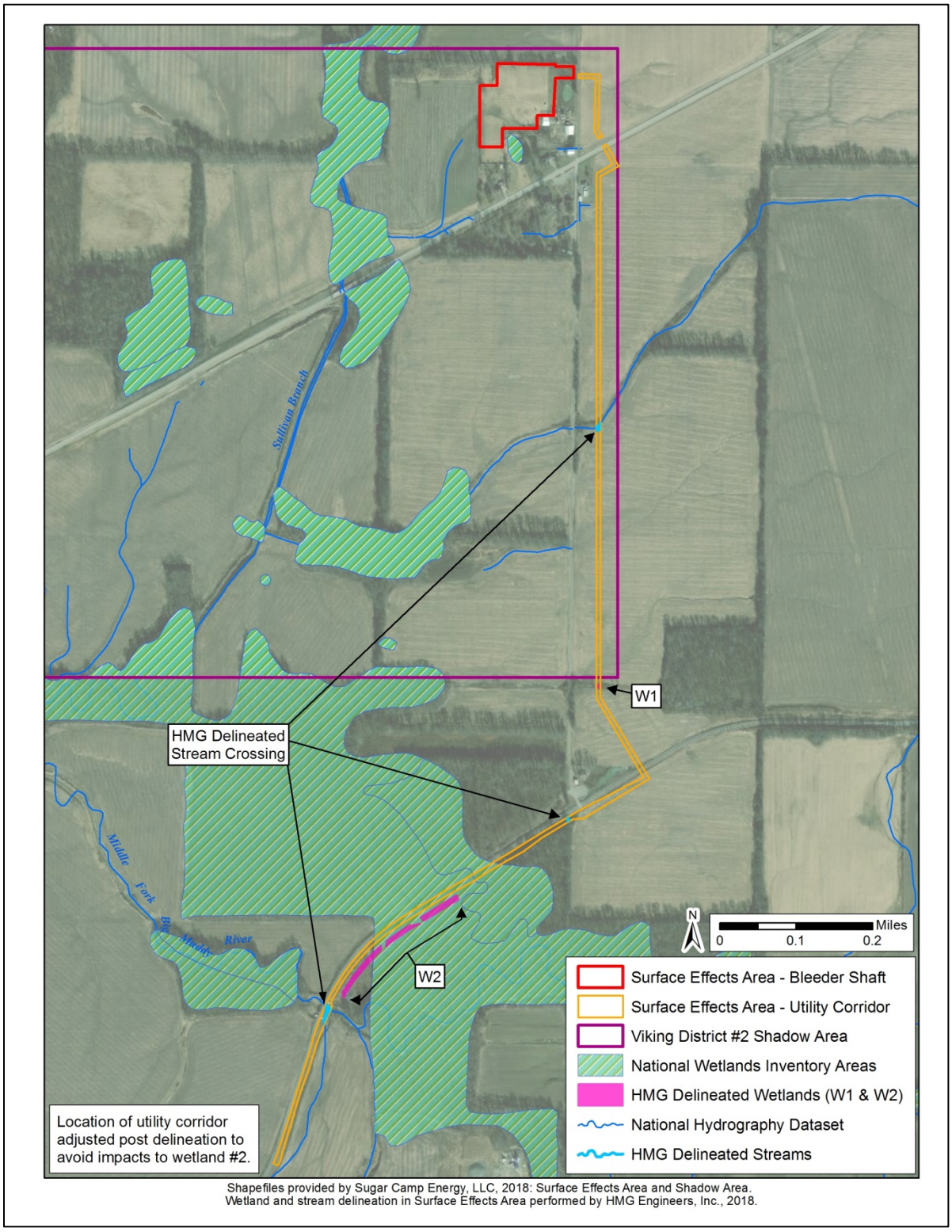


Figure 3-6 Wetlands within the Surface Effects Area

3.3 Atmospheric Conditions

3.3.1 Air Quality

As required by the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established primary and secondary National Ambient Air Quality Standards (NAAQS) for six principal air pollutants, which are called "criteria" pollutants. These include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), inhalable particulate matter (particulate matter with an aerodynamic diameter below 10 micrometers (µm), or PM_{10}), fine inhalable particulate matter (particulate matter with an aerodynamic diameter below 2.5 µm, or $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). Primary standards set limits to protect public health, including the health of sensitive populations, such as asthmatics, children, and the elderly. The secondary standards are set to protect against effects on public welfare, including damage to structures, crops, and ecosystems.

The Clean Air Act requires EPA to determine whether an area is in attainment (regions where a given pollutant's concentration is at or below the established NAAQS) or non-attainment (regions where a given pollutant's concentration is above the established NAAQS). These designations are based on air quality data collected from monitors located in urban and rural settings as well as other information such as modeling. Franklin and Hamilton counties are currently designated as in attainment for all NAAQS.

3.3.2 Greenhouse Gases

Greenhouse gases (GHG) are chemical compounds in the atmosphere that absorb a portion of the outgoing longwave radiation and reflect it back to the earth's surface, thus affecting the earth's energy balance. GHG emissions are converted to a carbon dioxide equivalent (CO_2e) basis using a GHG-specific multiplier called the global warming potential (GWP). The GWP for a particular greenhouse gas is the estimated ratio of surface warming caused by one unit mass of the greenhouse gas to that of one unit mass of carbon dioxide (CO_2) over a specified time period, typically 100 years. Methane is a greenhouse gas that has both man-made and natural sources and an estimated GWP of 28 to 36 (USEPA 2018a). One source of methane is coalification (the formation of coal in the earth). After the methane is formed, much of it remains within coal seams until the coal encasing the methane is fractured and exposed. Coal mining releases this methane, referred to as coal mine methane (CMM) as opposed to the methane that remains in the seam, referred to as coal bed methane (CBM) (USEPA 2018b). Although the methane contained in coal is formed naturally, the CMM is considered a man-made source because the methane would have remained within the coal seam if it had not been exposed by mining. While CMM is a large source of man-made methane emissions in the United States, EPA estimates that emissions decreased by 40 percent between 1990 and 2015 (USEPA 2018b).

In April 2009, EPA implemented a greenhouse gas reporting program (GHGRP) applicable to large GHG emission sources. The goal of the rule is to collect accurate and comprehensive emissions data to inform policy makers, and potentially to assist in developing a cap and trade system. The GHGRP became effective on December 29, 2009, and applies to certain specifically listed source types, any facility in a listed source category whose greenhouse gas emissions exceed 25,000 metric tons of carbon dioxide equivalent ($MTCO_2e$) per year, and certain listed fuel suppliers. The GHGRP applies to underground coal mines that liberate more than 36,500,000 actual cubic feet of methane per year. If a facility's emissions are greater than this threshold in calendar year 2010 or beyond, then it must begin monitoring, recording and reporting the GHG emissions annually beginning January 1, 2011. In 2014, the emissions reported by over 8,000 facilities under the GHGRP

accounted for approximately 50 percent of total U.S. GHG emissions (USEPA 2018c). The existing Sugar Camp Mine No. 1 is currently subject to the GHGRP.

3.4 Biological Environment

Terrestrial habitats within the project area in Franklin and Hamilton counties are characterized by a heavily fragmented landscape dominated by early successional habitat. Early successional habitats in the project area include fields (e.g., pastures and hayfields) and cultivated row crops (e.g., corn, soybeans or wheat). Based on recent aerial imagery, this early successional habitat is interspersed with forested fragments associated with riparian zones bordering tributaries to Carlton Branch, Sullivan Branch, the Middle Fork Big Muddy River, and ponds.

3.4.1 Wildlife

With the exception of those bird species able to either subsist on crops (e.g., American crow or ring-necked pheasant) or to nest among them (e.g., horned lark or killdeer), relatively few bird species are able to use monocultural cropland habitat. In addition, those species that cannot subsist in the agricultural areas are restricted to forested habitats along the riparian zones. Many types of reptiles, amphibians, mammals, and birds are found in the forested habitats in this area (IDNR 2002).

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 2002). 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 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.

3.4.2 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 (MBTA 1918).

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 approximately 150 miles to the west of the project area, and the Ohio River is approximately 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. Bodies of water that serve as breeding sites for these bird species exist within the project area.

3.4.3 Vegetation

Southern Illinois was once covered by a mosaic of oak-hickory forests and bluestem prairies, but most 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). Mesic tall-grass prairies are found in a mosaic pattern with the oak-hickory forest. Flatwood forests can be found on nearly level, clay-rich soils of poorly drained uplands. Two globally rare flatwoods terrestrial plant communities are found in this region:

1. The Pin Oak (*Quercus palustris*) - Post Oak (*Quercus stellata*) Lowland Flatwoods bottomland community occurs on terrace "flats" and is thought to have less than 20 occurrences throughout its range within southwest Indiana, southern Illinois, and southeast Missouri. Severe floods caused by dams may have eliminated post oak from most occurrences of this community. These lowland flatwoods have been classified by NatureServe (2014) 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 2014). 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 2014).

Within the project area, most of the upland forested areas are heavily fragmented. Woodlands are generally upland communities with several bottomland forests present. Dominate species include northern red oak (*Quercus rubra*), silver maple (*Acer Saccharіunum)* and various hickory species (Alliance 2018). Species such as sycamore (*Platanus occidentalis*), red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), and river birch (*Betula nigra*) are also common along stream corridors in this region. Most of the forested woodlots range in size from 10 to 50 acres. Common understory species include coralberry (*Symphoricarpos orbiculatus*), Japanese honeysuckle (*Lonicera japonica*), and Christmas fern (*Polystichum acrostichoides*), and beech (*Fagus*) saplings being common along the north facing slopes. No uncommon or rare plant communities have been documented or observed within the project area per Sugar Camp.

Aside from forested areas, other vegetation cover within the project area consists of cropland, pasture and wetlands. Land use data indicates that most of the surface effects area is covered with vegetation (HMG 2018).

3.4.4 Invasive Species

Agricultural land use has extensively altered the native vegetation of this region; consequently, invasive species occur throughout the project area. 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 2014). 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. Table 3-2 lists the USDA noxious species for Illinois that are capable of being spread (USDA 2014).

Table 3-2 Noxious Species List for Illinois

Noxious Common Name	Scientific Name
Canada Thistle	*Cirsium arvense*
Columbus Grass	*Sorghum almum*
Common Ragweed	*Ambrosia artemisiifolia*
Giant Ragweed	*Ambrosia trifida*
Johnsongrass	*Sorghum halapense*
Kudzu	*Pueraria lobata*
Marijuana	*Cannabis sativa*
Musk Thistle	*Carduus nutans*
Perennial Sowthistle	*Sonchus arvensis*
Source: Amended at 26 Ill. Reg. 14644, effective September 23, 2002	

Johnson grass, common ragweed, giant ragweed, and Canada thistle are known to occur in Hamilton County (Eddmaps 2018). Kudzu, Johnson grass, common ragweed, giant ragweed, and musk thistle are known to occur in Franklin County (Eddmaps 2018).

3.4.5 Aquatic Ecology

As stated earlier in the surface water and wetlands discussions, three named streams and multiple unnamed tributaries and ponds are present in the project area that would support aquatic fauna. Physical characteristics and habitat conditions of streams in the surface effects area were measured by HMG in 2018. The Rosgen Rapid Bioassessment Protocol (RBP) was used to rate habitat parameters from poor to optimal (Rosgen and Silvey 1996). In general, results indicated that habitats in this portion of the watershed were not considered optimal and would not support diverse communities.

3.4.6 Threatened and Endangered Species

Species listed as threatened or endangered 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. If federally or state-listed threatened or endangered 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).

The *Illinois Threatened and Endangered Species by County* list (IDNR 2016) was reviewed to determine what threatened and endangered species were known to occur in the counties of the project area. Federal and state threatened and endangered species were listed in Franklin and Hamilton counties.

