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SUGAR CAMP ENERGY, LLC
MINE NUMBER 1 – BOUNDARY REVISION 6
FINAL ENVIRONMENTAL IMPACT STATEMENT
Franklin and Hamilton Counties, Illinois

Lead Agency:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

Cooperating Agency:
U.S. ENVIRONMENTAL PROTECTION AGENCY
Chicago, Illinois

October 2020

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COVER SHEET

Sugar Camp Energy, LLC Mine No. 1 Expansion - Revision 6 EIS

Proposed action: The Tennessee Valley Authority (TVA) proposes to authorize the mining of TVA-owned coal, currently leased to Sugar Camp Energy, LLC, underlying approximately 12,125 acres in southern Illinois. Associated actions include the planned subsidence of much of the mined area, the construction of five Bleeder Shaft Facilities, and the processing of the coal at an existing Coal Preparation Plant.

Type of document: Final Environmental Impact Statement

Lead agency: Tennessee Valley Authority

Cooperating agency: U.S. Environmental Protection Agency

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Abstract: TVA evaluates a No Action and Action Alternative in this EIS. The Action Alternative consists of TVA approving the extraction of TVA-owned coal from an area of approximately 12,125 acres, the construction and operation of five Bleeder Shaft Facilities, and the planned subsidence of the ground surface above the extracted coal. Connected actions include processing, storing, and transporting the extracted coal via existing and proposed facilities. Under the No Action Alternative, TVA would not approve the extraction of the TVA-owned coal, and extracting, processing, storing, and transporting other coal in the area would continue. The Action Alternative is preferred due to being economically feasible, having similar environmental impacts to other alternatives, and meeting the purpose and need.

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EXECUTIVE SUMMARY

Purpose and Need for Action

TVA owns the coal reserves beneath the Project Area and executed a coal lease agreement in July 2002 with Sugar Camp Energy, LLC (Sugar Camp) to mine TVA-owned coal in Franklin, Hamilton, and Jefferson counties, Illinois. The purpose of the coal lease agreement is to facilitate the recovery of TVA-owned coal reserves in an environmentally sound manner. The Proposed Action would implement the terms of the existing coal lease agreement and recoup TVA's investment. Under the terms of the coal lease agreement, Sugar Camp may not commence mining of TVA-owned coal reserves until completion of all environmental reviews required for compliance with applicable laws and regulations. In fulfillment of its responsibilities under the National Environmental Policy Act (NEPA), TVA has prepared this Final Environmental Impact Statement to consider whether TVA will approve the proposed plan to extract TVA-owned coal within a 12,125-acre shadow area permitted under Significant Boundary Revision (SBR) Number (No.) 6 of Illinois Underground Coal Mine (UCM) Permit No. 382 and process the TVA-owned coal at existing and proposed facilities within the surface effects area of Sugar Camp Mine No. 1.

Alternatives

In this environmental impact statement (EIS), TVA evaluates a No Action Alternative and Action Alternative. The Action Alternative would consist of TVA approving the plan to extract TVA-owned coal reserves within a 12,125-acre portion of the overall SBR No. 6 shadow area (hereafter, the Shadow Area). The Action Alternative would involve the associated construction and operation of five Bleeder Shaft Facilities in different locations within the Shadow Area, together totaling approximately 27 acres. Planned subsidence (controlled sinking of the ground at the surface) of approximately 10,549 acres within the Shadow Area would result. Connected actions include processing of the extracted TVA-owned coal at an existing Coal Preparation Plant within an existing 2,420-acre surface effects area; treatment of the byproducts at both existing facilities and one new facility, known as the East Refuse Disposal Area; surface storage of coal; and offsite transport of processed coal via an existing rail loop. These facilities also process, store, and transport privately owned coal mined without TVA approval. Together, the 12,125-acre Shadow Area and the 2,420-acre surface effects area compose the Project Area. TVA's analysis of the Action Alternative takes into account the proposed mining plan in addition to the effects associated with ongoing mining operations.

Under the No Action Alternative, TVA assumes that Sugar Camp would continue the previously approved mining of approximately 25,847 acres of TVA-owned coal and privately owned coal (hereafter, the private/TVA-approved shadow area). In addition, Sugar Camp would continue processing, storing, and transporting the previously approved TVA-owned and privately owned coal.

Affected Environment

The Sugar Camp Mine No. 1 is located in Hamilton and Franklin counties in Illinois. The regional character is mostly rural, with agricultural and pasture fields, flat terrain with rolling hills, forested areas, and generally small towns and communities.

The Project Area is located east of the City of Benton. Current land use within much of the surface effects area is heavy industrial and includes operation of existing facilities for the processing, storage and transport of coal. Within the Shadow Area, current land use is primarily rural agricultural with some scattered residences. Nine historical archaeological sites, one

Precontact period archaeological site, and three potentially historic buildings have been recorded within the Project Area or vicinity. The other buildings in the vicinity of the Project are residential and/or farmstead buildings. Five churches and three cemeteries of unknown age are present within the Shadow Area.

The Shadow 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. Seven named streams, Granny Creek, Carlton Branch, Web Hill Branch, Sugar Camp Creek, Campbell Branch, Sullivan Branch, Ewing Creek, and Middle Fork Big Muddy River as well as multiple unnamed tributaries and creeks flow through the Shadow Area and surface effects area. The majority of the Project Area is characterized by a heavily fragmented landscape dominated by early successional habitat, such as pastures and hayfields. Forested areas and wetlands are scattered throughout and support a variety of plants and animals.

Environmental Consequences

Coal mining activities would occur under either the No Action Alternative or the Action Alternative. Reasonably foreseeable greenhouse gas emissions, including downstream emissions, are quantified. Other environmental consequences associated with either alternative, including the Action Alternative, have been deemed not significant and, for the most part, would be temporary due to minimization and mitigation efforts required in Illinois Department of Natural Resources (IDNR) permit conditions.

Minor, temporary impacts to soils, groundwater, floodplains, surface waters and wetlands, vegetation, wildlife, and aquatic life would occur with either alternative. Other resources that would be temporarily affected under either alternative include prime farmland, water quality and supply, natural areas, land use, transportation, utilities, noise, and visual. These impacts would be minimized or mitigated per IDNR permit requirements.

Under either alternative, permanent changes to geology would occur due to the removal of a portion of the Herrin No. 6 coal seam. Construction of the East Refuse Disposal Area, which constitutes an expansion of the existing surface effects area under either alternative, would result in permanent impacts to utilities, North Bobtail Road, wetlands, and land use. These impacts would be offset through required minimization and mitigation efforts.

Solid and hazardous waste and human health and safety impacts would be avoided due to compliance with relevant regulations and avoidance and mitigation measures under either alternative. Relative beneficial effects on socioeconomics would occur with either alternative. Environmental justice impacts would be avoided due to compliance with IDNR permit requirements to avoid, minimize, or mitigate the adverse effects of mining operations.

Under the Action Alternative, TVA would require appropriate consultations with the pertinent federal and state agencies to ensure impacts associated with the Bleeder Shaft Facilities to cultural resources and to federally and state-listed species are avoided, minimized, or mitigated. Generally, these consultations are also required under the No Action Alternative, per IDNR permit conditions.

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Symbols, Acronyms, and Abbreviations

APE	Area of Potential Effects
ARMPS	Analysis of Retreat Mining Pillar Stability
BGEPA	Bald and Golden Eagle Protection Act
CAA	Clean Air Act
CBM	Coal Bed Methane
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMM	Coal Mine Methane
CO	Carbon monoxide
CT	Census tract
CWA	Clean Water Act
dB	Decibel
DBA	A-Weighted Decibel
DBH	Diameter at Breast Height
DNL	Day-night Average Sound Level
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
°F	Fahrenheit
FPPA	Farmland Protection Policy Act
FR	Federal Register
GHG	Greenhouse gas
GHGRP	Greenhouse Gas Reporting Program
GWP	Global Warming Potential
HAP	Hazardous Air Pollutants
HARGIS	Historic Architectural Resources GIS System
HUC	Hydrologic Unit Code
IAC	Illinois Administrative Code
IBR	Incidental Boundary Revision
IDNR	Illinois Department of Natural Resources
IDOA	Illinois Department of Agriculture
IDOT	Illinois Department of Transportation
IEM	Iowa Environmental Mesonet

IEPA	Illinois Environmental Protection Agency
IGPA	Illinois Groundwater Protection Act
IHPA	Illinois Historic Preservation Agency
IIAS	Illinois Inventory of Archaeological Sites
ILCS	Illinois Compiled Statutes
INHS	Illinois Natural History Survey
IPaC	Information for Planning and Consultation
IRP	Integrated Resource Plan
ISGS	Illinois State Geological Survey
LB	Pound
LRD	Land Reclamation Division
MBTA	Migratory Bird Treaty Act
MSHA	Mine Safety and Health Administration
$MTCO_2e$	Metric Tons of Carbon Dioxide Equivalent
µg	Microgram
µm	Micrometer
NA	Natural Area
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
No.	Number
NO_2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O_3	Ozone
OMM	Office of Mines and Minerals
OSHA	Occupational Safety and Health Administration
OWR	Office of Water Resources
Pb	Lead

$PM_{2.5}$	Particulate matter whose particles are less than or equal to 2.5 micrometers
PM_{10}	Particulate matter whose particles are less than or equal to 10 micrometers
PPB	Parts per billion
PPM	Parts per million
PRT	Potential Roost Tree
RCRA	Resource Conservation and Recovery Act
RFFA	Reasonably foreseeable future action
RO	Reverse osmosis
RRA	Resource Rich Area
SBR	Significant Boundary Revision
SCC	Social Cost of Carbon
SEA	Supplemental Environmental Assessment
SFWA	State Fish and Wildlife Area
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMCRA	Surface Mining Control and Reclamation Act
SO_2	Sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
TVA	Tennessee Valley Authority
UCM	Underground Coal Mine
USACE	United States Army Corps of Engineers
USC	United States Code
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USEIA	United States Energy Information Administration
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WQC	Water Quality Certification

Glossary of Terms

Bleeder ventilation shaft Part of a ventilation system that removes methane gas from mine areas. Overall, a mine ventilation system consists of entries, ventilation controls, and fans. As part of the system, bleeder shafts circulate clean air throughout the underground workings and release methane-laden air from these areas.

Coal refuse The reject material that is produced in the processing of coal. Coal naturally occurs interbedded within sedimentary deposits, and the reject material consists of varying amounts of slate, shale, sandstone, siltstone, and clay minerals, which occur within or adjacent to the coal seam, as well as some coal that is not separated during processing.

Coal reserves Large deposits of coal that have been documented by geological surveys and engineering studies, are accessible, and from which coal can be economically produced.

Coal seam A coal stratum deposit that occurs between layers of rock.

Coal shearer A machine body containing electric motors, hydraulic equipment and controls that is mounted over the Armored Face Conveyor. Horizontal cutting drums are mounted on the machine with cutting picks and rotating in a plane parallel to the side of the machine. Coal shearers are sometimes referred to as “continuous miners.”

Coal slurry Coal mining operations use water to rinse coal once extracted. Coal slurry is the water that is left over from the rinsing process and contains elevated levels of chlorides, sulfates, arsenic, lead, mercury, and selenium.

Continuous mining An underground mining technique that utilizes machinery to cut and rip coal from the coal seam and load the coal onto conveyors in a continuous operation.