Aerial photographs, soils data, and land cover data within the project area were compared to known habitat preferences for listed species. Additionally, HMG scientists made a number of site visits to document characteristics of wetlands, streams and other potentially important habitats within the surface effects area to identify potential habitat and/or presence of listed species (HMG 2018). The information in the SBR and the IBR was subject to consultation and review by the IDNR-Office of Realty and Environmental Planning (OREP) and LRD, and the USFWS.

Collectively, Franklin and Hamilton counties contain listings for three federally listed and nine state listed threatened and endangered species, including four plants, one fish, two reptiles, three birds, and two mammals (Table 3-3). The entire project area was considered during the evaluation; however, an emphasis was placed on the surface effects area due to the nature of proposed disturbance and development in this area. Limited suitable habitat is present in the project area for most listed species.

Table 3-3 Threatened and Endangered Species in Project Vicinity

Common Name	Scientific Name	Franklin	Hamilton	Likely to occur in Surface Effects Area	Likely to occur in Shadow Area
Barn Owl	*Tyto alba*	x	x	Potential	Yes
False Bugbane	*Cimicifuga racemosa*	x		No	No
Green Trillium	*Trillium viride*	x		No	No
Indiana Bat*	*Myotis sodalis*	x	x	No	No
Little Blue Heron	*Egretta caerulea*	x		No	No
Northern Long-eared Bat*	*Myotis septentrionalis*	x	x	No	No
Ornate Box Turtle	*Terrapene ornata*	x		No	No
Piping Plover*	*Charadrius melodus*	x		No	No
River Cooter	*Pseudemys concinna*	x		No	No
River Redhorse	*Moxostoma carinatum*	x		No	No
Spotted Pondweed	*Potamogeton pulcher*	x		No	Potential
Storax	*Styrax americana*		x	Potential	No

*Federally-listed

3.4.6.1 Terrestrial Animals

Indiana Bat (*Myotis sodalis*) - 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 three 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 2011).

An Indiana bat presence/absence mist net survey was conducted by Alliance Consulting, Inc. (Alliance) in September 2017. The purpose of the survey was to confirm the presence or probable absence of the Indiana bat and northern long-eared bat within the vicinity of the project area. The mist net survey was completed with strict adherence to the USFWS 2017 Revised Range Wide Indiana Bat Summer Survey Guidelines and was authorized by USFWS and IDNR Scientific Collection Permits. A total of 54 net nights (5 locations) yielded a total of 41 bats of two species but no collection of Indiana or northern long-eared bats.

Northern Long-eared Myotis (*Myotis septentrionalis*) - Northern long-eared bat summer roosting/maternity habitat consists primarily of live or dead tree species and/or snags ≥3 inches diameter at breast height (dbh) that have exfoliating bark, cracks, crevices, and/or hollows, although they also use bat-houses, buildings, and other anthropogenic structures (Amelon and Burhans 2006). Winter roosting/maternity habitat typically consists of large caves and/or mines with large passages and entrances, constant temperatures, and high humidity with no air currents (USFWS 2015).

The northern long-eared bat has been documented at five sites in Franklin County. Four sites are approximately 2-3 miles southwest and the fifth is 14 miles southwest of the project area. As mentioned above, no northern long-eared bats were collected in the project area during 2017 mist net surveys.

Little Blue Heron (*Egretta caerulea*) - Little blue herons range from New England south to Florida along the Gulf Coast and north to Illinois. The little blue heron winters on the Gulf and the Atlantic Coasts north to New Jersey and also can be found in the tropics. This animal makes its home in freshwater swamps, lagoons, coastal thickets and islands; where its diet consists of fish, crustaceans, amphibians, insects, and reptiles (Rodgers and Smith 1995). In relationship to the project area, the closest known observation was in 1998, approximately seven miles northwest of the project area at Rend Lake in Franklin County. The types of wetlands it inhabits are absent from the proposed surface effects area and most of the project area.

Barn Owl (*Tyto alba*) - Barn owls inhabit open areas, including agricultural fields, grasslands and marshes. Their diet is dominated by voles and other small mammals (WDNR 2017). Barn owls nest and roost in a variety of places including hollows or natural cavities in trees, man-made structures, caves, and cliffs. Barn owls are capable of producing multiple broods in a nesting season. The peak of the initial nest occurs from March to May in the Midwest (IDNR 2010).

The barn owl is widespread, occurring throughout most tropical and subtropical regions of Central and South America, and extending into temperate regions in North America and Europe (WDNR 2017). Populations are stable in some parts of their range, but in the United States, seven Midwestern states, including Illinois, list barn owls as threatened or endangered. The most often cited cause of these declines has been the loss of nesting, roosting, and foraging sites resulting from changing agricultural practices and urbanization

(WDNR 2017). As agriculture has increased in scale and modern farming techniques have been implemented many farm buildings have disappeared from the landscape, rows of trees have been removed, and production has shifted from cover crops such as oats and hay to row crops like corn.

The barn owl has recently been documented at four sites in Franklin County and seven sites in Hamilton County. The Franklin County sites are located 16 miles west, 12 and 14 miles southwest, and 12 miles south of the project area, while the Hamilton County sites range from 2 to 17 miles east and 8 to 11 miles north from the project area. Suitable habitat is present in the project area.

Piping Plover (*Charadrius melodus*) - The piping plover is a small shorebird. Three geographically distinct summer breeding populations/locations are recognized in the U.S.: the Great Plains states, the shores of the Great Lakes, and the shores of the Atlantic Coast. Birds from all three populations winter on the southern Atlantic and Gulf coasts in the U.S. (USFWS 2014). Piping plovers use wide, flat, open, sandy beaches with very little grass or other vegetation. Nesting territories often include small creeks or wetlands. 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 2002). A loss of critical habitat along beaches and additional habitat areas has led to their listing as threatened. While traditional coastal habitat associated with the piping plover is not present in the project vicinity, the piping plover may stopover in the region during migration and is therefore identified within this section. However, no stopover habitat is present in or adjacent to the project area.

Ornate Box Turtle (*Terrapene ornata*) - The ornate box turtle can be found from South Dakota to Arizona east to the Mississippi Valley. Habitat includes prairies and open fields in former prairies (INHS 2014). The species can be characterized by its moderately high carapace that is flattened along the midline and lacks a keel (INHS 2018). The species was recorded at one site in Franklin County, nine miles northwest of the project area. Given the lack of suitable habitat, this species is not likely to occur in the project area.

3.4.6.2 Plants

False Bugbane (*Cimicifuga racemosa*) - False bugbane, also known as black cohosh, is a flowering plant of the buttercup family. The species prefers wooded areas. The plant has a single identified location in Franklin County, 17 miles southwest of the proposed surface effects area. Given this distance to the nearest known population and identified habitat being available in the project area, false bugbane is not likely to occur on or adjacent to the surface effects area.

Green Trillium (*Trillium viride*) - Green trillium prefers rich woodlands and prairie habitat. Within the assessment area, it is known only from Franklin County. The known Franklin County occurrence is located 14 miles southwest of the project area. Given the distance to known occurrences and suitable habitat, this species is not likely to occur in the project area.

Spotted Pondweed (*Potamogeton pulcher*) - Spotted pondweed is an aquatic plant distinguished by its black-spotted petioles and stems that can be found in shallow water, emergent marshes, and on muddy shores. The species is known from a single location in southwestern Franklin County, located 23 miles southwest of the project area. Given the

distance to known occurrences and limited suitable habitat, spotted pondweed could occur but is not likely to occur in the project area.

Storax (*Styrax americana*) - Storax is a deciduous shrub recognized by its alternate leaves, which are simple and toothed, and its showy, drooping, white flowers (Edgin & Mankowski 2013). Storax is an obligate wetland species found in floodplain forests, oxbow lakes, and deep swamps in southern Illinois (Mohlenbrock et al. 1961). Storax is found in very poorly drained habitats often in association with other wetland species including bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), water hickory (*Carya aquatica*), Virginia willow (*Itea virginica*), and southern buckthorn (*Bumelia lycioides*) (Mohlenbrock et al. 1961). Storax is known to occur at one site in Hamilton County, 13 miles northeast of the project area. Storax is common in deep swamp habitats with stable, regular hydrology, such as seasonally flooded or semi-permanently flooded habitats. This habitat association, as well as the range of storax, is at its northernmost extent in southern Illinois. One potentially suitable wetland is present within and adjacent to the utility corridor in the Middle Fork Big Muddy River floodplain.

3.4.6.3 Aquatic Species

River Redhorse (*Moxostoma carinatum*) - The river redhorse is a fish which occurs in the St. Lawrence-Great Lakes and Mississippi River basins. The species inhabits deep, swift, gravely riffles of small and medium sized river and is intolerant of silty bottoms, turbid water, and intermittent flow. The species is known to occur 18 miles southwest from the proposed surface effects area. Given this distance from a known occurrence and lack of suitable habitat within the project area, the species is unlikely to occur on or adjacent to the project area.

River Cooter (*Pseudemys concinna*) - The river cooter is a turtle found in the east from Virginia to northern Florida west to Oklahoma and Kansas, and north to southern Illinois and Indiana. The river cooter is found in backwaters and oxbow lakes of large rivers and reservoirs (INHS 2014). In Gallatin County, the river cooter is known to occur in several oxbow wetlands and large streams immediately adjacent to the Ohio River (INHS 2014).

Within the assessment area, the river cooter is known to occur in the Big Muddy River drainage in the Rend Lake area, upstream of the confluence with the Middle Fork, in Franklin County. The Big Muddy population is eight miles from the surface effects area but would not be affected by the operations since the surface effects area is not a tributary to that part of the Big Muddy basin.

Given the habitat preferences of the species, the distances to known populations, and the location of the project area in the Middle Fork Big Muddy watershed, the river cooter is not likely to be in the project area.

3.4.7 Natural Areas

This section addresses natural areas that are within ten miles of the project area. The Middle Fork Big Muddy River Resource Rich Area (RRA) surrounds the project area and the Ten Mile Creek State Fish and Wildlife Area is adjacent to the southeast.

Middle Fork Big Muddy River RRA is located in Franklin, Hamilton, and Jefferson counties. The project area is located within this 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. Some of the Ten Mile Creek areas are directly adjacent to the project area and within two miles of the surface effects 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. A portion of this wildlife area was transferred from TVA to the State of Illinois after surface mining reclamation.

A small portion of Rend Lake, associated with the Rend Lake State Fish and Wildlife Area, is located within the project area, approximately eight miles west of the surface effects area. Additional natural areas located within ten miles of the project area include: Wayne Fitzgerald State Recreation Area and Mt. Vernon Game Propagation Center.

3.5 Transportation

There are a total of 11 roads and approximately 11 miles of roads within the project area. The utility corridor is crossed by two roads (Illinois State Route 14 and County Road 100 E). A complete listing of roads within the project area is included below in Table 3-4. No permanent roads would be constructed and no roads would be permanently closed during this project. Subsidence would occur under 11 roads. Traffic would be temporarily re-routed during planned subsidence. In addition to the roads, two railroads transect the project area.

Table 3-4 Roads within the Project Area

Road Name	Miles in Project Area	County
Bobtail Rd	0.8	Franklin
Carlton Rd	0.8	Franklin
County Rd 000 E, Macedonia Rd	0.8	Franklin, Hamilton
County Rd 100 E, Thimble Ln	0.8	Hamilton
County Rd 30 E	0.2	Hamilton
Ewing Rd	1.1	Franklin
Happy Row Rd	0.7	Franklin
Hutchcraft Ln	0.5	Franklin
Illinois State Route 14, 1425 N Rd	3.9	Franklin, Hamilton
Meadows Ln	0.7	Franklin
N Thompsonville Rd	0.8	Franklin

Roadway authorities with jurisdiction in the project area include:

- Hamilton County Highway Department
- Franklin County Highway Department
- Knights Prairie Township Road District
- Northern Township Road District

- Flannigan Township Road District
- Cave/Eastern Township Road District

3.6 Utilities

Utilities found within the project area are shown below in Figure 3-7. Telephone, electric and water lines are present along roadways. Utilities with potential infrastructure within the project are listed below.

- Cips Co
- Akin Water District
- Hamilton County Rural Water
- Hill City Water District
- Macedonia Water System
- Ewing-Ina Water Commission
- Hamilton County Telephone Electric Co-op
- Southeastern Illinois Electric Co-op
- Wayne-White Counties Electric Co-op

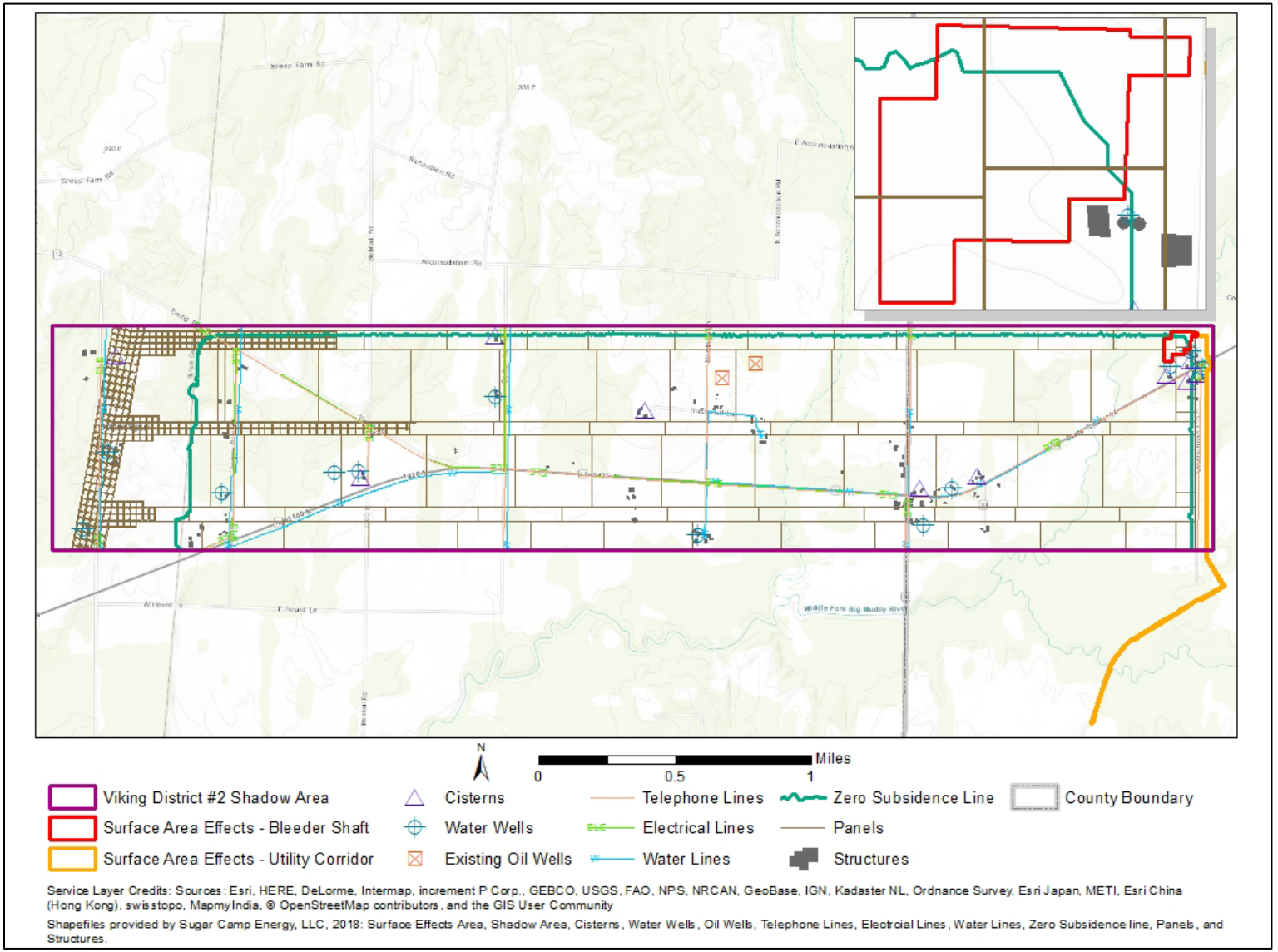


Figure 3-7 Project Area Infrastructure

3.7 Socioeconomic Conditions and Environmental Justice

Southern Illinois, including the project area counties, have traditionally had a large coal mining industry because of the rich mineral resources within the Illinois Coal Basin. The proposed mining would occur in the northeast corner of Franklin County and along the western portion of Hamilton County.

Census data available online through US Census Bureau (US Census Bureau 2018) has been summarized in Table 3-5. The most recent 10-year census data (2010) was utilized. Intermittent estimates conducted after the formal 2010 census are available but the base year of 2010 was used for analysis. The sites that would be mined are located in Census Tract 412 in Franklin County and 9732 and 9733 in Hamilton County.

Table 3-5 Demographics Data for Counties in the Project Area

Category	Hamilton	Franklin	State of Illinois	United States
2010 Census population	8,457	39,561	12,830,632	308,745,538
Median household income, 2012-2016 (in 2016 dollars)	$45,076	$39,507	$59,196	$55,322
Percent minorities (2010 Census data)	2.3%	2.8%	22.9%	23.4%
Percent persons below poverty level, 2012-2016	14.4%	21.5%	13.0%	12.7%

In comparison to state and national levels, both counties had relatively low per capita income levels in between 2012-2016, as outlined in Table 3-5. County minority levels are well below the state and national levels. Both counties poverty levels were higher than both the state and national levels.

3.8 Cultural Resources

Under Section 106 of the National Historic Preservation Act of 1966 (as amended), federal agencies are required to consider the impact of project undertakings on historic properties. Historic properties are defined as any prehistoric or historic district, site, building, structure, or object listed on or eligible for listing on the National Register of Historic Places (NRHP) (35 CFR 800). 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 the NRHP. This is a list of historic properties that are deemed worthy of preserving for the future. Three broad categories of cultural resources addressed below are archaeological sites, historic (standing) structures and traditional cultural properties.

3.8.1 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.

American Resources Group, Ltd. completed a Phase I archaeological surveys for the bleeder shaft, power borehole and waterline in April and May 2018 (Lomas 2018; Lence 2018a). No cultural resources were identified during the investigations.

3.8.2 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 pre-subsidence 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.

American Resources Group Ltd. completed a desktop review for historic structures in May 2018 (Lence 2018b). The review of the IHPA's Historic Architectural Resources GIS System (HARGIS), and the IHPA's Illinois Inventory of Archaeological Sites (which also includes structures and cemeteries), indicates that there are no historic structures or cemeteries that have been inventoried within the project area, nor are there any historic properties listed or eligible for listing on the NRHP. Additionally, there are no historic bridges indicated within the project area on the Illinois Department of Transportation's Historic Bridge inventory website (Lence 2018b).

3.8.3 Traditional Cultural Properties

Pursuant to 36 CFR Part 800.3(f)(2), TVA consulted with the following federally recognized Indian tribes regarding properties within the proposed project's APE that may have religious and cultural significance to them and eligible for listing in the NRHP: Absentee Shawnee Tribe of Oklahoma, Chippewa Cree Tribe of the Rocky Boy's Reservation, Citizen Potawatomi Nation, Eastern Shawnee Tribe of Oklahoma, Forest County Potawatomi Nation, Ho-Chunk Tribe of Wisconsin, Kaw Nation, Keweenaw Bay Indian Community, Kickapoo Tribe of Oklahoma, Kickapoo Tribe of Kansas, Lac Vieux Desert Band of Lake Superior Chippewa Indians, Menominee Indian Tribe of Wisconsin, Miami Tribe of Oklahoma, Osage Nation of Oklahoma, Ottawa Tribe of Oklahoma, Ponca Tribe of Oklahoma, Ponca Tribe of Nebraska, Pokagon Band of Potawatomi Indians, Peoria Tribe of Indians in Oklahoma, Prairie Band of Potawatomi Nation, Quapaw Tribe of Oklahoma, Red Lake Band of Chippewa Indians of Minnesota, Sac and Fox Tribe of the Mississippi in Iowa, Sac and Fox Nation of Missouri in Kansas and Nebraska, the Sac and Fox Nation of Oklahoma, Shawnee Tribe, United Keetoowah Band of Cherokee Indians, Winnebago Tribe of Nebraska, and the Wyandotte Nation.

TVA did not receive comments from any of the tribes regarding the potential presence of traditional cultural properties in the area.

3.9 Noise Levels

No private residences exist within the 12-acre surface effects area. During normal operation, properties directly adjacent to the surface effects area could potentially hear noise from the project such as trucks or machinery noises.

During construction of the bleeder shaft, blasting would occur. In accordance with 62 IL Adm. Code 1817.61 d) 2), a preliminary blast plan was submitted with the IBR application. The plan was prepared for the potential use of explosives during the construction of the bleeder shaft. The proposed bleeder shaft area is approximately 655 feet north of State Route 14. Five residences are within 1,000 feet of the bleeder shaft. In addition, there is

one residence approximately 0.25 miles to the northeast of the bleeder shaft and one residence approximately 0.5 miles east. There are two residences on State Route 14, within a mile of the bleeder shaft.

The bleeder shaft area would initially be developed with small dozers and a loader removing and stockpiling topsoil on the perimeters of the site for later reclamation of the site. Mobile equipment would be used to place durable rock on the surface. Noise from the mobile equipment would be heard at the closest residences for a time period of approximately one month. An experienced contractor would sink the 16-foot diameter by 900-foot deep shaft by conventional methods. This means that explosives would be used to fracture the rock so that it can be mucked and stockpiled on site for later reclamation of the shaft. Noise from the blasting would not exceed the state and federal regulatory limit of 1.33 dB. The construction noise would be eliminated after the approximate seven-month construction period.

After the bleeder shaft is sunk, a blower fan would be installed to ventilate the mine. The fan installation would be similar to the one that was evaluated in TVA's 2011 Environmental Assessment for the Sugar Camp Mine No. 1 (TVA 2011). Fan noise may be heard at the surrounding residences and by traffic passing on State Route 14. The noise would be constant for the lifetime of Viking District #2, which is anticipated to be April 2019 through July 2023. The fan cone would be pointed east, away from the closest residences, in order to minimize noise to the residences.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

The anticipated potential effects of implementing the No Action Alternative and the Action Alternative are described below for each resource area. Under the No Action Alternative, TVA would not approve the mine plan and Sugar Camp would not be allowed to extract coal from TVA-owned coal reserves within the 2,250-acre shadow area and above ground mining operations would not take place.

Under the Action Alternative, TVA would approve Sugar Camp's mining plan and Sugar Camp would mine the TVA coal reserves in the area. The potential effects of mining-related activities were considered. Anticipated environmental consequences would be related to subsidence of approximately 1,861 acres of land in the project area, and disturbance and development of approximately 12 acres of land in the surface effects area as outlined in Table 2-1.

Subsidence is the settlement of the ground surface following the collapse of underground mining shafts or voids once the coal has been removed. Planned subsidence is included in Sugar Camp's proposed mining plan (Figure 4-1). Maximum subsidence of about 5.3 feet is expected on the surface in the center of the three longwall panels. Under its mining permit, Sugar Camp is required to avoid subsidence-related damages to private property or to reimburse affected parties for those damages.

The effects of subsidence can be predicted based on the thickness of the coal seam to be mined and the structure of rock layers above the coal seam. Predicted subsidence profiles and post-subsidence contours were submitted to IDNR-OMM. The predictions were created by using the Surface Deformation Prediction System (SDPS) as developed by Virginia Tech University for the U.S. Office of Surface Mining and distributed by the Carlson Software Company. As mentioned above, maximum subsidence was predicted to be 5.3 feet during the Sugar Camp's SDPS predictive modeling. Analysis of the post-subsidence contours indicates that numerous ponded areas, measuring approximately 181 acres, would develop as a result of the planned subsidence. These areas are identified on Figure 4-1 and are required by Illinois Administrative Code to be repaired. In general, subsidence is permanent but related impacts are temporary if mitigated. The largest impacts would be encountered at the edge of the longwall panel in the area of transition from 0 to 5.3 foot subsidence.