Longwall mining An underground mining technique capable of extracting “panels” of coal known as “longwall panels.” A coal shearer removes a longwall panel as a single “slice,” while hydraulic jacks support the roof above and in front of the coal shearer. Once a longwall panel is extracted, the coal shearer and hydraulic jacks are advanced, and overlying rock collapses into the void behind, causing subsidence at the surface.

Longwall panel The “panel” or “slice” of coal mined during the longwall mining process. Longwall panels can measure up to approximately 1,500 feet wide and two miles long.

Planned subsidence Controlled sinking of the ground due to the extraction of coal, water, oil, natural gas, or mineral resources from underground mining, pumping, or fracking activities.

Plate testing A load-bearing test of soil used for determining the ultimate bearing capacity of the earth’s surface and the likelihood of settlement under a given load.

Refuse disposal area A portion of land including but not limited to an impoundment or excavated portion of the earth intended as permanent disposal or long-term storage of coal refuse.

Room-and-pillar mining An underground mining technique that extracts coal in a grid-like pattern such that portions of the coal seam are left intact to support the roof of the mine. The series of parallel areas or “rooms” from which coal is extracted are called “entries.”

Sedimentation pond A constructed pond that is sited in networks to slow the velocity of water and cause the deposition of suspended materials.

Shadow area The geographic area in an application or permit where underground mining is proposed or approved. This area includes all resources above and below the coal that are protected by the State Act and may be adversely impacted by underground mining operations, including planned subsidence.

Slurry pond A constructed pond or lagoon used to settle and drain the solids from coal slurry.

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

The Tennessee Valley Authority (TVA) owns coal reserves underlying approximately 64,689 acres of land in Franklin, Hamilton, and Jefferson counties, Illinois (Figure 1-1). TVA executed a coal lease agreement with Sugar Camp Energy, LLC (Sugar Camp) in July 2002 to mine portions of the TVA coal reserves. The lease agreement facilitates the recovery of TVA-owned coal reserves in an environmentally sound manner. Under the terms of the lease agreement, Sugar Camp may not commence mining of TVA-owned coal reserves under a mining plan or any mining plan revision until completion of all environmental reviews required for compliance with applicable laws and regulations have been finalized. As part of Significant Boundary Revision (SBR) Number (No.) 6 of its Underground Coal Mine (UCM) Permit No. 382, Sugar Camp presented to TVA a mining plan to extract TVA-owned coal reserves within a 12,125-acre area in Franklin and Hamilton counties. The Proposed Action would implement the terms of the lease agreement and recoup TVA's investment.

In fulfilling its responsibilities under the National Environmental Policy Act (NEPA), TVA has prepared this environmental impact statement (EIS) to inform TVA's decision on whether to approve Sugar Camp's proposed mining plan to extract TVA-owned coal underlying approximately 12,125 acres of land, hereafter Shadow Area, and process the TVA-owned coal at existing and proposed facilities within the surface effects area (Figure 1-1). The Shadow Area is composed of a northern and southern portion. Surface activities to support underground mining of TVA-owned coal, as well as privately owned coal, include the processing, storage, and transport of the coal at an existing Coal Preparation Plant, within an existing 2,420-acre surface effects area located between the northern and southern portions of the Shadow Area. One new 389-acre facility, known as the East Refuse Disposal Area, would be built within a 525-acre site in the existing surface effects area. The East Refuse Disposal Area would be associated with both TVA-owned and privately owned coal reserves, the mining of which is not subject to TVA approval. Together, the 12,125-acre Shadow Area and the 2,420-acre surface effects area compose the Project Area.

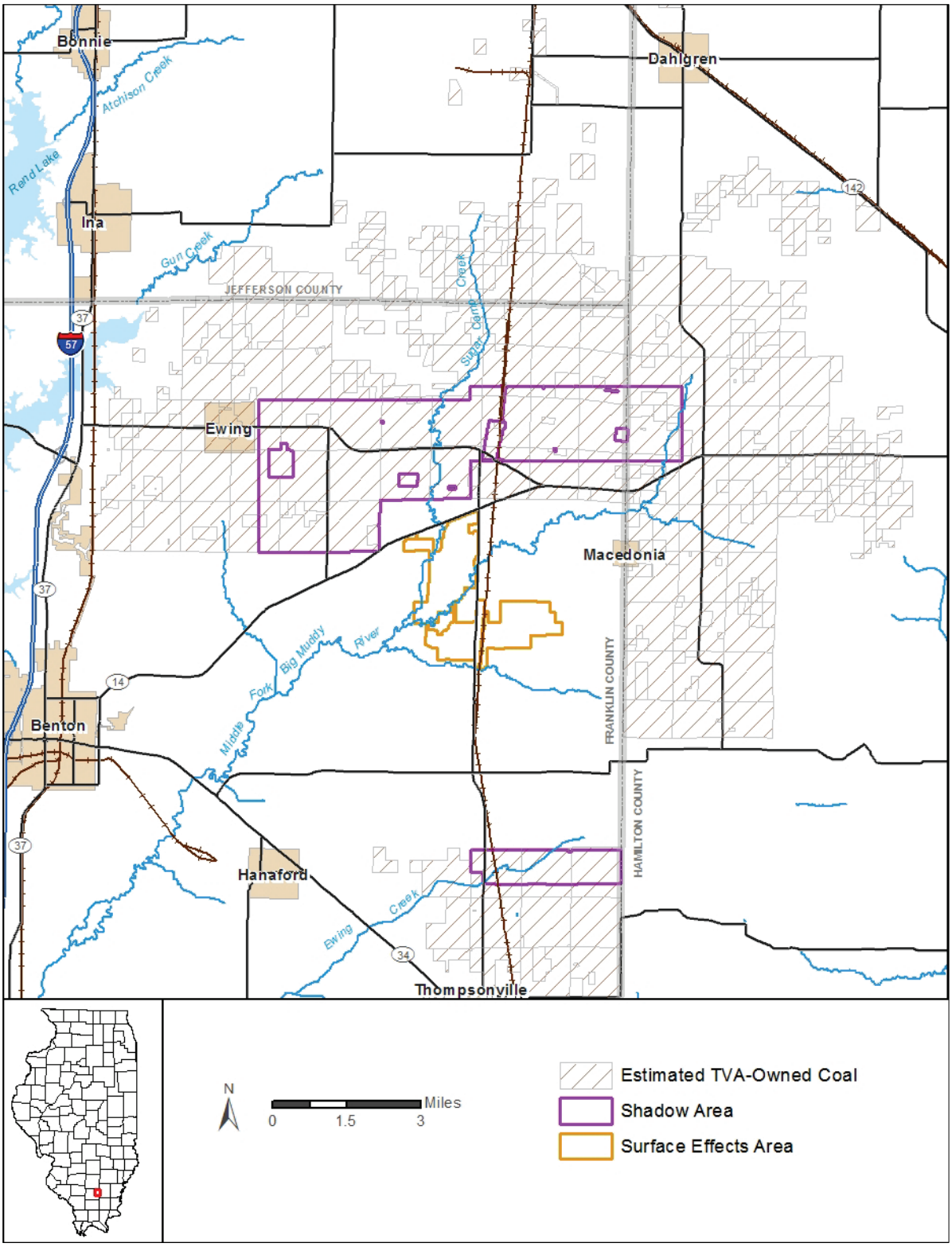

Figure 1-1. Project Location Map

1.1. Background

TVA is a federal corporation and instrumentality of the United States government, created in 1933 by statute 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 ownership of two large coal reserve blocks in the southern Illinois section of the Illinois Basin coal region.

TVA generally leases its mineral rights to private coal mining companies and receives royalties on the amount of coal recovered under lease agreements. The coal mined by the companies are generally sold on the market. However, TVA occasionally enters into contracts to purchase coal mined from its reserves for use at TVA power plants. The environmental impacts of TVA's coal purchasing policies, as well as TVA's use of coal to generate electricity, have been evaluated in previous EISs, as described in Section 1.3.2.

In 2002, TVA leased its Illinois Basin coal reserves to Sugar Camp with the condition that any proposed mining plan must be subject to environmental review and TVA approval. The mining plan is also subject to review and approval by the State of Illinois, which has regulatory authority delegated by the U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement under the Surface Mining Control and Reclamation Act (SMCRA) of 1977.

In 2008, Sugar Camp obtained UCM Permit No. 382 from the IDNR, Office of Mines and Minerals (OMM), Land Reclamation Division (LRD), referenced hereafter as IDNR-OMM, for Sugar Camp Mine No. 1. UCM Permit No. 382 originally authorized underground longwall mining operations under approximately 12,103 acres in Franklin and Hamilton counties. UCM Permit No. 382 also included a surface effects area to process, store and transport the coal, where the existing Coal Preparation Plant is located. Since then, Sugar Camp has received permit revisions to expand underground longwall mining operations for Sugar Camp Mine No. 1, and TVA has prepared multiple environmental assessments (EAs) for the extraction of TVA-owned coal in these additional areas (See Figure 1-2 and Section 1.3 for further description).

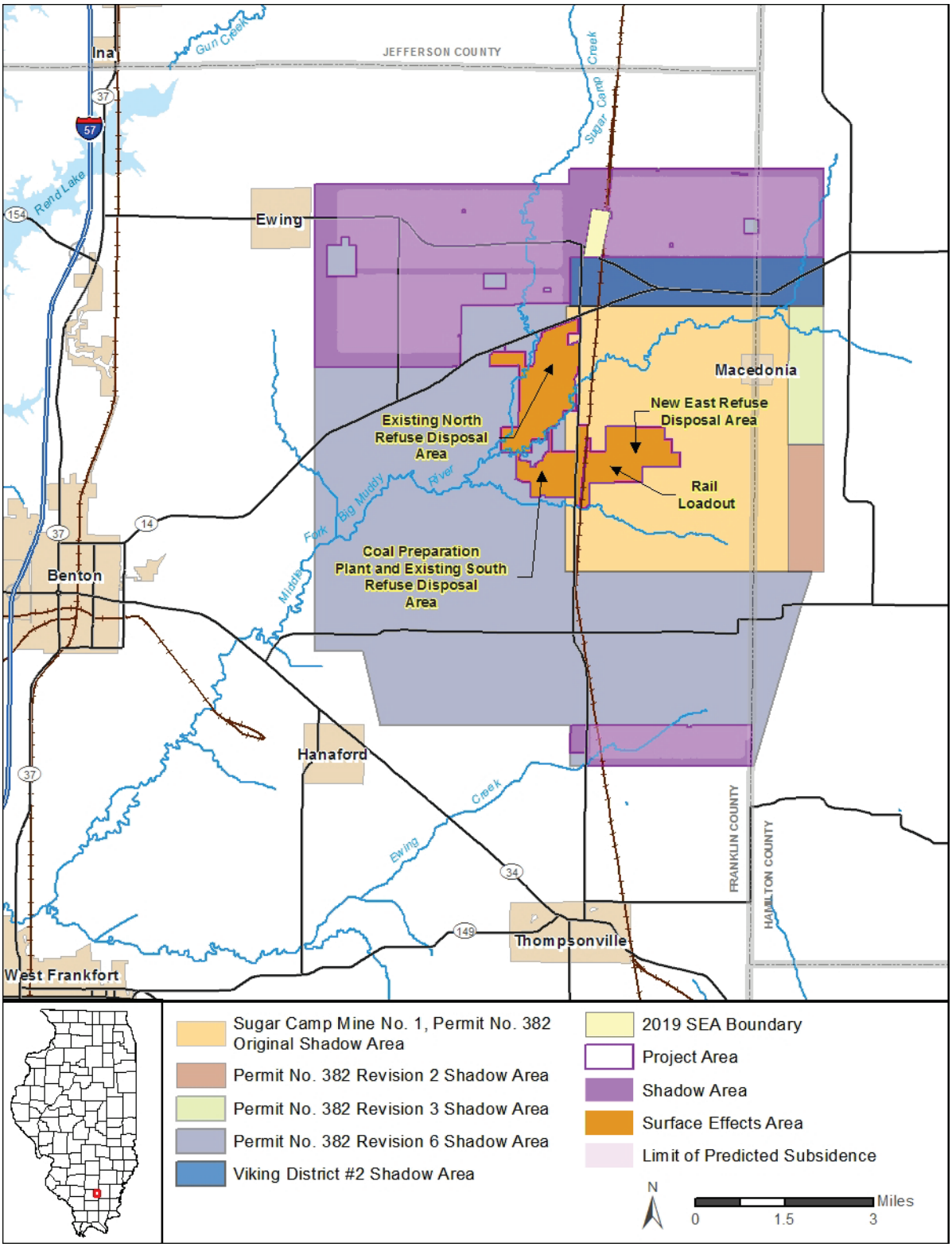

Figure 1-2. Mine Area Permitted under Sugar Camp No. 1, Permit No. 382 and Subsequent Permit Revisions