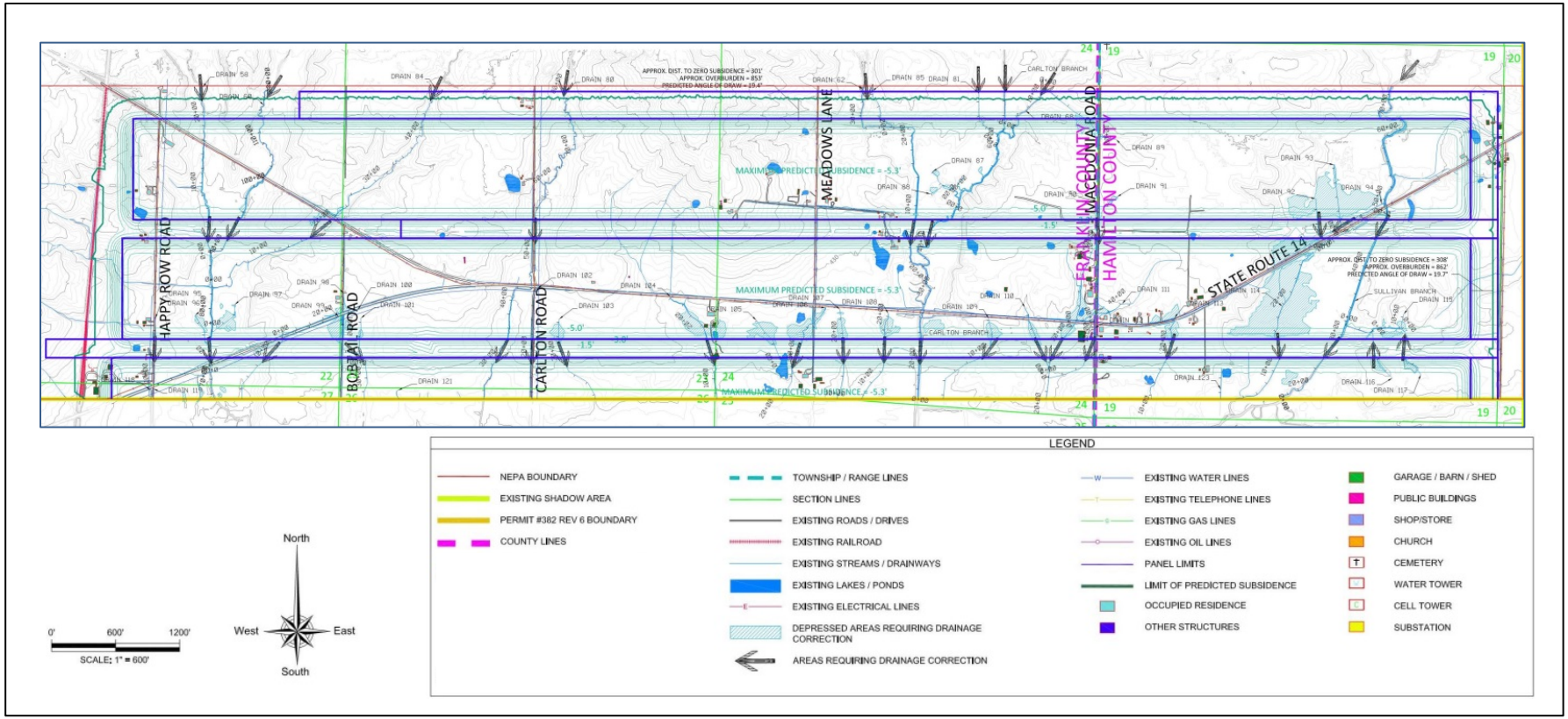


Figure 4-1 Proposed Mining Plan

4.1 Physical Environment

4.1.1 Geology and Soils

4.1.1.1 The No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.1.1.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in temporary impacts due to surface disturbance in the surface effects area and planned subsidence in the shadow area.

Less than six acres of prime farmland and farmland of statewide importance would be temporarily disturbed within the approximate 12-acre surface effects area during construction and operation. Pasture land in the bleeder shaft area would be restored during reclamation in 2023. Impacts within the utility corridor would be minor and only last one construction season.

Subsidence could temporarily affect approximately 886 acres of prime farmland resources and farmland areas of statewide importance through changes in surface drainage patterns and the subsequent change in the internal moisture status of the soils. However, due to planned reclamation efforts to return the area to its pre-subsidence drainage patterns, the permanent impact to prime farmland post-reclamation would be minor. Per the Illinois Department of Agriculture (IDOA), "Agriculture Department staff serve as advisors to the coal mining industry and the Illinois Department of Natural Resources in mined land reclamation and restoration efforts. The Agriculture Department reviews mining permit applications to ensure they contain adequate farmland reclamation plans. Employees conduct on-site mine inspections to monitor the quality and timeliness of reclamation work. By overseeing the collection of crop samples on mined land, the Department helps determine whether yields meet specified targets that correspond to the land's pre-mining production levels" (IDOA 2018).

IDNR-OMM requires coal companies to reestablish drainage patterns and stream profiles affected by mining activities. Topsoil removed during surface-disturbing activities would be replaced with a 6-inch thick layer of topsoil during reclamation as outlined in the UCM application to IDNR-OMM. 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-OMM ensures that active coal mining operations are properly reclaimed, thereby assuring the restoration of lands affected by mining (including subsidence) to productive uses. IDNR-OMM inspects all coal mining sites to ensure reclamation standards are met and that approved reclamation plans are followed. Additionally, IDNR-OMM 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 farmland and farmland areas of statewide importance could be temporarily impacted during the process of correcting drainage problems, but the permanent impact is generally minor.

In the event that temporarily impaired drainage or drainage repair work from subsidence causes crop losses or prevents the temporary planting of crops, the surface owner or tenant farmer would be eligible for compensation as follows:

- Crop loss would be compensated by paying an agreed to posted price at the local farm service center for the year's loss based on the average prior yields for that field which is affected; and,

- Alteration or construction of additional waterways would be compensated by paying the fair market value for the acreage reduced (taken out of) from productivity; or,

- Other reasonable compensations which may be mutually negotiated with a landowner on a case by case basis.

4.1.2 Floodplains

TVA adheres 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" (EO 11988, Floodplain Management). 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 (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

4.1.2.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, there would be no surface disturbance or subsidence, or any other changes to the existing floodplain.

4.1.2.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan and allow Sugar Camp to extract TVA-owned coal. Sugar Camp would construct the surface effects area and place equipment, soil and subsurface material stockpiles, and boreholes within it, as well as construct utilities within a 1.7-mile corridor. Subsidence would also occur above the longwall mining area.

In the surface effects area, portions of the shaft cuttings stockpile, the mobile crib plant, the Connex boxes, subsoil and cuttings stockpile, a 10-ft by 10-ft concrete pad, and a 12-inch borehole would be located within the 100-year floodplain of Campbell Branch and Sullivan Branch, as shown in Figure 3-4. The crib plant, Connex boxes, 12-inch borehole, 10-ft by 10-ft concrete pad, portions of the subsoil and cuttings pile, shaft cuttings pile and the topsoil stockpile would be located within the 100-year floodplain of Sullivan Branch. There is no practicable alternative to locating these facilities within the floodplain because the location of these facilities is dictated by the underground mining operations. Based on information provided by Sugar Camp on July 11, 2018, numerous site layouts were considered and the final layout was chosen to minimize adverse impacts and still meet project objectives.

The crib plant is mobile and can be relocated outside of the floodplain in the event of a flood. To minimize adverse impacts, Sugar Camp would develop an evacuation plan to relocate all flood-damageable equipment at the surface effects location, including the mobile crib plant, outside of the floodplain in the event of a flood. Additionally, Sugar Camp has committed to elevating any boreholes located in or near the 100-year floodplain to or above the 500-year flood elevation, which was computed by Sugar Camp to be 439 feet. The surface effects area would be returned to its original grade and seeded at the end of the project, which would be consistent with EO 11988.

The utility corridor would cross the 100-year floodplain of the Middle Fork Big Muddy River. Consistent with EO 11988, utilities are considered to be repetitive actions in the 100-year floodplain that should result in minor impacts. To minimize adverse impacts to floodplains, utilities would be bored under streams and standard best management practices would be used during construction of the utilities.

Subsidence would occur within the floodplains of Sugar Camp Creek, Carlton Branch, Sullivan Branch, and several unnamed tributaries within the longwall mining footprint. Prior to reclamation, subsidence from underground mining could temporarily increase the size of floodplains due to the decrease in surface elevation. In addition, flood depths in existing floodplain areas could temporarily increase. As a condition of its mine permit, the State of Illinois requires Sugar Camp to correct any drainage changes caused by subsidence and repair any damage that may be caused by subsidence and subsidence-induced flooding. Construction of berms and/or dredging in advance of planned subsidence would protect land, dwellings, and structures within potential flooding areas (IDNR 2008).

With the implementation of the following practices and measures, TVA's granting permission to Sugar Camp to mine coal in Viking District #2 under Sugar Camp's filed mining plan would comply with EO 11988 and there would be no significant impacts to floodplains and their natural and beneficial values.

- Standard BMPs would be used during construction in the utilities corridor;
- Sugar Camp would develop an evacuation plan to relocate all flood-damageable equipment at the surface effects location, including the mobile crib plant, outside of the floodplain in the event of a flood; and
- Sugar Camp would flood-proof any borehole or shaft located in or near the 100-year floodplain to or above elevation 439.

4.2 Water Resources

Subsidence has the potential to affect water resources by altering stream elevations and gradients and by altering the rate of water infiltration into underground strata that bear groundwater. Sugar Camp would be required by its mining permit to replace drinking, domestic or residential water supplies that become contaminated or interrupted by mining activities.

4.2.1 Groundwater

4.2.1.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.2.1.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in insignificant impacts within the surface effects area; however, this may result in impacts due to planned subsidence in the shadow area.

Subsidence could cause either an increased or a decreased flow to groundwater hydrology, depending on how the rock layers fracture. 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 1992). Water quality information from the former domestic wells that have been replaced by connections to public water supplies is being collected by the applicant. This program would be continued into the future, and is expected to provide useful data relative to the restoration of well production.

No significant, detrimental impacts on drinking, domestic and residential water supplies are anticipated due to the proposed mining operations for several reasons: 1) Although planned subsidence mining methods are proposed, the geologic conditions of the shadow area are favorable for limiting the impacts of any planned subsidence on both surface and ground water hydrology; 2) The soils in the shadow area were deposited in the Pleistocene and measure from under 10 feet to 54 feet in thickness for the proposed mine project area; 3) Drill logs indicate the soil materials to be predominately clay, with scattered holes indicating the presence of some sand in the unconsolidated zone (HMG 2018). Based on the nature and thickness of the consolidated overburden in the shadow area, subsidence is not likely to have significant, long-term impacts on groundwater supplies.

Current underground mining by conventional room and pillar development mining practices in the Herrin No. 6 seam generates a nominal quantity of groundwater inflow into the mine. The quantity of inflow is produced when the roof is fractured by longwall panel extraction and is consistent over time. This inflow is produced mainly from the relatively close overlying sandstone unit near the roof of the coal seam. Inflow rates based on current pumping records is approximately 2,100 gpm (HMG 2018). Such inflow to a mine may result in temporary diminished output of area domestic wells finished in these strata. This may result in replacement water supplies being provided by the applicant as mining progresses to these users. If the inspection of wells reported to have diminished output without a return to normal output is confirmed, these residents are then connected to a public water source. As a condition of the mining permit, any decrease in water quality or quantity would be corrected by Sugar Camp, and adequate clean water would be supplied to the parties affected until the correction was made.

4.2.2 Surface Water

4.2.2.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.2.2.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in insignificant impacts due to disturbance in the surface effects area and temporary impacts due to planned subsidence in the shadow area.

There is no surface water within the bleeder shaft area, however the utility corridor would cross beneath one named stream, the Middle Fork Big Muddy River, two unnamed tributaries to Sullivan Branch and one unnamed tributary to the Middle Fork Big Muddy River. Direct impacts to these streams will be avoided by boring under them.

With surface area disturbances, there may be increased sediment loading to nearby streams or ponds from stormwater runoff leaving the surface effects area. However, with proper sediment and erosion controls, sediment loading to surface water can be minimized.

During initial construction, sediment would be managed through the use of erosion and sediment control best management practices (BMPs) as required by the NPDES permit. BMPs are required for construction sites that disturb more than one acre of land. Sediment would be managed through the use of erosion control practices (e.g., seeding, straw, mulch, or vegetative cover) as well as fugitive dust minimization (e.g., wetting roads prior to heavy use). Runoff would be managed through the use of sediment control practices (e.g. silt fence, wattles, or hay bales) as well as water quality protection measures (e.g., sediment ponds or establishment of riparian zone buffer zones) as necessary. Embankments or cut and fill slopes would be permanently seeded and stabilized, and not affected during the life of the mine.

As a result of proper management techniques, the change in sediment contribution due to construction activities within the surface effects area would be insignificant. As an anticipated condition of the mining permit, Sugar Camp must return water flow patterns to pre-subsidence patterns through stream mitigation activities.

One impoundment of 20 acre-feet capacity or more is present in the northwest corner of the project area. This pond is outside of the subsidence area and is not expected to be impacted by planned subsidence.

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. 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.

4.2.3 Water Supply

4.2.3.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.2.3.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This may result in impacts due to planned subsidence in the shadow area.

Subsidence could cause either an increased or a decreased flow to residential well water, depending on how the rock layers fracture. No major surficial aquifers have been recorded within the mine area; however, a bedrock aquifer associated with Pennsylvanian sandstone in the depth range of 200 to 360 feet below ground surface is utilized as a water source for domestic and farm use in the area. Table 4-2 lists the wells and cisterns located within the shadow area. Pre-subsidence monitoring of identified wells for quality and quantity would be completed with the permission of the landowners. As a condition of the mining permit, any decrease in water quality or quantity would be corrected by Sugar Camp, and adequate clean water would be supplied to the parties affected until the correction was made. This may include connection to a public water supply. Potential effects to water supplies or availability would be minor with mitigation. See Figure 3-5 for the approximate location of water wells and cisterns in the project area.

Table 4-1 Well Usage in the Project Area

Type	**Frequency**
Domestic Wells (Drinking or household use)	5
Wells (purposes other than drinking or household use)	3
Existing wells (no longer used)	7
Cisterns (purposes other than drinking or household use)	5
Cisterns (no longer used)	8

Source: HMG 2018

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 and the rapid water level recovery in shallow water wells after subsidence (Booth and Spande 1992). Sugar Camp would be 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). Wells that do not have a specific agreement already in place to address post-subsidence 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). The UCM application includes a signed affidavit from Sugar Camp that all documents and rights bestowed to legally conduct subsidence

would be provided to IDNR-OMM. This would include any missing agreements for water wells and the associated sampling.

4.2.4 Wetlands

4.2.4.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.2.4.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in insignificant impacts due to disturbance in the surface effects area and planned subsidence in the shadow area.

There are no wetlands present within the bleeder shaft area, so there would be no impacts to wetlands due to surface disturbances in that portion of the project area. During HMG's wetland and stream delineation, the proposed utility corridor overlapped two forested wetlands totaling approximately 0.6 acres. However, the utility corridor was moved after the wetland delineation in order to avoid wetland impacts to wetland 2 (W2). Boring operations are planned under the wetland 1 (W1, Figure 3-6) and it is expected that the utility corridor would be confined to the track fill area adjacent to the existing railroad track to avoid the W2. As a result, no major or permanent impacts are expected.

Prior to reclamation, there could be potential changes to the approximately 225 acres of NWI-mapped wetlands present within the subsidence area. 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.

Initial subsidence and changes in groundwater and subsurface flow could create increased temporary 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 subsides in order to restore floodplains back to pre-mining conditions. After landscape re-contouring, the flow would largely be restored to pre-mining conditions, and the newly-created ponded areas would decrease. Figure 4-1 indicates areas that would be likely to pond and locations drainage corrections would be necessary.

Subsidence impacts would be temporary until pre-mining drainage conditions are restored. Drainage corrections are typically complete within one year. Post-subsidence assessment would determine changes in hydrology and drainage that need to be restored. Once hydrology is restored, no permanent impacts would remain. This level of impact is considered insignificant.

4.3 Atmospheric Conditions

4.3.1 Air Quality

4.3.1.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan expansion. Therefore, no effects would occur from surface disturbance or underground operations in the proposed project area. No change to the indirect air emissions is expected to result from the No Action Alternative.

4.3.1.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan expansion. This would result in impacts due to surface disturbance and underground operations in the shadow area. As indicated above, the intended coal consumers are anticipated to continue to burn coal, whether from other sources or from the proposed project. As such, the indirect emissions resulting from combustion of the Viking District #2 coal is not expected to cause any changes to the ambient air quality in the areas surrounding the end user.

Construction equipment at the surface would cause temporary increases in criteria pollutant emissions from vehicle and equipment operation. Air quality standards would be maintained by controlling fugitive dust generated by surface disturbance. These emissions would be insignificant with the implementation of best management practices (e.g., wetting the roads and/or using dust control chemicals before use of access/haul roads during prolonged dry weather conditions 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.

4.3.2 Greenhouse Gases

4.3.2.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan expansion. Therefore, no greenhouse gas emissions would occur from surface disturbance or underground operations in the proposed project area or from transportation of the coal. However, it is important to note that greenhouse gas emissions would not be a net reduction equivalent to the total emissions from the proposed mine expansion.

Under the No Action Alternative, the energy that would have been produced by the Sugar Camp mined coal would most likely be replaced by alternate energy sources (including coal from other production areas). While the production and consumption of those replacement energy sources would have associated greenhouse gas emissions, the emissions from the replacement sources of energy are unknown because they would not be under TVA's control. For the purposes of analysis, TVA assumes that the No Action Alternative must consider a range of actions to be taken by Sugar Camp from complete replacement of coal reserves from coal reserves to no replacement. TVA anticipates, then, that greenhouse gas emissions would be the same or less under the No Action Alternative than the proposed

action because, typically, coal combustion is more carbon intensive per unit energy than other forms of fossil fuels. (EPA 2018h).

4.3.2.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan in Viking District #2. This would result in impacts due to coal extraction in the shadow area and transportation of the coal to end users, as well as from the eventual combustion of the extracted coal. No major impact to the regional climate would be associated with the Action Alternative.

Direct Emissions – Mining Operations

In 2016, the GHGRP information submitted by Sugar Camp Energy, LLC reported emissions of 1,498,326.4 metric tons CO_2e ($MTCO_2e$) (USEPA 2018d) and separately reported total coal production of 11.4 million short tons (tons) of coal (FELP 2018). Based on this information, the CMM emitted to the atmosphere by existing mine operations is estimated as 0.13 $MTCO_2e$/ton coal produced. The maximum projected annual coal production under the Action Alternative would occur in 2020 and would be approximately 6.1 million tons.

The operation of mining equipment (direct emissions) and transportation (indirect emissions) of the coal would also generate GHG emissions. The GHG emissions associated with these operations are anticipated to be negligible compared to the CMM and coal combustion emissions.

Indirect Emissions – Coal Combustion

Assuming that all of the coal extracted from the mine is combusted, the associated GHG emissions were calculated using emission factors and GWP values from the GHGRP rule, obtained from 40 Code of Federal Regulations (CFR) Part 98 for bituminous coal.

Action Alternative Total GHG Emissions

Table 4-2 summarizes the maximum projected annual GHG emissions associated with the Action Alternative.

Table 4-2 Action Alternative GHG Emissions

		Maximum Annual Coal Production	6,100,000	tons per year
		Bituminous Coal Heat Content:	24.93	MMBtu/ton [a]
			152,073,000	MMBtu/yr
GHG	GWP [b]	Emission Factor [c]	Emissions (MT)	Emissions ($MTCO_2e$)
Combustion				
CO_2	1	93.28 lb/MMBtu	14,185,369	14,185,369
CH_4	25	1.1E-02 lb/MMBtu	1,673	41,820
N_2O	298	1.6E-03 lb/MMBtu	243	72,508
Mining				
CH_4	25	0.13 MTCO2e/ton coal		793,000
CO_2e (Total)				15,092,698

[a] 40 CFR Part 98, Table C-1, reflecting the update effective January 1, 2014.
[b] 40 CFR Part 98, Table A-1, reflecting the update effective January 1, 2014.
[c] 40 CFR Part 98, Tables C-1 and C-2, reflecting the update effective January 1, 2014.

The projected maximum annual emissions associated with the Action Alternative under the control of TVA (i.e., mining operations direct emissions) represent approximately 0.03% of the 2.99 billion $MTCO_2e$ of direct GHG emissions reported through the GHGRP (USEPA 2018e) for 2016, 0.01% of the estimated 6.51 billion $MTCO_2e$ of total U.S, GHG emissions (USEPA 2018f) for 2016, and 0.37% of the total Illinois GHG emissions (USEPA 2018g) for 2016 assuming that 50% of total Illinois emissions were reported under the GHGRP and that all of the mined coal is combusted in Illinois (note that the vast majority of the mined coal is exported to other states in the southeast US or overseas).

For perspective, direct emissions from the entire SBR No. 6 area would represent at most approximately 0.06% of the direct GHG emissions reported through the GHGRP (USEPA 2018e) for 2016, approximately 0.03% of the estimated total U.S GHG emissions (USEPA 2018f), and 0.86% of total Illinois emissions. This is based on the UCM application for the entire SBR No. 6 area, which states that annual coal production would be 14 million tons per year at optimum capacity.

4.4 Biological Environment

4.4.1 Wildlife

4.4.1.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.4.1.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in insignificant impacts due to disturbance in the surface effects area and planned subsidence in the shadow area.

The majority of the area where surface disturbance would take place has already been disturbed (maintained pasture, cultivated fields, roads and a railroad), and the species most likely present in the surface effects area are those associated with early-successional, regularly-disturbed habitat. Any wildlife present in the surface area at the time of construction activities may temporarily disperse to nearby areas of similar habitat, but they would likely return to the area after the completion of reclamation activities. The post-mining land use is expected to follow that of pre-mine land use, so impacts to wildlife habitat would be negligible.

There is currently no evidence that subsidence would affect the surface usage of habitat by, or productivity of, wildlife within the project area. Prior to mitigation, an increase of ponded water or wetland habitat may provide temporary benefit to wildlife. Upland habitats would be temporarily disturbed in some areas but suitable adjacent habitat would still be present. 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.

4.4.2 Migratory Birds

4.4.2.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.4.2.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in insignificant impacts to migratory birds due to surface disturbance in the surface effects area and planned subsidence in the shadow area.

The project area is within the boundaries of the Big Muddy River watershed, which lies within a major avian flight corridor between the Mississippi and Ohio Rivers. The migratory birds are attracted to flooded fields and large lakes in the area. There might be temporary changes in flooding due to subsidence. A temporary increase in ponded areas may provide a benefit to migratory birds. No large water bodies that serve as breeding grounds are present or would be negatively impacted long-term. Any effects resulting from mining such as small changes in flooding would be subject to mitigation under Sugar Camp's integrated fish and wildlife habitat reclamation plan. Since potential floodplain impacts are temporary and suitable breeding grounds would not be impacted, migratory bird flight plans and stopovers would not be significantly impacted and the Migratory Bird Treaty Act requirements would be met.

4.4.3 Vegetation

4.4.3.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.4.3.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in temporary impacts due to surface disturbance in the surface effects area and planned subsidence in the shadow area.