1.2. Decision to be Made

In November 2017, Sugar Camp received SBR No. 6 of UCM Permit No. 382, from IDNR-OMM, for an underground mine expansion of 37,972 acres in Franklin and Hamilton counties, Illinois. TVA must determine whether or not to implement the terms of the existing coal lease agreement and approve Sugar Camp's proposal to mine approximately 12,125 acres of TVA-owned coal reserves within the Shadow Area (shown as Shadow Area in Figure 1-2). The coal reserves in the majority of the UCM Permit No. 382 SBR No. 6 shadow area are privately owned, and TVA has no decision or permission-granting authorities for the privately owned coal reserves. Connected actions considered as part of the Project include the operation of existing UCM Permit No. 382 facilities for the processing, storage and transport of coal on an approximately 2,420-acre surface effects area in Franklin County.

The Sugar Camp mining plan involving TVA-owned coal includes the following activities in separate locations:

Shadow Area

- Coal Extraction and Planned Subsidence: The mining plan includes extraction of approximately 186 million tons of unprocessed ("raw") TVA-owned coal from the 12,125-acre Shadow Area over a total of 16 years scattered between 2021 and 2040. If approved, underground mining within the Shadow Area would be performed using two techniques. Coal would be extracted using room-and-pillar and continuous mining techniques during a development period, followed by longwall mining and associated planned subsidence at a later time. Planned subsidence (controlled settlement of the ground surface) of about 10,549 acres of land within the Shadow Area would occur once the coal has been removed through longwall mining methods.

- Bleeder Shaft Facilities: The mining plan includes the construction and operation of five Bleeder Shaft Facilities, each occupying about 5.3 acres, within the Shadow Area. Site-specific impacts would be evaluated by TVA prior to construction due to the exact locations of these facilities being unknown at this time.

Surface Effects Area

- Existing Facilities: Coal processing, storage, and transportation of TVA-owned coal would utilize existing facilities permitted under UCM Permit No. 382. These occupy portions of a 2,420-acre surface effects area and currently process both previously approved TVA-owned coal and privately owned coal. This activity would contribute to existing water discharge locations from sedimentation ponds. With approval of the mining plan, an estimated 300 thousand processed tons of TVA-owned coal would be produced each year between 2021 and 2023, and approximately 7.1 million processed tons of TVA-owned coal would be produced each of the 13 years TVA coal is mined between 2024 and 2040, resulting in a total production of approximately 92.8 million tons of processed TVA coal.

- New Facilities: New surface disturbance of approximately 525 acres within the eastern portion of the 2,420-acre surface effects area for construction of the new 389-acre East Refuse Disposal Area. This facility is under consideration by Sugar Camp and would be submitted to IDNR-OMM for approval upon final design. If

approved by IDNR-OMM, the East Refuse Disposal Area would be built whether or not TVA approves the Proposed Action. If constructed, the facility would be used to store refuse from the processing of TVA-owned coal.

Sugar Camp's ongoing actions also approved by SBR No. 6 (shown as Permit No. 382 Revision 6 Shadow Area in Figure 1-2) involve extraction of approximately 359 million unprocessed tons of coal within a 25,847-acre shadow area that includes both privately owned coal and TVA-owned coal approved for mining under separate environmental reviews, hereafter the private/TVA-approved shadow area. These ongoing actions involve planned subsidence within the private/TVA-approved shadow area. New surface disturbances associated with these ongoing actions consist of approximately four 5.3-acre bleeder ventilation shaft facilities within the private/TVA-approved shadow area and the 389-acre East Refuse Disposal Area discussed above, which would have an associated 525-acre construction disturbance area. While the ongoing actions are not considered as connected actions to the currently proposed TVA-owned coal mining activities, TVA's decision takes into account the proposed mining plan in addition to the effects associated with Sugar Camp's ongoing actions. The effects of the ongoing actions along with the Proposed Action are considered in detail in the cumulative impacts section of this EIS (Section 3.14).

1.3. Related Environmental Reviews

In 2008, Sugar Camp obtained UCM Permit No. 382 from the IDNR-OMM for underground longwall mining operations under approximately 12,103 acres in Franklin and Hamilton counties. UCM Permit No. 382 also includes a surface effects area to process, store and transport the coal (a connected action to the current proposed action). Since then, Sugar Camp has received multiple permits from IDNR-OMM to expand underground longwall mining operations for Sugar Camp Mine No. 1, and TVA has prepared multiple environmental assessments (EAs) and supplemental EAs (SEAs) for the mining of TVA-owned coal within each expansion area. Revisions made to this permit and approved by IDNR are listed below, followed by TVA EAs and SEAs that address the mining of TVA-owned coal by Sugar Camp (see TVA 2020 for the NEPA documents listed below).

- Incidental Boundary Revision (IBR) No. 1 to UCM Permit No. 382 (2010) for 1.45 acres of land for road access on private property.
- IBR No. 2 for UCM Permit No. 382 (2010) for 17 acres of surface disturbance for bleeder ventilation shaft installation overlying TVA-owned coal.
- IBR No. 3 for UCM Permit No. 382 (2010) for a 19-acre shadow area associated with TVA-owned coal.
- SBR No. 1 to UCM Permit No. 382 (2010) for 817 acres of subsidence overlying TVA-owned coal. The boundaries of this permit include IBRs Nos. 1–3.
- IBR Nos. 4 and 5 to UCM Permit No. 382 for two concrete bore holes on private property.
- SBR No. 6 to UCM Permit No. 382 (2017) for an underground shadow area revision of an additional 37,972 acres to be mined with the extraction of coal in the Herrin No. 6 seam via longwall mining. The permit was granted in November when IDNR-OMM issued "Results of Review: Permanent Program Significant Revision

Application No. 6 to Permit No. 382." This permanent program finding concluded that there was reasonable basis on which to issue a significant revision to UCM Permit No. 382, as modified. The mining of TVA-owned coal under the Proposed Action is included in SBR No. 6 (IDNR 2017).

1.3.1. Sugar Camp Mine No. 1 Reviews

1.3.1.1. TVA Sugar Camp Mine No. 1. EA (May 2011)

This EA evaluated the potential environmental effects of Sugar Camp's proposed mining of approximately 2,600 acres of TVA-owned coal underneath the IBR No. 2 shadow area and a portion of the original 12,103-acre shadow area of the Sugar Camp Mine No. 1.

1.3.1.2. TVA Sugar Camp Mine No. 1. SEA (May 2013)

This SEA evaluated the potential environmental effects of Sugar Camp's proposed mining of TVA-owned coal underneath an additional 880 acres of the IBR No. 3 shadow area.

1.3.1.3. TVA Sugar Camp Mine No. 1 Expansion Viking District #2 EA (November 2018)

This EA evaluated the potential environmental effects of the proposed expansion along the north perimeter of its original mine perimeter, into a 2,250-acre area referred to as Viking District #2, included in SBR No. 6.

1.3.1.4. TVA Sugar Camp Mine No.1 Expansion Viking District #2 SEA (May 2019)

This SEA evaluated the potential environmental effects of the proposed expansion of mining into a 155-acre area adjacent to Viking District #2, included in SBR No. 6.

1.3.2. Coal Purchase and Utilization Reviews

TVA regularly enters into coal purchase contracts and these purchases have the potential to include the acquisition of TVA-owned coal extracted under the Action Alternative. TVA generally evaluated the effects of purchasing and utilizing coal in previous NEPA reviews. In 1971, TVA issued the *Final Environmental Statement on Policies Relating to Sources of Coal used by Tennessee Valley Authority for Electric Power Generation*, which programmatically addressed the potential effects of TVA's continuing purchase of coal to burn at TVA power plants. Among other considerations, the document presents impacts from underground mining, including acid and chemical drainage, land stabilization issues, worker safety hazards, erosion, and visual effects, and considers several alternatives to coal purchase.

In June 2019, TVA completed an Integrated Resource Plan (IRP) and associated EIS to determine how TVA will meet the demand for electricity in its service territory over the next 20 years, while achieving TVA's objectives to deliver reliable, low-cost, and cleaner energy with fewer environmental impacts. The IRP EIS describes TVA's 2015—2018 coal purchasing activities. In FY2018, TVA purchased approximately 54 percent of its coal from the Illinois Basin, within which Sugar Camp Mine No. 1 operates, and most of that coal was extracted by underground mining methods. Illinois Basin coal is described as having higher methane emissions than other coal reserves from which TVA purchases coal, likely due to the higher methane content of bituminous coals. Coal combustion accounts for approximately 80 to 90 percent of the greenhouse gas (GHG) emissions associated with the coal, while the preparation and transport of TVA-purchased coal account for less than one percent of GHG emissions. Other GHG sources include limestone mining and transport, lime processing, plant construction, and decommissioning. Water consumption and byproduct (e.g., ash) production resulting from the use of coal are also considered.

1.4. Scoping and Public Involvement

Per the IDNR-OMM permitting process, Sugar Camp advertised the Proposed Action and the private actions associated with UCM Permit No. 382 SBR No. 6 in the *Benton Evening News*, a newspaper published in the Project Area vicinity, in April 2017, to announce the permit approval. Sugar Camp also made the permit application available to the public via the Franklin and Hamilton county clerks. Copies of the application were sent to the Illinois Department of Agriculture (IDOA), Illinois Environmental Protection Agency (IEPA), U.S. Department of Agriculture (USDA) Natural Resources Conservation Service, and U.S. Fish and Wildlife Service (USFWS) for review and comment. IDOA, IEPA, and USFWS, as well as members of the public provided comments on the application, and IDNR provided responses in the IDNR's "Results of Review, Permanent Program Significant Revision Application No. 6 to Permit No. 382," also distributed to the public.

On August 12, 2019, TVA published a Notice of Intent (NOI) in the *Federal Register* announcing that it planned to prepare an EIS to address the potential environmental effects associated with mining 12,125 acres of TVA-owned coal in the Project Area located in Franklin and Hamilton counties, Illinois (Appendix A). The NOI initiated a 30-day public scoping period, which concluded on September 11, 2019. In the NOI, TVA solicited public input on other reasonable alternatives and environmental resources that should be considered in the EIS.

During the public scoping period, TVA received comments from the U.S. Environmental Protection Agency (USEPA), the Sierra Club, and one private citizen (Appendix B). Comments were received regarding permits and agency coordination, alternatives analysis, the action alternative, and several resource categories, including water resources, air quality and greenhouse gases (GHGs), human health and safety, and socioeconomics and environmental justice. In their comments, USEPA requested to participate in the NEPA process as a cooperating agency.

Specific information in response to the comments are presented in Sections 1.5, 2.1.2, and 2.1.3, as well as various sections in Chapter 3. Pertaining to the scoping comments, the following information is included in Chapter 3 of the EIS:

- Consideration of impacts to jurisdictional waters (Waters of the U.S.), water quality, including the potential for introducing pollutants, and cumulative changes to water supply;

- Evaluation of air quality and greenhouse gas emissions per NEPA requirements, Council on Environmental Quality's (CEQ) guidance, and current case law with consideration of recent climate report findings;

- Assessment of both the occupational health and safety of mine workers and the health and safety of the general public in the Project vicinity, including safety related to humans and infrastructure during planned subsidence; and

- Analysis of the effects of the Project on vulnerable populations, including minority and low-income populations.

Based on scoping comments and TVA's experience with similar environmental evaluations, the following potentially affected environmental resources are analyzed in this EIS:

- Geology, Soils, and Prime Farmland
- Groundwater/Aquifers
- Surface Water and Wetlands
- Floodplains
- Water Quality
- Water Supply
- Air Quality and GHGs
- Vegetation
- Wildlife
- Aquatic Life
- Threatened and Endangered Species
- Natural Areas
- Land Use
- Transportation
- Utilities
- Cultural Resources
- Solid and Hazardous Waste
- Human Health and Safety
- Socioeconomics and Environmental Justice
- Noise and Visual Resources

During the 45-day public review and comment period of the Draft EIS, TVA received comments from USEPA, the Sierra Club, and one private citizen (Appendix C). Comments were received regarding the purpose and need for the Project, public involvement, permits and agency coordination, description of alternatives, alternatives analysis, environmental impacts generally and in regards to several resource categories, including water resources, air quality and GHGs, biological environment, and environmental justice, the cumulative analysis, and the Record of Decision. The comments and responses are included as Appendix C. Some of the comments warranted changes in the Final EIS; any revisions are referenced by Final EIS section in the comment responses in Appendix C.

1.5. Regulatory Compliance, Permits, Licenses, and Agency Coordination

This EIS was prepared consistent with TVA's NEPA regulations at 18 Code of Federal Regulations (CFR) Part 1318 (85 Federal Register [FR] 17434, Mar. 27, 2020). Because TVA began this EIS before the Council on Environmental Quality (CEQ)'s recently issued NEPA regulations (85 FR 43304-43376, Jul. 16, 2020) took effect in September of 2020, TVA followed TVA's NEPA regulations and the previously promulgated CEQ regulations in the preparation of this EIS. The CEQ regulations can be found at 40 CFR 1500-1508, and were originally issued in 1978 (43 FR 55990, Nov. 29, 1978), with minor revisions in 1979 and 1986.

Table 1-1 presents the laws and executive orders (EOs) relevant to the Proposed Action by environmental resource area in addition to NEPA.

Table 1-1. Laws, Regulations, and Executive Orders Relevant to the Proposed Action.

Resource Area / Activity	Law / Regulation / Executive Order
Water quality	Clean Water Act (33 United States Code [USC] §§ 1251-1387)

Resource Area / Activity	Law / Regulation / Executive Order
Groundwater	Hydrologic Balance Protection (62 Illinois Administrative Code [IAC] 1817.41(j)) Resource Conservation and Recovery Act (42 USC Ch. 82 § 6901 et seq.) Safe Drinking Water Act (42 USC §§ 1996)
Air quality and noise	Clean Air Act (42 USC Ch. 85 § 7401 et seq.) Designation of Areas for Air Quality Planning Purposes (40 CFR 81) Environmental Impact Statement – Incomplete or Unavailable Information (40 CFR 1502.22(b)) Mandatory Greenhouse Gas Reporting (40 CFR 98) Standards of Performance for Electric Utility Steam Generating Units (40 CFR 60.40Da-60.52Da) Use of Explosives: General Requirements (62 IAC 1817.61(d)2)
Wetlands and waters	Clean Water Act (33 USC § 1251 et seq.) EO 11990 – Protection of Wetlands EO 13778 – Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the “Waters of the United States” Rule Illinois Natural Areas Preservation Act (525 Illinois Compiled Statuses [ILCS] 30)
Floodplains	EO 11988 – Floodplain Management Flood Plain Management Criteria for Flood-prone Areas (44 CFR 60.3)
Migratory birds	Bald and Golden Eagle Protection Act (BGEPA) (16 USC §§ 668-668c) Migratory Bird Treaty Act (MBTA) (16 USC §§ 703-712)
Endangered and threatened species	Endangered Species Act (16 USC §§ 1531-1599) Illinois Endangered Species Protection Act (520 ILCS 10)

Resource Area / Activity	Law / Regulation / Executive Order
Cultural resources	Human Skeletal Remains Protection Act (20 ILCS 3440; 17 Illinois Administrative Code 4170) Illinois State Agency Historic Resources Preservation Act (Illinois revised statutes 1989, ch. 127, pars. 2661 et seq.) (known as: State 707) National Register of Historic Places – Criteria for Evaluation (36 CFR 60.4) National Historic Preservation Act (54 USC §§ 300101 et seq.) Native American Graves Protection and Repatriation Act (25 USC Ch. 32 § 3001 et seq.) Protection of Historic Properties (36 CFR 800)
Environmental justice	EO 12898 – Federal Actions to Address Environmental Justice in Minority and Low-Income Populations Illinois Environmental Protection Act (Chapter 415, Act 5. Title III)
Land use	Farmland Protection Policy Act (7 USC §§ 4201-4209)
Coal mining	Illinois Surface Coal Mining Land Conservation Reclamation Act (Chapter 225, Act 720) Permanent Program Rules and Regulations (62 IAC 1700-1850) Surface Mining Control and Reclamation Act (30 USC §§ 1201-1328)
Waste management	Characteristics of Hazardous Waste (40 CFR 261.21-261.24) Comprehensive Environmental Response, Compensation, and Liability Act (42 USC §§ 9601 et seq.) Emergency Planning and Community Right to Know Act (42 U.S. Code Chapter 116) Lists of Hazardous Wastes (40 CFR 261.31-261.33) Resource Conservation and Recovery Act (42 USC Ch. 82 § 6901 et seq.) Solid Waste Disposal Act (42 U.S. Code Chapter 82) Toxic Substances Control Act (15 USC Ch. 53, Subch. I §§ 2601-2629)

Resource Area / Activity	Law / Regulation / Executive Order
Safety	Occupational Safety and Health Act (29 U.S.C. §651 et seq. (1970))
	EO 13045 – Protection of Children From Environmental Health Risks and Safety Risks
	Federal Mine Safety and Health Act (30 USC §§ 801-962)
	Mandatory Health Standards – Underground Coal Mines (30 CFR 70)
	Mandatory Safety Standards – Underground Coal Mines (30 CFR 75)
	Mandatory Safety Standards, Surface Coal Mines and Surface Work Areas of Underground Coal Mines (30 CFR 77)
	Subsidence Control (62 IAC 1817.121(d))
Utilities	Subsidence Control Plan (62 IAC 1784.20(b)8)

In addition to TVA's approval, Sugar Camp's operations require permits from other state and federal agencies. These other agencies also require completion of environmental reviews and public comment periods as part of their permit approval processes. The permits and approvals from other agencies were incorporated in the authorization of Sugar Camp's mining plan included in UCM Permit No. 382, issued by IDNR-OMM in 2008, and in SBR No. 6, issued by the IDNR-OMM in 2017. A UCM permit is required to conduct underground mining activities and the surface operations associated with the underground activities. The permit area includes support areas, facilities, and roads. Insignificant Permit Revision(s) associated with UCM Permit No. 382 are required for the construction of Bleeder Shaft Facilities. A coal mining permit must be renewed every five years.

1.5.1. IEPA NPDES

A National Pollutant Discharge Elimination System (NPDES) individual Coal Mine Permit (Permit No. IL0078565) was issued by IEPA Bureau of Water to Sugar Camp in 2008 for point source discharges of pollutants into Middle Fork Big Muddy River, Akin Creek, and two unnamed tributaries on the private property portion of Sugar Camp Mine No. 1 in Franklin County. Coverage under this permit does not authorize acid mine drainage disposal. Permit No. IL0078565 also included Construction Authorization No. 5212-13 for construction of mine components and associated storm water discharges during construction. This NPDES permit was renewed and modified on May 24, 2016 (Appendix D). Revisions to the permit would be necessary for additional surface water discharge outfall locations and land disturbance associated with all construction projects associated with Sugar Camp Mine No. 1.

Sugar Camp would submit a notice of intent (NOI) or would update a previously submitted NOI prior to construction of the East Refuse Disposal Area. An NOI submittal may also be required prior to construction of each Bleeder Shaft Facility, depending on the area of surface disturbance. TVA would conduct additional NEPA review for the Bleeder Shaft Facility locations, including review of the terms of any permits associated with them.

1.5.2. IEPA Section 401 WQC and Section 404 USACE Permits

In the U.S. Army Corps of Engineers (USACE) St. Louis District and the State of Illinois, Sections 404 and 401 of the Clean Water Act (CWA) prohibit the discharge of dredged or fill material into Waters of the U.S., also known as jurisdictional waters, including wetlands and streams. The discharge of dredged or fill material into Waters of the U.S. is prohibited unless authorized by the U.S. Army Corps of Engineers (USACE), IDNR-Office of Water Resources (OWR), and the IEPA through a joint application process. Permit applications filed simultaneously with these agencies would be processed concurrently in an independent manner. If the USACE, INDR-OWR, or the IEPA determine that permits are not required by their agency, they would inform the applicant and the other agencies, as necessary. A CWA Section 404 nationwide permit and CWA Section 401 water quality certification (WQC) permit would be required for impacts to jurisdictional waters that are less than 0.5 acre. If impacts to jurisdictional waters are greater than 0.5 acre, CWA Section 404 and 401 individual permits would be required. Sugar Camp was issued a Section 401 WQC by IEPA Bureau of Water in 2009 for the discharge of fill material in wetlands, Akin Creek, and Middle Fork Big Muddy River on the private property portion of Sugar Camp Mine No. 1 in Franklin County.

Discharge of fill material and dredging in jurisdictional streams and wetlands would be necessary for the construction of the East Refuse Disposal Area within the surface effects area. Drainage correction activities in the Shadow Area following subsidence would involve dredging, and placement of fill would require additional wetland surveys through the CWA Section 404 and 401 permitting process. It is anticipated that a Section 401 certification would be granted automatically by IEPA Bureau of Water through this process. The exact locations of the five Bleeder Shaft Facilities are not known at this time, as their placement is largely dictated by the underground mining operations as they occur. If it is not possible to avoid jurisdictional streams and wetlands for the construction of the Bleeder Shaft Facilities, discharge of fill material to these features may be necessary and would require compliance with CWA Sections 404 and 401 and associated mitigation, if required. TVA would analyze surface water impacts of siting each of the five proposed Bleeder Shaft Facilities in subsequent environmental review.