Some disturbance of existing plant communities would occur in areas designated for the installation of the mine features (i.e., graveled areas, soil piles, and access roads). No significant impacts to vegetation are anticipated because no uncommon terrestrial plant communities or otherwise unusual vegetation is known to occur on the lands to be disturbed. Furthermore, plant communities in the surface effects area would be restored based on the proposed post-mining land use. Plant communities in the area of planned subsidence may be temporarily impacted by ponded water but would return to pre-mine conditions post reclamation.

4.4.4 Invasive Species

4.4.4.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.4.4.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in minor impacts due to surface disturbance in the surface effects area and planned subsidence in the shadow area.

Construction activities and soil disturbances could potentially be a vector for the introduction of invasive species or could facilitate the movement of Illinois regulated noxious weeds listed for Franklin and Hamilton counties. Protocols set forth by the Illinois Noxious Weed Law-Section 220.230 would be followed for the cleaning of equipment and clothing, to avoid movement of these species. This would fulfill obligations for compliance of EO 13112, Invasive Species.

4.4.5 Aquatic Ecology

4.4.5.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.4.5.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in insignificant impacts due to surface disturbance in the surface effects area and minimal impacts due to planned subsidence in the shadow area.

There are no surface water features within the bleeder shaft area. No loss of habitat would occur in the utility corridor due to boring operations under the three intermittent streams and one perennial stream (Middle Fork Big Muddy River). Three named streams and numerous intermittent and ephemeral streams are present in the project area as shown in Figure 3-5.

Prior to reclamation, aquatic life could be affected by the alteration of habitat conditions within streams 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 on aquatic life are expected to be temporary as hydrology and thus aquatic habitat would be restored through reclamation. Impacts to streams or other watercourses would be subject to Sugar Camp's mitigation plan for reestablishing the pre-mining drainage patterns by grading and/or dredging areas of trapped or standing water. With implementation of these remediation and mitigation activities, permanent impacts to aquatic life in these streams would be minimized.

4.4.6 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).

4.4.6.1 Terrestrial Animals

4.4.6.1.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.4.6.1.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This could result in temporary impacts due to surface disturbance in the surface effects area and planned subsidence in the shadow area.

Both the state and federal lists were reviewed and habitats were evaluated to determine which species might be located in the surface effects area. No suitable habitat for piping plover, ornate box turtle, river cooter, or little blue heron is known from the project area. USFWS comments on SBR No. 6 to Permit No. 382 indicated that there is no critical habitat in the project area for the piping plover. Therefore the IDNR made a no effect determination regarding potential impacts of the project to piping plover. TVA adopts this no effect determination. Due to lack of suitable habitat present in the area, ornate box turtle, river cooter, and little blue heron would not be impacted by the proposed actions.

The following state-listed terrestrial species were determined to be of potential concern in the surface effects area where land disturbance would take place: Indiana bat, northern long-eared bat, and barn owl.

- The Illinois Department of Natural Resources reviewed the potential impacts of this project on federally listed Indiana bat and northern long-eared bat pursuant to 17 Ill. Adm. Code Part 1075. Following the US Fish and Wildlife Indiana Bat Summer Survey Guidelines a presence/absence survey for Indiana bat and northern long-eared bat mist net survey was conducted in project area in 2017. Neither bat species was collected. The project plans include boring under trees. Tree removal would only occur as a last resort. Due to negative survey results, lack of known critical habitat for these two bat species in the project area, and small likelihood that trees would be removed, the IDNR determined that the project would not affect the Indiana bat or northern long-eared bat. See IDNR approval letter dated July 13, 2018, Section 1817.97(b). TVA adopts this no effect determination.

- There are currently no structures located within the surface effects area and trees would only be removed if absolutely necessary. Although unlikely, direct impacts could occur to barn owl nests if trees are removed while birds are nesting. Due to the documentation of the species at multiple sites in Franklin and Hamilton Counties, with distances from the project area ranging from 2 to 17 miles, populations of this species are not expected to be impacted.

Potential habitat for these species exists in the project area and may be temporarily disturbed by subsidence due to changes in hydrology. Any habitat disturbance resulting from mining would be subject to restoration under Sugar Camp's integrated fish and wildlife habitat reclamation plan. Due to the minimal amount and temporary nature of disturbance from subsidence, the distance to known occurrences, and limited habitat, no major impacts to these species are expected.

As a condition of the anticipated mining permit, Sugar Camp would be required to correct any potential changes in water flow that could occur because of subsidence. No habitat loss would be experienced post-mining. Any stream reshaping activities would require additional wetland surveys through the Section 404 permitting process and potentially threatened and endangered species review, if a permit is required. These surveys would identify any populations of threatened and endangered species that may be impacted. Therefore, state or federally listed species would not be significantly affected by the construction of the mine features or by the subsequent subsidence and reclamation. The Action Alternative would not likely adversely affect state or federally listed species.

4.4.6.2 Plants

4.4.6.2.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.4.6.2.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. Both the state and federal lists were reviewed and habitats were evaluated within the surface effects area to determine which species might be located in the project vicinity. The delineated wetland (W2) in the surface effects area, closest to the Middle Fork Big Muddy River, is associated

with suitable habitat for storax. However, operations are planned to take place within the railroad fill in this area and impacts to this species are not expected to occur as a result of the proposed actions. Additionally, no state or federal plant species were determined to be located in the project area so no takes or permanent impacts are expected. No threatened or endangered plant species would be impacted by planned subsidence.

4.4.6.3 Aquatic Species

4.4.6.3.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.4.6.3.2 Action Alternative

Both the state and federal lists were reviewed and habitats were evaluated to determine which species might be located in the project area. No state or federal aquatic species were determined to be located in the surface effects or adjacent areas so no impacts are expected due to construction of surface features.

Spotted pondweed may be present in the project area. Potential habitat for this species exists on the western edge of the project area and may be temporarily impacted by subsidence due to changes in hydrology. Any effects resulting from mining would be subject to restoration under Sugar Camp's integrated fish and wildlife habitat reclamation plan. Due to the minimal amount of disturbance from subsidence, the distance to known occurrences, and limited existing habitat, no significant impacts to these species are expected. No habitat loss would be experienced post-mining.

4.4.7 Natural Areas

4.4.7.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.4.7.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This may result in impacts due to planned subsidence in the shadow area.

The Middle Fork of the Big Muddy River RRA surrounds the project area. The Ten Mile Creek State Fish and Wildlife Area (FWA) is located adjacent to the project area. Rend Lake State FWA is within one mile of the project area. Potential indirect impacts to the RRA and FWA 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 pre-mining conditions, permanent impacts to hydrologic functions that support the RRA and FWA would be avoided or minimized. Because there are existing streams and tributaries not affected by subsidence that support the hydrologic functions of the RRA and FWA, no further impacts to portions of Middle Fork of the Big Muddy River RRA and the Ten-Mile Creek FWA are anticipated.

The natural areas of Wayne Fitzgerald State Recreation Area and Mt. Vernon Game Propagation Center are located more than three miles away from the area of planned subsidence. Therefore, no impacts are anticipated.

4.5 Transportation

4.5.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.5.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. There are no roads within the bleeder shaft area; however the utility corridor overlaps two roads (County Road 100 E and State Route 14) and the Savatran, LLC Railroad. Because boring operations would be utilized, there would be no surface disturbances to roads or the railroad within the surface effects area, and no impacts are anticipated.

Temporary impacts to roads would occur due to planned subsidence in the shadow area. Approximately 9.2 miles of roads within the project area could be affected by mine-related traffic and subsidence. A minor increase in traffic would occur during construction of the bleeder shaft and operation of the mine. An increase in traffic associated with routine ventilation shaft air quality testing is not expected on a continuous basis due to the remote location of the bleeder shaft area. As required by IDNR, measures to minimize inconvenience to the users of public roadways would be taken such as routing around planned subsidence areas. No permanent road closures are expected within the project area.

Sugar Camp would be required to monitor the roadway section as the longwall panel passes underneath it, and temporary corrective measures (e.g., minor re-grading, 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 pre-subsidence conditions. Subsidence on unpaved roads is easier to address with temporary regrades than on paved roads, which require constant patching of the asphalt surface.

The necessary waivers from the public authority governing these roads would be obtained. Several county roads in the project area would be subsided, and Sugar Camp would repair any damages caused by the subsidence. Specific actions would be determined for infrastructure prior to subsidence occurring. Measures to be taken on the surface to prevent or minimize the effects of planned subsidence may include the following:

- Re-contouring and drainage correction in agricultural areas
- Temporary support for surface structures, flexible utility connections
- Exposure of pipelines
- Re-grading and re-ditching for roadways

Hecras modeling would be completed in advance of critical areas located in or near the existing 100 year flood plain in relation to the mining sequence to direct pre-mitigation work

to prevent or minimize the effects of planned subsidence. Less than ten depressional areas requiring drainage correction are expected adjacent to roadways.

4.6 Utilities

4.6.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.6.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in temporary impacts to utilities due to planned subsidence in the shadow area. Utility components may become damaged, broken or out of alignment as a result of planned subsidence. Subsidence could temporarily affect telephone, water, and electric utility lines that follow public roadways but actions listed previously are taken ahead of subsidence to limit damages as listed in the previous section.

Sugar Camp has existing agreements or would pursue agreements with governmental bodies and utility companies responsible for all public roadways, and utility lines expected to be affected by subsidence. Such agreements, to be negotiated well in advance of subsidence, would allow the implementation of measures designed to prevent or minimize subsidence damage and/or outline a timely procedure for the repair or replacement of damaged facilities following subsidence. These agreements would vary in scope and content, and would be site specific for each such facility. As an example, if a water line is broken or leaking, action would be taken immediately to repair it.

In accordance with 62 ILL. Adm. Code 1784.20 b) 8), the convenience and safety of the public would be a high priority in the development and implementation of such cooperative agreements. Sugar Camp would be required by IDNR-OMM to inform utility companies well in advance of subsidence to adequately prepare for subsidence effects. Sugar Camp would also be required to compensate utilities for repair of any damage caused by its mining activities. The effects of the proposed action on utilities would therefore be minimal after preventive planning with utility companies and subsequent repair.

4.7 Socioeconomic Conditions and Environmental Justice

4.7.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.7.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would likely result in positive socioeconomic impacts in the area due to employment opportunities. The proposal would not disproportionately affect low-income or minority populations. The area included in the proposed mine plan has a small, widely dispersed population. The affected counties have a larger percentage of people living under the poverty level than the state average but smaller minority populations than the state average. Income levels in these counties are lower than the state average, which is typical for rural, mining areas.

Temporary jobs may be created for construction of the bleeder shaft and installation of utilities. Operation of a large coal mine requires hundreds of workers. Jobs would also be created or maintained for operation of the mine during an estimated four year period.

Although workers have likely already been hired by Sugar Camp to support current mining, approval of additional mining would secure those jobs for an extended period and workers would continue use of resources in the vicinity of the project area. If additional jobs are created for construction of the bleeder shaft, it is anticipated that the job openings would be posted locally in an attempt to source workers from the local community, however some highly technical positions or those that require specific experience may be filled from candidate pools outside of the counties. No permanent or negative impacts would occur.

4.8 Cultural Resources

4.8.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.8.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. No impacts are anticipated for archaeological sites or historic structures from the construction of the proposed bleeder shaft and utility corridor. An archaeological survey and historic structures desktop analysis identified no historic properties within the footprint of the bleeder shaft and waterline (Lomas 2018; Lence 2018a; Lence 2018b). TVA finds that no historic properties would be impacted by the proposed undertaking. In a letter dated July 19, 2018, TVA consulted with the Illinois State Historic Preservation Officer regarding TVA's finding of no effect to historic properties (see Appendix A). The SHPO concurred with this finding in a letter included in Appendix A.

TVA consulted with federally recognized Indian tribes with an interest in the area regarding properties within the proposed project's impact area that may have religious and cultural significance to them and be eligible for listing in the NHRP. TVA received a letter from one tribe, the Osage Nation, which expressed agreement with TVA's findings (also included in Appendix A). No other comments were received. Therefore, TVA is not aware of any traditional cultural properties that would be affected by the proposal.