1.5.3. Other State Permits

Clean Air Act (CAA) permits are required from IEPA Bureau of Air for the operations associated with coal processing plants and Bleeder Shaft Facilities. The existing CAA permit (Title V Permit No. 12070021) associated with the Coal Preparation Plant is on file with IEPA. As the annual quantities of coal processed at the Coal Preparation Plant would not change with the processing of the TVA coal, a modification to the existing CAA permit would not be necessary in order to process additional coal at the Coal Preparation Plant. However, revisions to this permit would be submitted for the construction of the Bleeder Shaft Facilities. Documentation of the CAA permit is required for the IDNR-OMM-issued Insignificant Permit Revision(s) associated with the Bleeder Shaft Facilities. Dust (particulate matter emissions) is not emitted during the operation of these facilities; thus, the Bleeder Shaft Facility operations would not need to be included in the fugitive dust emissions control plan associated with the Coal Preparation Plant.

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 IDNR-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 that have insignificant impacts on floodways and floodplains under the jurisdiction of IDNR-OWR. This permit may be required for bleeder shaft locations within floodplains. Sugar Camp has applied for an IDNR-OWR dam permit for construction and operation of the East Refuse Disposal Area.

A permit was issued by IDNR-OWR in November 2012 for the south refuse disposal area. The activity was described as fill and sediment pond excavation at Sugar Camp Mine in the Middle Fork Big Muddy River and Akin Creek floodplains. A permit was issued by IDNR-OWR in May 2015 for the north refuse disposal area.

IDNR does not regulate construction near the edge of floodplains if the obstructions would not cause a significant increase in flood levels. IDNR does not regulate construction activities in the floodways of streams draining less than ten square miles.

1.5.4. Consultation Requirements

1.5.4.1. USFWS and IDNR

Concurrence by USFWS and IDNR on the impact of the Shadow Area on federally and state-listed threatened and endangered species was obtained in August 2017. Consultation between IDNR and USFWS on the Bleeder Shaft Facilities and the construction and operation of the East Refuse Disposal Area is ongoing. Consultation with USFWS on the Bleeder Shaft Facilities would be finalized once the locations are known, while consultation for the East Refuse Disposal Area will be finalized during the IDNR permitting process.

1.5.4.2. IHPA

Concurrence by the Illinois Historic Preservation Agency (IHPA, which operates as the Illinois State Historic Preservation Office [SHPO]) on the impact of the Proposed Action on historic properties and archaeological sites in the Project Area vicinity was previously obtained by Sugar Camp. TVA initiated consultation with IHPA under Section 106 of the National Historic Preservation Act (NHPA) regarding the TVA-owned portion of SBR No. 6 on November 7, 2019 (Appendix D). The IDNR Cultural Resources Manager responded on December 9, 2019, indicating to copy IDNR on correspondences with IHPA, as IDNR reviews mine-related cultural resources consultations and coordinates with IHPA on these (Appendix D). TVA coordination with IHPA and the IDNR Cultural Resources Manager is ongoing for the Bleeder Shaft Facilities. The results of these consultations would be updated in separate NEPA reviews for those facilities.

1.5.4.3. Federally Recognized Tribes

Pursuant to Section 106 of the NHPA, TVA initiated consultation with federally recognized Indian tribes regarding the properties that may have religious and cultural significance to them that could be affected by the Project. The tribes consulted consist of:

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

TVA initiated consultation with these tribes on November 8, 2019. Two responses were received, from the Miami Tribe of Oklahoma and Osage Nation (Appendix D). The Miami Tribe of Oklahoma did not indicate any sites or places of significance or importance within the Project Area. The Osage Nation expressed interest in the area and requested continued consultation as the locations of the Bleeder Shaft Facilities are identified.

1.6. Environmental Impact Statement Overview

NEPA requires federal agencies to consider and study the potential environmental consequences of proposed major Federal actions on the human environment. Proposed actions, in this context, can include new and continuing activities that are conducted, financed, assisted, regulated or approved by federal agencies, as well as new or revised plans, policies or procedures. The NEPA process helps federal agencies make decisions based on an understanding of a proposed action's impacts and, if necessary, to take actions that protect, restore and enhance the environment (40 CFR 1500.1(c)). NEPA also requires that federal agencies provide opportunities for public involvement in providing comments on proposed actions prior to the Federal decision-making process.

TVA has prepared this EIS to assess the environmental impacts of the Proposed Action. The Draft EIS was made available to interested individuals, groups, and federal, state and local agencies for their review and comment. This Final EIS includes the comments TVA received on the Draft EIS, responses to those comments, and changes to the EIS text made in response to the comments and for other reasons.

The completed Final EIS was made available to the public on TVA's website, and notices of its availability were sent to those who received the Draft EIS or submitted comments on the Draft EIS. TVA sent the Final EIS to USEPA, which will publish a notice of its availability in the *Federal Register*. No sooner than 30 days after the notice of availability, TVA will issue a Record of Decision that will include (1) the decision; (2) the basis for the decision and preferences among alternatives; (3) the alternative that was considered environmentally preferable; (4) a summary of important environmental impacts; and (5) associated mitigation measures, monitoring, and enforcement requirements.

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CHAPTER 2 – ALTERNATIVES

TVA evaluated two alternatives: the No Action Alternative and the Action Alternative, discussed in Section 2.1 and Section 2.2, respectively. TVA considered other alternatives but determined that they would not be feasible. Non-feasible alternatives are discussed in Section 2.3 below.

2.1. Alternative A – The No Action Alternative

Under the No Action Alternative, TVA would not approve the SBR No. 6 plan to mine TVA-owned coal within the Shadow Area. Although Sugar Camp has secured SBR No. 6 from IDNR-OMM for mining the proposed TVA-owned coal as well as the adjacent privately owned and previously approved TVA coal, the Action Alternative requires approval from TVA for mining the proposed TVA-owned coal. Thus, in the absence of TVA approval, Sugar Camp would be limited to privately owned coal and previously approved TVA coal located within the private/TVA-approved SBR No. 6 shadow area in expanding its underground mining operations. TVA approved the mining of small portions of its coal reserve in the SBR No. 6 following NEPA reviews for the Viking District #2 mine expansion, discussed in Section 1.3 (TVA 2020). Under the No Action Alternative, Sugar Camp plans to produce up to 9.5 million tons per year of processed coal through 2040.

Specifically, Sugar Camp's ongoing activities associated with SBR No. 6 (shown as Permit No. 382 Revision 6 Shadow Area in Figure 1-2) under the No Action Alternative include extraction of approximately 359 million unprocessed tons of coal (179.5 million tons of processed coal) within the 25,847-acre private/TVA-approved shadow area. Sugar Camp's ongoing actions also involve planned subsidence of about 22,484 acres of land within the private/TVA-approved shadow area. The ongoing actions include processing, storage and offsite transport of coal at an existing Coal Preparation Plant occupying an area of approximately 2,420 acres, described below in Section 2.1.2.1. New surface disturbances associated with the ongoing actions consist of approximately four 5.3-acre bleeder ventilation shaft facilities within the private/TVA-approved shadow area and the 525-acre East Refuse Disposal Area described in Section 2.1.2.1.

2.2. Alternative B – Action Alternative

Under the Action Alternative, TVA would implement the terms of the existing coal lease agreement and approve the proposed mining plan as submitted by Sugar Camp in SBR No. 6. According to the IDNR-OMM-approved plan, TVA would allow Sugar Camp to mine TVA-owned coal reserves within the 12,125-acre Shadow Area. This would be in addition to the mining of the privately owned and previously approved TVA coal included in the No Action Alternative. Additional IDNR-OMM permits would be required for connected actions, such as the construction and operation of up to five Bleeder Shaft Facilities and the construction and operation of the new East Refuse Disposal Area within the surface effects area. The mining plan also includes Sugar Camp's proposed reclamation plan, which addresses restoring the Project Area to IDNR-OMM-approved post-mining land use when mining operations are concluded.

Extraction of newly proposed TVA-owned coal under SRB No. 6 would occur via room-and-pillar and continuous mining techniques during an initial three-year development period between 2021 and 2023. Longwall mining operations and associated planned subsidence would occur during a 13-year period between 2024 and 2040. While the estimated

completion date for the proposed extraction of TVA-owned coal within the Shadow Area is 2040, actual mining durations would vary based on the actual annual production achieved.

Each aspect of the Action Alternative is described in the following sections.

2.2.1. Surface Facilities

Bleeder Shaft Facilities

The mining plan includes the construction of five Bleeder Shaft Facilities required for the proposed action. Each facility would disturb about 5.3 acres of surface lands within the 12,125-acre Shadow Area. Table 2-1 presents approximate acreages for development of each of the five 5.3-acre Bleeder Shaft Facilities (based on previously constructed Bleeder Shaft Facilities to support the mine).

Table 2-1. Example Development of Each Bleeder Shaft Facility

Bleeder Shaft Area Development	Acres	Percent of Total Bleeder Shaft Area
Shaft cuttings stockpile	1.0	18.9%
Soil stockpiles	0.5	9.4%
Surfaced area	2.0	37.7%
Undeveloped area	1.8	34.0%

The siting of the Bleeder Shaft Facilities is influenced by environmental and engineering constraints and state regulations, and proposed facility locations would be coordinated with landowners. According to Section 1761.11 of the IDNR Rules, surface coal mining operations, including Bleeder Shaft Facilities, that do not predate August 3, 1977, shall not be sited within 300 feet of any public building, school, church, community or institutional building, public park, or occupied dwelling in existence, under construction, or contracted for at the time of public notice. During the public comment period on the IDRN-OMM permits associated with these facilities, landowners may state concerns about the proximity of proposed facilities, including Bleeder Shaft Facilities; these concerns would be considered by Sugar Camp, and the siting of these facilities may be adjusted.

A bleeder shaft is part of a ventilation system that removes methane gas from mine areas. A mine ventilation system consists of entries, ventilation controls, and fans. Bleeder shafts circulate clean air through the underground workings to eliminate accumulations of methane gas, and the methane-laden air is exhausted through the bleeder shaft (Figure 2-1). Fans are installed on the ventilation shaft to increase the rate of air circulation and, in turn, reduce the risk of explosions and fires.

A typical bleeder shaft facility would be located on a site containing the following elements: a concrete pad (occupying approximately 2,430 square feet of surface area and approximately four feet thick), one 16-foot diameter concrete-lined ventilation shafts, two 16-inch diameter steel-lined boreholes with concrete pads, two 12-inch diameter steel-lined utility boreholes with concrete pads, a transformer on a concrete pad, a compressor station, and a crib plant with associated facilities (see Figure 2-2). All of the shafts and boreholes would be extended approximately 970 feet deep to the subject coal seam. Two (25 feet by 25 feet by 10 feet) temporary drill pits may be used during construction to support utility boreholes. The drill sites would be covered with eight inches of crusher-run gravel.

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 outside of drainage ways to minimize soil erosion. Sugar Camp would seed these stockpiles with grasses, legumes, and small grain cover crops to minimize susceptibility to excessive water and wind erosion.

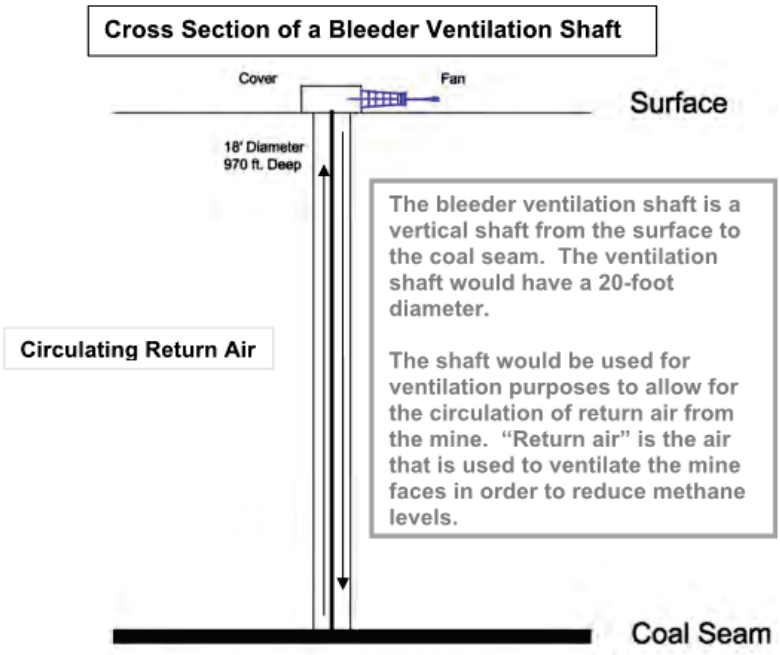


Figure 2-1. Diagram of Representative Ventilation Bleeder Shaft for Typical Sugar Camp Mine No. 1 Operations

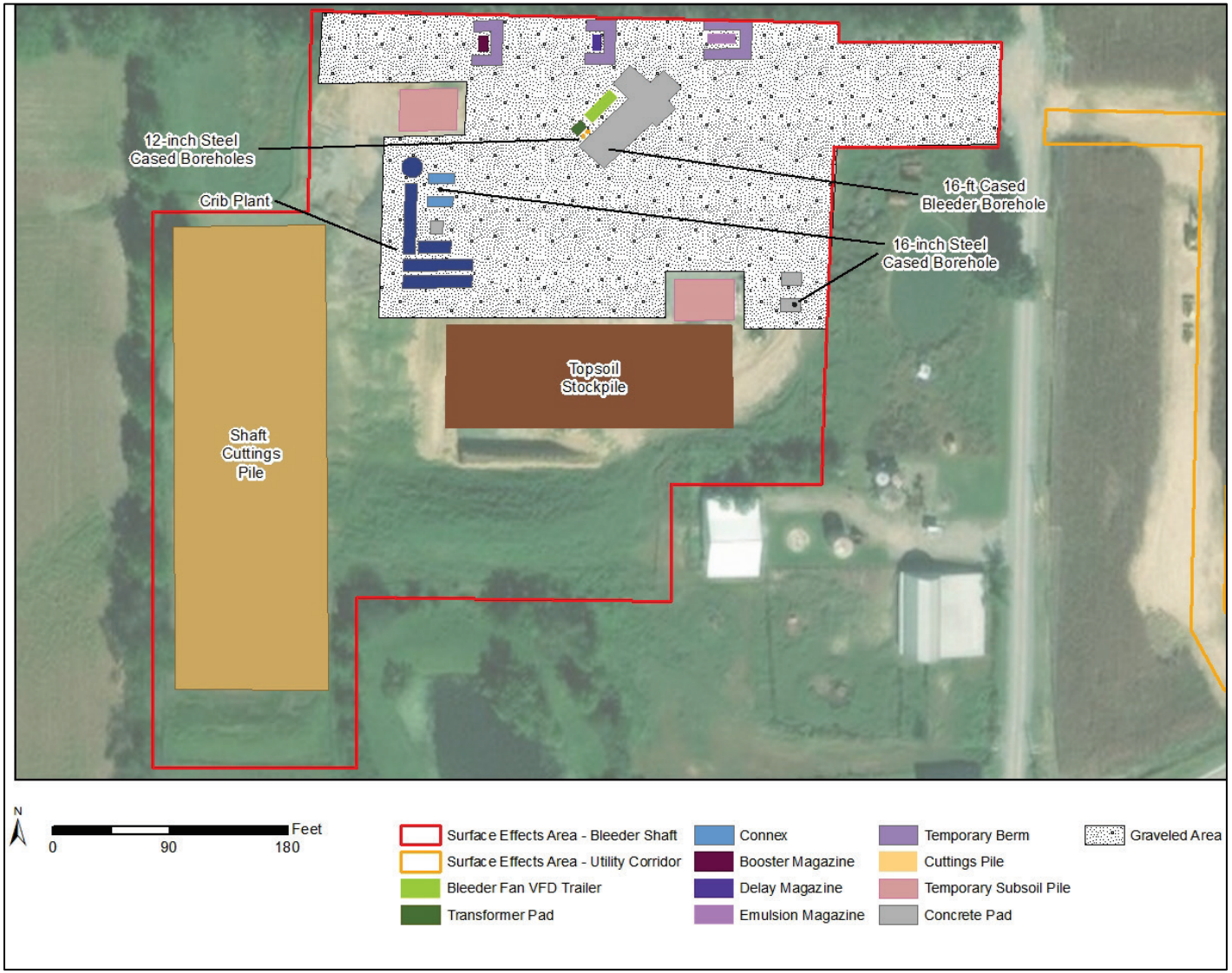


Figure 2-2. Representative Bleeder Shaft Facility (Viking District #2)

Coal Preparation Plant

The extracted coal, both TVA-owned and privately owned, would be processed at an existing Coal Preparation Plant located within the 2,420-acre surface effects area, on privately owned lands and outside of the 12,125-acre Shadow Area. The currently operating plant was approved by IDNR-OMM in 2008 and did not require TVA approval. Water used at the plant is treated on-site. Sugar Camp holds an NPDES permit to discharge water from 15 locations outside of the Shadow Area (Appendix D). Use of the existing Coal Preparation Plant for the Action Alternative would not result in any new surface facilities, and the overall processing capacity would not change. Under the Action Alternative, the Coal Preparation Plant would operate for a longer period of time.

East Refuse Disposal Area

Sugar Camp proposes to construct a new refuse disposal area, referred to herein as the East Refuse Disposal Area, for the long-term storage of refuse from the existing Coal Preparation Plant. The East Refuse Disposal Area would occupy a footprint of approximately 389 acres within a 525-acre site where construction activities would occur. The East Refuse Disposal Area would be designed similarly to the existing refuse disposal areas by utilizing a low permeability liner and would require approval from IDNR-OMM. The liner would restrict the groundwater flow into and out of the East Refuse Disposal Area. No leachate would be anticipated. A revision to the NPDES permit would be submitted to IEPA to add additional surface water discharge outfalls, groundwater wells to monitor the potential effects of the East Refuse Disposal Area, and any new outfalls associated with existing refuse disposal areas on surface water and groundwater quality. IEPA would take appropriate enforcement actions to remedy any violations. If approved by IDNR-OMM, the East Refuse Disposal Area would be constructed with or without TVA approval in order to process the privately-owned coal already approved for mining by IDNR-OMM. Thus, the East Refuse Disposal Area would be constructed under the No Action Alternative. If the Action Alternative is approved by TVA, the East Refuse Disposal Area would also be used for the storage of refuse from the preparation of the TVA-owned coal.

The East Refuse Disposal Area would be built using a downstream construction method, and the coarse coal refuse embankment would be constructed from the fine coal slurry cells outward. A total of four stages are proposed to be constructed within the East Refuse Disposal Area. Final grading of the East Refuse Disposal Area site would occur after the outslopes are at the approved grade and terraces are at the approved elevation. Agricultural lime or an approved material would be applied at the completion of the grading operation and prior to placing root medium soil material on the outslopes. After the root medium has been graded to the required thickness, topsoil material would be placed on the slopes. A total of four feet of soil cover would cover the refuse outslopes. Since the proposed East Refuse Disposal Area would occupy a 389-acre footprint, the reclamation process would be completed in sections until the outslopes have been covered in root medium and topsoil.

As each section of the refuse outslope is completed, the area would be seeded with the approved temporary seed mixture to minimize the potential for wind and water erosion. During the first favorable season, the approved cool season permanent seed mixture would be applied to the reclaimed outslopes. During the reclamation process of the outslopes, the coarse refuse cap would be constructed. Coarse coal refuse would be disposed of in the fine coal slurry cells and would “bridge” the cells to eliminate the impounding capacity. To

supplement the compacted coarse refuse cap, the first foot of soil would be compacted to insure that the migration of rainfall would not enter the covered fine coal refuse cells. After the root medium is graded to the required thickness, topsoil material would be placed and graded. Revegetation of the cap would follow the same procedure as the outslopes, except the approved warm season permanent seed mixture would be applied.

Sugar Camp would be responsible for the operation, inspection and maintenance of the East Refuse Disposal Area. This structure would be inspected at least annually. The structure would also be inspected immediately after any major storm or any earthquake. If the inspection team finds any significant problems developing, the engineer will have Sugar Camp arrange for correction of the problem.

2.2.2. Coal Extraction and Planned Subsidence

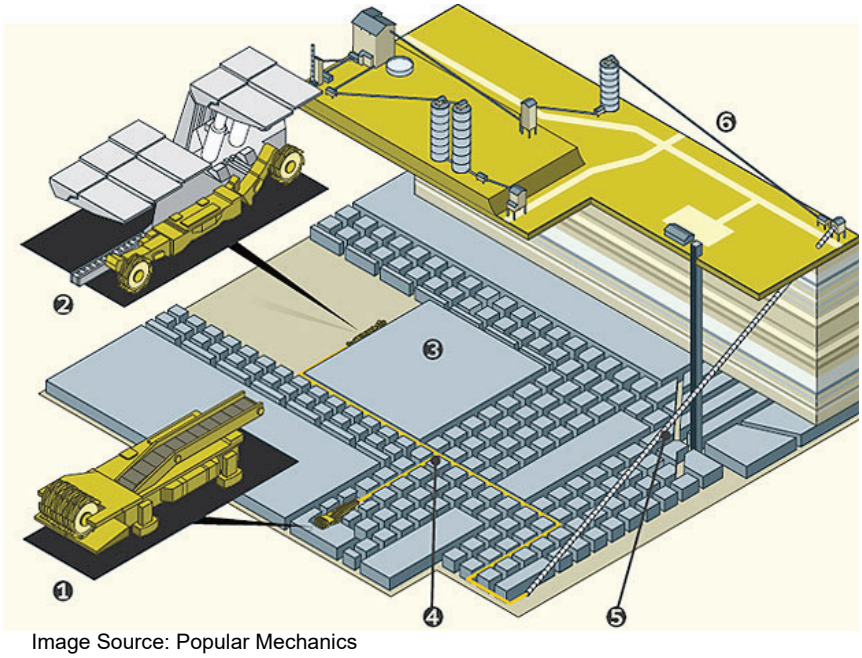
Approximately 60 percent of the coal mined in the world is extracted by underground mining methods. Two primary types of underground mining methods are room-and-pillar and longwall mining. Sugar Camp proposes both methods for mining portions of the Herrin No. 6 coal seam in the SBR No. 6 shadow area.

Room-and-pillar mining involves the extraction of coal in a grid-like pattern such that 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 would be completed to develop main entries for the longwall portions of the mine and for certain other areas that would not be longwall mined. For areas to be mined by the room-and-pillar method, entry and cross cut spacing would typically be on 120-foot centers, with an entry and crosscut width of 20 feet 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. Plate testing would be conducted in conventional room-and-pillar sections within the first 1,000 feet of entering the area. Should any changes in mine stability or conditions be encountered, a more detailed study of floor, roof and pillars would be performed at that time. The entryways provide access for workers, ventilation, and mining equipment. Room-and-pillar equipment includes continuous miners, shuttlecars, conveyor belts, and roofbolters. The coal would be transported by conveyor from the Project Area to the existing Coal Preparation Plant. If approved, room-and-pillar mining would be expected to begin by the end of 2020.