Subsidence could cause temporary ponding near streams and temporarily inundate previously dry cultural sites. Stream restoration activities to alleviate ponding could potentially affect subsurface cultural deposits, if present. Restoration involves ground-disturbing activities such as excavation. Excavation areas are small in width and less than 1,000 feet in length. These stream restoration activities may require further cultural resources work prior to disturbance to establish whether archaeological sites are present. Further cultural resources work may include, but is not limited to, additional consultation with consulting parties in order to develop a plan to assess and resolve adverse effects to archaeological sites.

4.9 Noise Levels

4.9.1 No Action Alternative

Under the No Action Alternative, TVA would not approve Sugar Camp's mining plan. Therefore, no effects would occur from surface disturbance or subsidence.

4.9.2 Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in impacts due to construction in the surface effects area.

Because blasting would be utilized for the construction of the bleeder shaft, a Blasting Plan has been developed for this project by Miller Contracting Services, Inc. Blasting would be conducted within 1,000 feet of a five residences. An additional four residences are located within one mile of the bleeder shaft. There would be no blasting within 1,000 feet of a public building, school, church, community building or institutional building. All surface blasting would be conducted between sunrise and sunset unless otherwise approved. Blasting would be conducted in a manner that protects the public, workers and property. The air blast would be maintained below 133 dB and would be temporary in duration. These noise levels would end after completion of the shaft and are considered temporary and insignificant.

In addition, drilling might be used to complete the shafts. Noise generally decreases by six dB with every doubling of distance from a noise-generating source. It is assumed that the drill and other associated construction equipment would have a noise level of 110 dB (equivalent to a jackhammer), with noise at the few potentially occupied dwellings would be less than 56 db. This noise level is less than ambient noise within a business or commercial area, but louder than ambient noise in a rural setting (Engineering Toolbox 2003). Surrounding residents and commuters passing on nearby roads 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. This noise would be constant for the lifetime of mining operations. Commuters passing on nearby roads and five nearby residences could potentially 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 frequency) for residential areas, and is therefore considered insignificant.

Additional traffic during construction of the bleeder shaft may also produce additional noise for residents in the vicinity of the surface effects area. Only five residents are within 1,000 feet of the bleeder shaft and noise levels would not be constant. This is not considered to be a major impact.

4.10 Cumulative Impacts

Various potential environmental effects, primarily those due to subsidence, would occur as a result of Sugar Camp's mining of TVA-owned coal reserves under approximately 2,250 acres of land in Franklin and Hamilton counties in southern Illinois. TVA owns rights to the coal reserves that are proposed to be mined by Sugar Camp and exercises federal control and responsibility over those resources.

As analyzed in the 2011 EA, Sugar Camp was previously approved by the State of Illinois to mine approximately 3,480 acres (Sugar Camp Mine No. 1) of TVA-owned coal reserves in Hamilton and Franklin counties, and TVA has approved Sugar Camp's mining plan for extracting those coal reserves. Therefore, because Sugar Camp is currently permitted to extract these coal reserves, the potential for environmental effects exists regardless of TVA's decision to allow Sugar Camp to mine coal beneath Viking District #2. However, IDNR permits would require Sugar Camp to mitigate or compensate for damages resulting from subsidence.

Sugar Camp's coal mining operations at Sugar Camp Mine No. 1 generate GHG emissions and the additional coal mined in Viking District #2 would result in an increase in direct GHG emissions resulting from the new mining operations. In addition, some portion of the indirect emissions resulting from combustion could potentially be categorized as an increase over the No Action Alternative. Because all GHG emissions contribute to cumulative climate change impacts, these additional emissions would contribute to the cumulative impacts of climate change. However, because the new GHG emissions associated with the Alternative Action are less than 0.4 percent of the total estimated Illinois GHG emissions in 2016, the cumulative impact of these new emissions is considered to be insignificant on a global scale.

Under the Action Alternative, Sugar Camp would be able to extend its underground mining operations into approximately 2,250 acres of underground coal reserves owned by TVA. Thus, any additional environmental effects from mining beneath the project area would constitute cumulative effects in addition to those resulting from currently planned and permitted mining activities for Sugar Camp Mine No. 1. Past, present and future mining for Sugar Camp Mine No. 1 comprises approximately 50,510 acres. Because Sugar Camp is required to mitigate subsidence-related damages, these potential cumulative environmental effects are expected to be minor.

4.11 Unavoidable Adverse Environmental Impacts

Use of land for construction of the bleeder shaft and utility corridor would result in unavoidable impacts to less than six acres of prime farmland and farmland of statewide importance during operation of the mine. Unavoidable impacts may occur to approximately 14 acres of prime farmland and farmland of statewide importance due to temporarily ponded water. The extent of the impact would depend on the timing of subsidence and drainage correction.

As explained in Section 4.3.2, extraction of underground coal results in the unavoidable release of methane, a GHG, to the atmosphere. Release of methane would occur as a result of Sugar Camp's coal mining, which constitutes an unavoidable adverse effect.

Subsidence following mining operations has the potential to cause unavoidable impacts to various resources due to changes in topography or from direct damage to structures. Subsidence could cause changes in drainage patterns, thereby indirectly affecting wetland functions. Groundwater quantity and quality could also be impacted. However, Sugar Camp's permit would require repair of such damages or compensation to surface landowners for these damages; therefore, these impacts are considered temporary.

4.12 Relationship of Short-Term Uses and Long-Term Productivity

The 12-acre surface effects area would be a temporary use of this property. The bleeder shaft area would be restored to its former productivity after mining is complete. The utility corridor will only be temporarily impacted during installation. Planned subsidence would affect most of the project area to various degrees. Such subsidence does not normally directly affect the inherent productivity of the surface for typical land uses such as agriculture or forestry. Thus, the removal of coal from beneath the project area is not expected to negatively affect the long- term productivity of the area to any noticeable extent.

4.13 Irreversible and Irretrievable Commitments of Resources

As used here, irreversible commitments of resources include the use or consumption of non-renewable resources as a result of a decision or implementing a proposed action. The extraction of coal is an irreversible commitment of resources. Likewise, the use of fuel and electric energy to power mining equipment represents another irreversible use of resources.

Irretrievable commitments involve the use or commitment of resources for a period of time, even a long period. An example of an irretrievable resource commitment is the loss of timber production on a newly-cleared transmission line right-of-way through a previously forested area. In that case, removal of the transmission line and the right-of-way would eventually result in the restoration of forest land and timber productivity.

For this project, temporary loss of the productivity and agricultural use of prime farmlands in the project area is an irretrievable commitment of resources. However, after mining is completed, the site would be reclaimed, and the prime farmland would be restored.

CHAPTER 5 – LIST OF PREPARERS

5.1 NEPA Project Management

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5.2 Other Contributors

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CHAPTER 6 – ENVIRONMENTAL ASSESSMENT RECIPIENTS

6.1 Federal Agencies

U.S. Army Corps of Engineers – Louisville District, Newburgh Regulatory Field Office
U.S. Fish and Wildlife Service – Southern Illinois Sub-Office, Marion, Illinois

6.2 State Agencies

Illinois Department of Natural Resources – Land Reclamation Division
Illinois Environmental Protection Agency

6.3 Individuals and Organizations

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CHAPTER 7 – LITERATURE CITED

Alliance Consulting, Inc (Alliance). 2017. A Summer Survey for the Federally Endangered Indiana Bat (*Myotis sodalist*) and the Threatened Northern Long-eared Bat (*Myotis Septentrionalis*). Viking Shadow Area 1. Permit No. 382/ NPDES Log No. 1357-07 Near Macedonia, Franklin and Hamilton Counties, Illinois.

Amelon, S., and D. Burhans. 2006. Conservation assessment: *Myotis septentrionalis* (northern long-eared bat) in the Eastern United States. U.S. Department of Agriculture, Forest Service, General Technical Report NC-260: Conservation Assessments for Five Forest Bat Species in the Eastern United States.

American Resource Group, Ltd. 2018. Illinois Archaeological Survey Short Report. Phase I Cultural Resources Survey and Assessment of the TG2 Bleeder Shaft Waterline, for Sugar Camp Energy, LLC Hamilton County, Illinois. May 1, 2018.

American Resource Group, Ltd. 2018. Illinois Archaeological Survey Short Report. Phase I Cultural Resources Survey and Assessment of a TG2 Bleeder Shaft and Power Borehole, for Sugar Camp Energy, LLC Hamilton County, Illinois. April 9, 2018.

Booth, C.J. and E.D. Spande. 1992. "Potentiometric and Aquiver Property Changes Above Subsiding Longwall Mine Planes, Illinois Basin Coalfield." Groundwater, 30(3).

Eddmaps. 2018. Early Detection and Distribution Mapping System. Retrieved from http://www.eddmaps.org/distribution/.

Edgin, B. and A. Mankowski. 2013. Final Recovery Planning Outline with Listing Status Review Triggers for the Illinois Threatened Storax (*Styrax americana*). Approved by the Illinois Endangered Species Board at February 20, 2014 Special Meeting. Available online at: https://www.dnr.illinois.gov/ESPB/Documents/Recovery%20Docs/recovery%20planning%20outline%20styrax%20americana%20073013%20-%20Final022014.pdf.

Engineering Toolbox. 2003. Outdoor Ambient Sound Levels. Retrieved from https://www.engineeringtoolbox.com/outdoor-noise-d_62.html.

Foresight Energy LP (FELP). Form 10-K Annual Report. Retrieved from https://seekingalpha.com/filing/3925358. July, 2018.

HMG. 2018. Application for NEPA Boundary Review. Sugar Camp Mine, Franklin and Hamilton County, Illinois. May 2018. *Note: Information in this document was extracted or revised from the Significant Permit Revision 6 for Permit 382 Application submitted by Sugar Camp to IDNR-OMM in 2017.

Ill. Admin. Code tit. 2, pt. 551, Amended at 26 Ill. Reg. 14644, effective September 23, 2002.

Illinois Department of Agriculture (IDOA). 2018. Farmland Protection. Retrieved from: https://www2.illinois.gov/sites/agr/Resources/FarmlandProtection/Pages/default.aspx#h7.

Illinois Department of Mines and Minerals (IDMM). 1994. November 2, 1994. Interagency Agreement "Implementation of National Historic Preservation Act for Underground Mining."

Illinois Department of Natural Resources (IDNR). 2002. "Big Muddy River Assessment Area." Volume 3: Living Resources. https://www.ideals.illinois.edu/handle/2142/13861.

IDNR. 2008. Results of Review, Permanent Program Permit Application No. 382 Sugar Camp Energy LLC, Sugar Camp No. 1 Mine.

IDNR. 2010. The Illinois Barn Owl Recovery Plan. https://www.dnr.illinois.gov/ESPB/Documents/IllinoisBarnOwlRecoveryPlanNovember2010.pdf.

IDNR. 2016. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/ESPB/Documents/ET_by_County.pdf.

IDNR. 2017. Results of Review, Permanent Program Significant Revision Application No. 6 to Permit No. 382 Sugar Camp Energy LLC, Sugar Camp Mine No. 1.

Illinois Environmental Protection Agency (IEPA). 2014. 303d List of Impaired Waters.

INHS. 2014. Illinois Herpetology Species. http://www.inhs.illinois.edu/animals_plants/herps/ilspecies.html.

INHS. 2018. Terrapene ornate (Agassiz, 1857) – Ornate Box Turtle. http://wwx.inhs.illinois.edu/collections/herps/data/ilspecies/te_ornata/.

Illinois State Geological Survey (ISGS). 1956. Circular 212, Groundwater Geology in Southern Illinois.

Lence, Cally. 2018a. Phase I Cultural Resources Survey and Assessment of the TG2 Bleeder Shaft Waterline for Sugar Camp Energy, LLC, Hamilton County, Illinois. Prepared by American Resources Group Ltd, Carbondale, Illinois, for Sugar Camp Energy, LLC, Marion Illinois.