Longwall mining involves the full extraction of coal from a section of the seam or face using mechanical shearers (Figure 2-3). 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 dimensions of longwall panels vary but may be 1,400 feet wide and up to 20,000 feet long. The longwall process results in a planned subsidence of surface areas within the Shadow Area. Walls consisting of standing coal pillars separate the panels and support the roof as well as providing access between panels. 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 the coal is transported by the conveyor system. The shields are advanced as the shearer cuts the coal to allow for a safe workspace for the mine workers. The removal of coal sequentially allows the overburden to fill the void with a resultant movement of the surface. This collapse results in a subsidence on the surface. This movement is predictable, uniform, and minimizes damage to surface structures as mining progresses.

Consistent with the requirements given in 30 § CFR 817.121 of SMCRA, Sugar Camp must promptly repair or compensate the owner for material damage resulting from subsidence caused to any structure or facility that existed at the time of the coal extraction under or adjacent to the materially damaged structure. In addition, Sugar Camp must correct any material damage resulting from subsidence caused to surface lands, to the extent technologically and economically feasible, by restoring the land to a condition capable of maintaining the value and reasonably foreseeable uses that it could support before subsidence damage. These are herein referred to as IDNR-OMM-approved post-mining conditions.

The extraction of TVA-owned coal reserves under the Action Alternative is proposed to begin in late 2020 and would occur during an estimated 16-year period between 2020 and 2040, resulting in the total production of approximately 92.8 million tons of processed TVA-owned coal. According to the mining plan, 14 longwall panels of TVA-owned coal would be mined during mining operations. Extraction height would be approximately 7.7 feet, and the total percentage of coal to be removed in the longwall extraction areas would be 90 percent. An average of approximately 7.1 million processed tons of TVA-owned coal would be produced during each of the 13 years of longwall extraction of TVA coal. Figure 2-4 shows the location of the panels and the years they would be mined. Updates to the mining plan and schedule would be included in the annual underground workings map submitted to IDNR-OMM.



1- Continuous Mining Equipment
2- Longwall Shear
3- Longwall Panel
4- Conveyor Belt
5- Mine Slope
6- Surface Features

Image Source: Popular Mechanics

Figure 2-3. Typical Longwall Mine Layout

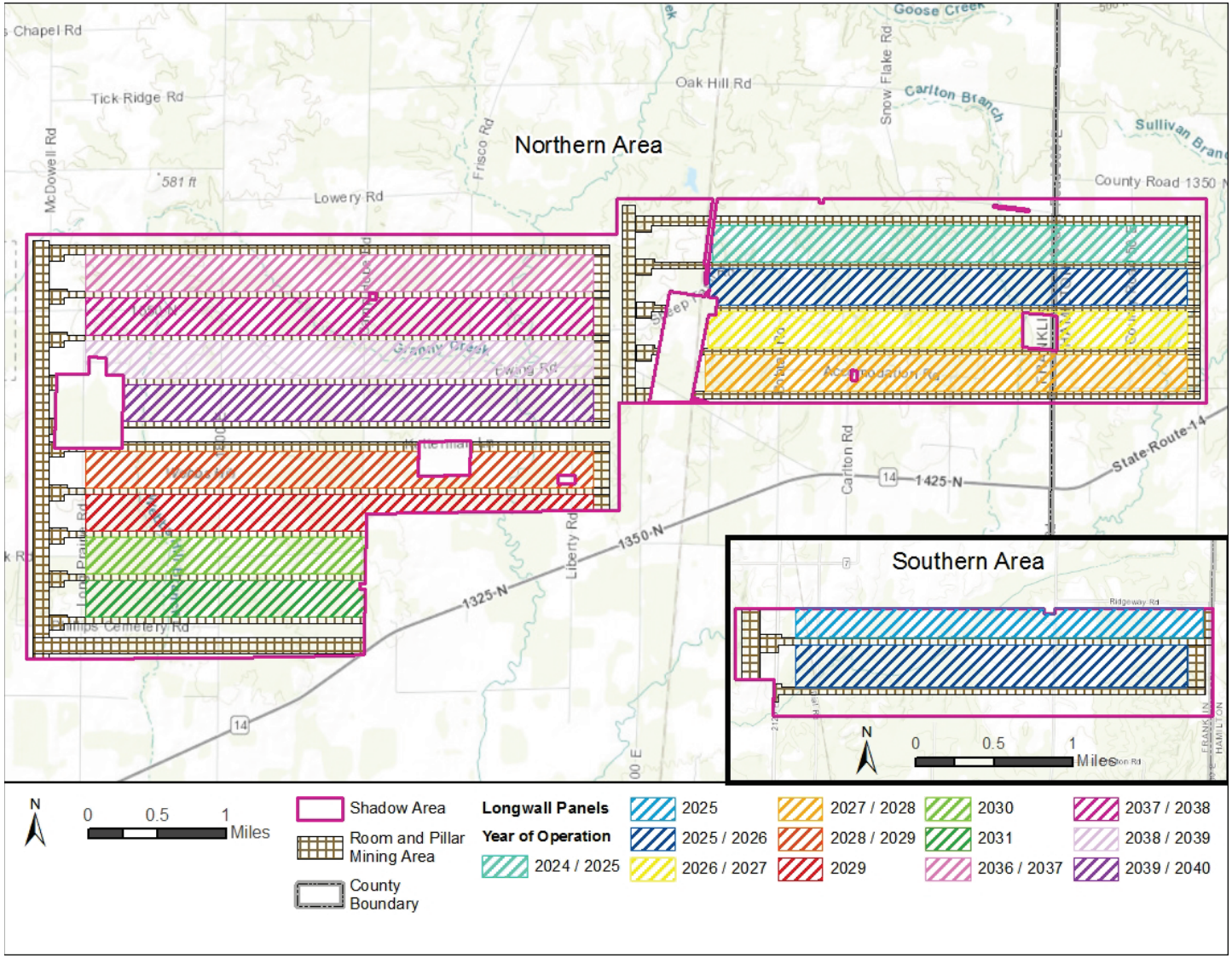


Figure 2-4. Location of Underground Panels and Proposed Years of Operations for Mining TVA-owned Coal

Within the 12,125-acre Shadow Area, an estimated 10,549 acres of surface lands would subside with a predicted maximum subsidence of five and a half 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 TVA Shadow Area**
Shadow Area projected to subside (Longwall Panels)	10,549	87%
Shadow Area not projected to subside (room-and-pillar or non-mining areas)	1,576	13%
Total Shadow Area	12,125	100%

2.2.3. Reclamation

The UCM permit application requires detailed restoration plans for surface effects and subsided areas. Many components of mining operations would be decommissioned and their sites restored as their operational life comes to an end. This includes components such as refuse disposal areas and Bleeder Shaft Facilities. 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 final reclamation for Sugar Camp Mine No. 1 would begin in 2040. The post-mining land use for the Project Area is included in Sugar Camp's reclamation plan, which addresses restoring the Project Area to IDNR-OMM-approved post-mining conditions when mining operations are concluded.

Sugar Camp would backfill and seal all mine openings associated with SBR No. 6 coal extraction, including Bleeder Shaft Facilities and boreholes, in accordance with pertinent state and federal regulations. The 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 Mine Safety and Health Administration (MSHA) and IDNR-OMM regulatory standards after they are no longer needed. Steel casings would be cut off five feet below ground 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 capped with concrete at least one foot thick. All utility boreholes would be plugged and filled with neat cement. The shaft would be surveyed, and the appropriate courthouse would be notified as required by Operator Memorandum 00-01.

All rough grading would be completed within 180 days following the removal of all facilities, except the refuse disposal areas (the reclamation for which is described below). Final grading, including root medium placement, topsoil placement, and temporary crop cover, would be completed within 12 months of the cessation 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 native soils removed prior to disturbance by the mining operations. Topsoil and subsoil would be redistributed throughout the permitted area using 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, as approved by IDNR-OMM.

All the areas affected by the installation of surface facilities (except the refuse disposal areas) would be final-graded in accordance with the approved IDNR-OMM reclamation plan. In 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 replacement 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 temporary erosion control 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 anthropogenic structures. Prior to this type of work being conducted, approval would be obtained from the appropriate regulatory agencies. The particular 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. The work would be performed in accordance with accepted engineering and conservation practices. Upon completion of grading activities, the reclaimed 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.

Due to acting as storage features, the partial reclamation of existing and proposed refuse disposal areas would consist of abandonment by filling in the reservoir areas (i.e., the impoundments) with coarse refuse (or other suitable material) to capacity. In conjunction with the abandonment, all outlet pipes would be filled with grout once the impounding capability has been removed. Soil materials would be placed as a cap over the entire embankment and slurry pond. These materials would be graded to provide adequate drainage over the entire portion of the Project Area that has been impacted by refuse placement, and these areas would be seeded and mulched. Unless an alternate soil thickness is approved by the IDNR, the cover would consist of at least four feet of soil material over all refuse areas. Ditches and other auxiliary drainage features would be maintained to provide drainage. Due to the lack of full reclamation, the existing and proposed refuse areas could serve as pasture land following reclamation but would likely not be suitable for row crops.

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 may be accomplished through stream-dredging activities, which are subject to requirements under state law, and Sections 401 and 404 of CWA. 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 ensure the land reaches a condition capable of maintaining the value and reasonable foreseeable uses that it could support prior to subsidence. Primary methods would include restoration of drainage by small cut and fill operations and filling of cracks that do not close on their own with soil or limestone materials.

A pre-subsidence survey of structures, such as buildings and bridges, would be conducted by a trained and experience person prior to subsidence occurring. This survey would include photographic and sketched documentation of the pre-subsidence condition of the structures. 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 property owner and any comments to the survey would be addressed. If a property owner decided to take a waiver and release Sugar Camp for any subsidence damages to their structures, then a pre-subsidence survey for that particular property is not completed and no future follow-up on that property is necessary.

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. Damages would be compensated either by providing property owners the pre-mining value of the structure, repairing the structure to pre-mining conditions, or providing property owners with the difference between the pre-mining and post-mining value of the structure.

2.3. Alternatives Considered but Eliminated From Further Analysis

The following alternatives have been considered but eliminated from further analysis:

Alternative site configuration or shadow area locations. During scoping, TVA received a comment that this EIS should include alternatives with differing site configurations or mine locations. TVA considered such alternative(s) but determined that they were not feasible and were unlikely to result in reduced environmental impacts. Figure 2-5 shows the extent of the TVA Illinois Coal Reserve under lease to Sugar Camp, as well as the portions of the reserve that have been previously mined or approved for mining and the portions that are the subject of the current Proposed Action. The SBR No. 6 mining plan, including the 12,125 acres of TVA coal that is the subject of the proposed action, was configured to maximize the efficient and economical mining of coal, while utilizing existing surface facilities to process, store and transport the coal offsite and minimizing impacts to the extent feasible. Shifting the shadow area to the east is not feasible due to the presence of a natural gas pipeline; relocating the pipeline or mining under it would not be cost effective. The magnitude of most of the environmental impacts are directly related to the quantity of

coal mined and, assuming the existing Coal Preparation Plant would be used for a reconfigured mine, the environmental impacts would be similar. A major relocation of the shadow area could also require the construction of a new coal preparation plant, likely resulting in greater overall environmental impacts. Shifting the shadow area to the north, west, or south, while possible, offers no environmental or economical advantage over the current plan.