Lence, Cally. 2018b. May 14, 2018. Letter Report: Sugar Camp Energy, LLC Viking 2nd District, North Half, Historic Structures Review.

Lomas, Monica. 2018. Phase I Cultural Resources Survey and Assessment of a TG2 Bleeder Shaft and Power Borehole for Sugar Camp Energy, LLC, Hamilton County, Illinois. Prepared by American Resources Group Ltd, Carbondale, Illinois, for Sugar Camp Energy, LLC, Marion Illinois.

Migratory Bird Treaty Act (MBTA). 16 United Stated Code (U.S.C.) § 703-712. 1918. Migratory Bird Treaty Act of 1918. Approved July 3, 1918. Chapter 128, § 2, 40 Statute 755. As amended on June 20, 1936, Chapter 634, 49 Statute 1556; September 8, 1960, PL 86-732, 74 Statute 866; October 17, 1968, PL 90-578, 82 Statute 1118; December 5, 1969, PL 91-135, 83 Statute 282; June 1, 1974, PL 93-300, 88 Statute 190; November 8, 1978, PL 95-616, 92 Statute 3111; November 10, 1986, PL 99-645, 100 Statute 3590; and October 30, 1998, PL 105-312, 112 Statute 2956.

Mohlenbrock, R.H., G.E. Dillard, and T.S. Abney. 1961. A survey of Southern Illinois aquatic vascular plants. The Ohio Journal of Science 61(5): 262, September, 1961.

Mohlenbrock, Robert H. 1986 Guide to the vascular flora of Illinois. Southern Illinois University Press. 507 pp.

Morse, L. E., J. M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity, Version 1. Arlington, Va.: NatureServe.

Muller, Jon. 1986. Archaeology of the Lower Ohio River Valley. Orlando, Fla.: Academic Press.

NatureServe. 2014. NatureServe Explorer: An Online Encyclopedia of Life, Version 7.1. Retrieved from http://www.natureserve.org/explorer.

Nawrot, J. R., L. Kirk, and E. Elliott-Smith. 2003. "Subsidence Wetlands: An Assessment of Values." Presented at the 2003 National Meeting of the American Society of Mining and Reclamation and the 9th Billings Land Reclamation Symposium, Billings, Montana, June 3-6, 2003. Published by American Society of Mining and Reclamation, 3134 Montavesta Rd., Lexington, KY 40502.

Owili-Eger, A.A.C. 1983. Geohydrologic and Hydrogeochemical Impact of Longwall Coal Mining on Local Aquifers. Society of Mining Engineers and the American Institute of Mining, Metallurgical, and Petroleum Engineers Preprint No. 83-376:16.

Rosgen, D.L. and H.L. Silvey. 1996. Applied River Morphology. Wildland Hydrology Books. Fort Collins, CO.

Rodgers, Jr., James A. and Henry T. Smith. 1995. Little Blue Heron (Egretta caerulea), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/145/articles/introduction.

Schroder, Sissel. 2004. "Power and Place: Agency, Ecology, and History in the American Bottom, Illinois." Antiquity 78 (302):812-827.

Sparks, D. W., J. O. Whitaker Jr., and C. M. Ritzi. 2004. "Foraging Ecology of the Endangered Indiana Bat." Pages 15-27 in Proceedings of Indiana Bat & Coal Mining: A Technical Interactive Forum. Alton, Ill.: U.S. Department of the Interior, Office of Surface Mining, and Carbondale, Ill.: Coal Research Center, Southern Illinois University.

Sugar Camp Energy, LLC. 2018. Incidental Boundary Revision for Permit No. 382. Viking Bleeder Shaft. Hamilton County, IL, Sugar Camp Mine 1. May 15, 2018.

Sutherland, A. B., J. L. Meyer, and E. P. Gardiner. 2002. "Effects of Land Cover on Sediment Regime and Fish Assemblage Structure in Four Southern Appalachian Streams." Freshwater Biology 47(9):1791-1805.

Tennessee Valley Authority (TVA). 2011. Approval of Illinois Coal Lease Mine Plan – Sugar Camp Mine No. 1. Environmental Assessment. Knoxville, Tennessee.

TVA. 2013. Supplemental EA (SEA) Approval of Illinois Coal Lease Mine Plan – Sugar Camp Mine No. 1. Environmental Assessment. Knoxville, Tennessee.

United States Census Bureau. 2018. "Franklin County, Illinois." State and County QuickFacts. Retrieved from https://www.census.gov/quickfacts/fact/table/US/PST045217.

United States Census Bureau. 2018. "Hamilton County, Illinois." State and County QuickFacts. Retrieved from https://www.census.gov/quickfacts/fact/table/US/PST045217.

United States Department of Agriculture (USDA), Natural Resources Conservation Service. 2018. Farmland Protection Policy Act. Retrieved from https://www.nrcs.usda.gov/wps/portal/nrcs/detail/?cid=nrcs143_008275.

United States Department of Agriculture, Natural Resources Conservation Service. 2014. Web Soil Survey. Retrieved from http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

USDA. 2014. Illinois Noxious Species List. http://plants.usda.gov/java/noxious?rptType=State&statefips=17.

USEPA. 2018b. Coalbed Methane Outreach Program. Retrieved from https://www.epa.gov/cmop/frequent-questions. July, 2018.

USEPA. 2018c. Greenhouse Gas Reporting Program (GHGRP). Retrieved from https://www.epa.gov/ghgreporting/greenhouse-gas-reporting-program-and-us-inventory-greenhouse-gas-emissions-and-sinks. July, 2018.

USEPA. 2018d. Greenhouse Gas Summary Report for 2016. Retrieved from https://ghgdata.epa.gov/ghgp/service/html/2016?id=1010263&et=undefined. July, 2018.

USEPA. 2018e. Greenhouse Gas Reporting Program (GHGRP). Retrieved from https://www.epa.gov/ghgreporting/ghgrp-reported-data. July, 2018.

USEPA. 2018f. Greenhouse Gas Reporting Program (GHGRP). Retrieved from https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf. July, 2018.

USEPA. 2018g. Facility Level Information of Greenhouse Gases Tool (FLIGHT). Retrieved from https://ghgdata.epa.gov/ghgp/main.do. August, 2018.

USEPA. 2018h. Sources of Greenhouse Gas Emissions. Retrieved from https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#electricity. August 2018.

United States Fish and Wildlife Service (USFWS). 1999. Indiana Bat (Myotis sodalis) Revised Recovery Plan. Fort Snelling, Minn.: U.S. Fish and Wildlife Service.

USFWS. 2011. White-Nose Syndrome: Something is Killing our Bats. Retrieved from http://www.fws.gov/whitenosesyndrome.

USFWS. 2014. National Wetlands Inventory, Wetlands Mapper Application. Available online at: http://www.fws.gov/wetlands/Data/Mapper.html.

USFWS. 2014. Endangered Species, Midwest Region, Illinois – County Distribution of Federally Threatened, Endangered and Candidate Species. Available online at: http://www.fws.gov/midwest/endangered/lists/illinois-spp.html.

USFWS. Interstate Mining Compact Commission, and Office of Surface Mining. 2014. Range-wide Indiana Bat Protection and Enhancement Plan Guidelines for Surface Coal-Mining Operations. Available online at: http://www.osmre.gov/lrg/docs/INBatPEPGuidelines.pdf.

USFWS. 2015. IPaC Species Information: Life history for northern long-eared bat (*Myotis septentrionalis*). http://ecos.fws.gov/ipac/wizard/speciesInformation!showSpeciesInformation.action?spcode=A0JE.

United States Water Resources Council. 1978. "Floodplain Management Guidelines for Implementing Executive Order 11988." 43 Federal Register 6030 (10 February 1978).

University of Kentucky. 2006. Estimating Tons of Coal on a Property. Retrieved from http://www.uky.edu/KGS/coal/estimatingTons.htm.

Woods, A. J., J. M. Omernik, C. L. Pederson, and B. C. Moran. 2006. Ecoregions of Illinois (poster with map, descriptive text, summary tables, and photographs): Reston, Va.: United States Geological Survey (map scale 1:1,250,000).

Wisconsin Department of Natural Resources. 2017. Barn Owl (*Tyto alba*) Species Guidance. Retrieved from https://dnr.wi.gov/files/PDF/pubs/er/ER0701.pdf.

APPENDIX A – CORRESPONDENCE

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

Hamilton County PLEASE REFER TO: SHPO LOG #003041918
Macedonia
NW of State Route 14 & CR 100E
Section:19-Township:5S-Range:5E
ARG-2015, IDNR/DMM- 2016
IBR Permit #382 for TG2 bleeder shaft & power borehole

August 21, 2018

Clinton E. Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

Dear Mr. Jones:

We have reviewed the documentation submitted for the referenced project(s) in accordance with 36 CFR Part 800.4. Based upon the information provided, no historic properties are affected. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with section 106 of the National Historic Preservation Act of 1966, as amended. This clearance remains in effect for two (2) years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).

If you are an applicant, please submit a copy of this letter to the state or federal agency from which you obtain any permit, license, grant, or other assistance. If further assistance is needed contact Jeff Kruchten, Chief Archaeologist at 217/785-1279 or Jeffery.kruchten@illinois.gov.

Sincerely,

Robert F. Appleman
Deputy State Historic
Preservation Officer

Illinois State Historic Preservation Office ** Review & Compliance/Old State Capitol

Osage Nation Historic Preservation Office

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Date: **September 7, 2018** **File: 1718-3602IL-8**

RE: **Tennessee Valley Authority (TVA), Sugar Camp Energy, LLC, Mining Plan Approval for 2,500 Acres of Coal Reserves, Hamilton County, Illinois**

Tennessee Valley Authority
Marianne Shuler
400 West Summit Hill Drive
Knoxville, TN 37902

Dear Ms. Shuler,

The Osage Nation Historic Preservation Office has evaluated your submission regarding the proposed Tennessee Valley Authority (TVA), Sugar Camp Energy, LLC, Mining Plan Approval for 2,500 Acres of Coal Reserves, Hamilton County, Illinois and determined that the proposed project **most likely will not adversely affect any sacred properties and/or properties of cultural significance to the Osage Nation.** For direct effect, the finding of this NHPA Section 106 review is a determination of **"No Properties"** eligible or potentially eligible for the National Register of Historic Places.

In accordance with the National Historic Preservation Act, (NHPA) [54 U.S.C. § 300101 et seq.] 1966, undertakings subject to the review process are referred to in 54 U.S.C. § 302706 (a), which clarifies that historic properties may have religious and cultural significance to Indian tribes. Additionally, Section 106 of NHPA requires Federal agencies to consider the effects of their actions on historic properties (36 CFR Part 800) as does the National Environmental Policy Act (43 U.S.C. 4321 and 4331-35 and 40 CFR 1501.7(a) of 1969). **The Osage Nation concurs that the Federal Energy Regulatory Commission fulfilled NHPA compliance by consulting with the Osage Nation Historic Preservation Office in regard to the proposed project referenced as Tennessee Valley Authority (TVA), Sugar Camp Energy, LLC, Mining Plan Approval for 2,500 Acres of Coal Reserves, Hamilton County, Illinois.**

The Osage Nation has vital interests in protecting its historic and ancestral cultural resources. We do not anticipate that this project will adversely impact any cultural resources or human remains protected under the NHPA, NEPA, the Native American Graves Protection and Repatriation Act, or Osage law. **If, however, artifacts or human remains are discovered during project construction, we ask that work cease immediately and the Osage Nation Historic Preservation Office be contacted.**

Should you have any questions or need any additional information please feel free to contact me at the number listed below. Thank you for consulting with the Osage Nation on this matter.

Andrea A. Hunter, Ph.D.
Director, Tribal Historic Preservation Officer

James Munkres
Archaeologist

627 Grandview * Pawhuska, OK 74056 Telephone 918-287-5328 * Fax 918-287-5376