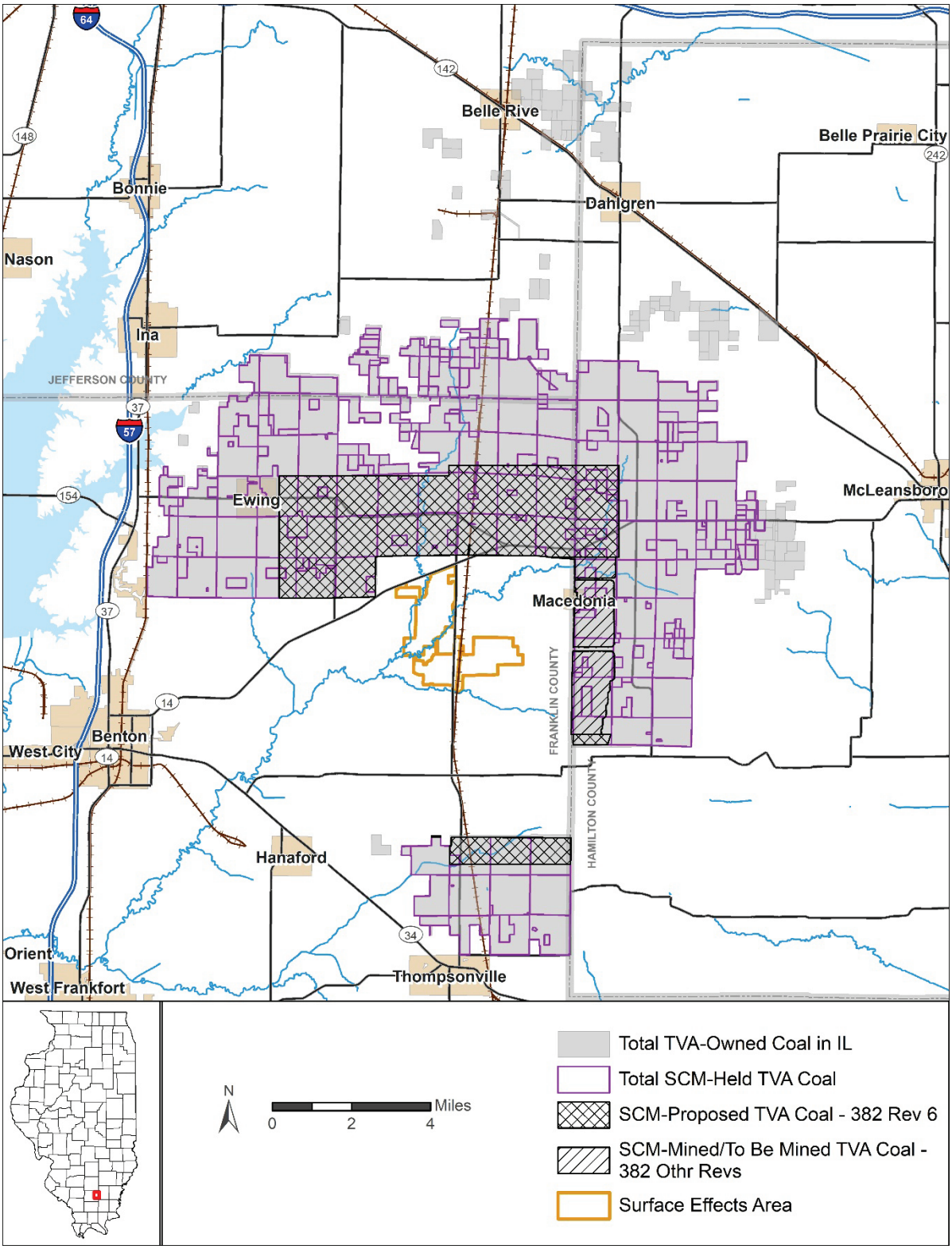


Figure 2-5. Location of TVA-owned Coal and Existing and Proposed Shadow Areas

Selling the TVA mineral rights. During scoping, a commenter suggested that TVA consider selling its mineral reserves as an alternative to approving the mining of the coal by Sugar Camp. Whether this would result in reduced environmental impacts depends on the intention and goals of the purchaser. If the purchaser is a mining company or other energy-related company, the coal would likely be mined and the resulting impacts would be similar to those of the proposed action. Alternatively, if the intention of the purchaser was to not mine the coal, the impacts of the mining and subsequent utilization, including the emission of GHGs from its combustion, would be eliminated. Under this scenario, the impacts would be similar to those of the No Action Alternative; TVA would, however, receive some monetary compensation from the sale of the reserve.

Utilizing different mining methods. Longwall mining, in combination with limited room-and-pillar mining to access the longwall panels, is the most efficient and cost-effective method to mine coal in seams such as the Herrin No. 6 seam in the Project Area. According to the U.S. Energy Information Administration's (USEIA) 2018 Annual Coal Report, an average of 4.7 tons per man hour are produced by continuous mining techniques in the Illinois Basin, while the longwall mining method produces an average of 11.1 tons per man hour. Longwall mines in the Illinois Basin operated by Foresight Energy, LLC, the parent company of Sugar Camp, have produced 16 to 17 tons per man hour. Longwall mining results in more complete recovery of coal and, aside from the short-term impacts of subsidence which are mitigated through IDNR-OMM-required measures, results in environmental impacts that are similar to those of other underground mining techniques. The use of different mining methods is not economical and would not meet the purpose and need for TVA or Sugar Camp. For these reasons, alternatives utilizing different mining methods were rejected from further consideration.

2.4. Comparison of Alternatives

Under the No Action Alternative, TVA would not approve the SBR No. 6 plan to mine TVA-owned coal reserves located in the Shadow Area. Thus, no potential environmental effects related to the Proposed Action would be anticipated. The 25,847-acre shadow area associated with privately owned coal and previously approved TVA-owned coal—i.e., the remaining portion of the SBR No. 6 shadow area—would be mined without the mining of additional TVA-owned coal. Surface and underground disturbances associated with the private and TVA-approved coal would occur. After mining is complete, the private/TVA-approved shadow area would be restored to IDNR-OMM-approved post-mining conditions.

Under the Action Alternative, TVA would approve the SBR No. 6 plan to mine TVA-owned coal reserves located in the 12,125-acre Shadow Area, and TVA-owned coal resources within the Shadow Area would be extracted by Sugar Camp. Surface and underground disturbances would occur. After mining is complete, the Project Area would be restored to IDNR-OMM-approved post-mining conditions.

Under both the No Action and Action Alternative, construction of the East Refuse Disposal Area would occur. Each alternative would also include construction and operations of several 5.3-acre bleeder shaft facilities; however, these facilities would be constructed in differing shadow areas. The primary distinction between the No Action Alternative and the Action Alternative is the location of the associated shadow areas within the SBR No. 6 permitted area and the estimated acreage of planned subsidence based on the overall shadow area acreage.

Table 2-3 lists potential impacts associated with the No Action and Action Alternative. Cumulative effects, which are more fully presented in Section 3.14, are summarized in Table 2-3 for comparative purposes. Past, present and reasonably foreseeable future actions (RFFAs) that are considered in the cumulative analysis include coal mining activities and other identified federal and private actions within 20 miles of the Project Area or a specified geographic area of analysis particular to a given resource area, as discussed in Section 3.14. For all resource areas, activities associated with the No Action Alternative were included for consideration in the cumulative analysis.

Table 2-3. Summary and Comparison of Alternatives by Resource Area

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Geology and soils	No direct or indirect impacts to geology or soils would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Temporary impacts to soils and prime farmland due to planned subsidence in the 25,847-acre private/TVA-approved shadow area and associated bleeder shaft facilities. • Temporary impacts to soils in the new East Refuse Disposal Area, also associated with the Action Alternative, until the area is capped. Permanent effects to prime farmland in this location due to only being suitable for pasture land and not row crops following reclamation. • Permanent change to the regional geology due to removal of approximately 9.6 percent of the Herrin No. 6 coal seam.	Temporary impacts to soils and prime farmland due to surface disturbances and planned subsidence in the 12,125-acre Shadow Area associated with the mining of the additional TVA-owned coal. As with the No Action Alternative, temporary impacts to soils in the new East Refuse Disposal Area, until the area is capped. Permanent effects to prime farmland in this location due to only being suitable for pasture land and not row crops following reclamation. Permanent change to the geology of the Project Area due to removal of an additional 4.5 percent of the Herrin No. 6 coal seam. Cumulatively, with implementation of the Action Alternative along with other nearby mining actions, including actions associated with the No Action Alternative, permanent removal of approximately 56.6 percent of the Herrin No. 6 coal seam would occur. Permanent, cumulative effects to prime farmland due to existing and proposed refuse disposal areas associated with these actions would potentially impact approximately 6,400 acres in Franklin County, affecting approximately 0.02 percent of farmland across the state.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Groundwater/aquifers	No direct or indirect impacts to groundwater would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Minor, insignificant, mitigated impacts to groundwater from the East Refuse Disposal Area, also associated with the Action Alternative. • Temporary, short-term groundwater quantity impacts in the 22,484-acre subsidence area.	Minor, insignificant, mitigated impacts to groundwater from the East Refuse Disposal Area, also associated with the Action Alternative. Temporary, short-term groundwater quantity impacts in the additional 10,549-acre subsidence area. Cumulatively, implementation of the Action Alternative, with consideration to other nearby mining actions, including actions associated with the No Action Alternative, would result in moderate, short-term groundwater quantity impacts in the overall 201,481-acre subsidence area and the overall 12,974-acre surface effects area. However, significant impacts to groundwater would not occur due to adherence to the groundwater monitoring program and reclamation plans associated with these mining actions.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Surface waters and wetlands	No direct or indirect impacts to surface water and wetlands would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Avoidance of Waters of the U.S. to the maximum extent practicable during the siting of associated bleeder shaft facilities. • Long-term impacts to 27,806 linear feet of ephemeral and intermittent streams, 1.4 acres of wetlands, and one pond totaling 0.2 acres for construction of the new East Refuse Disposal Area; however, these impacts would be minor due to required mitigation. • Temporary, minor impacts as a result of subsidence of approximately 22,484 acres.	Bleeder Shaft Facilities associated with the additional 12,125-acre Shadow Area would be located to avoid Waters of the U.S. to the maximum extent practicable. As under the No Action Alternative, the East Refuse Disposal Area has the potential to impact 27,806 linear feet of ephemeral and intermittent streams, 1.4 acres of wetlands, and one pond totaling 0.2 acres. Impacts would be long term, but minor because of required mitigation. Temporary, minor impacts could occur to surface waters and wetlands as a result of subsidence of approximately 10,549 additional acres. Cumulatively, implementation of the Action Alternative, along with other nearby mining actions, including activities associated with the No Action Alternative, would result in moderate temporary impacts in the overall 201,481-acre subsidence area. No significant cumulative impacts associated with the overall 265,191-acre coal extraction area or the overall 12,974-acre surface effects area associated with the Action Alternative and other mining actions are anticipated due to avoidance of surface water and wetlands to the maximum extent practicable. Any impacts to Waters of the U.S. would be subject to USACE 404 permits and IEPA 401 WQCs and would be mitigated as required by these permits.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Floodplains	No direct or indirect impacts to floodplains would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Potential impacts to floodplains due to construction of associated bleeder shaft facilities; however, these impacts will be avoided or mitigated. • No impacts to floodplains with construction of the East Refuse Disposal Area, also associated with the Action Alternative. • Potential temporary impacts to floodplains in the approximate 22,484-acre area to be subsided.	Potential impacts due to construction of the Bleeder Shaft Facilities in the additional 12,125-acre Shadow Area would be avoided or mitigated. As with the No Action Alternative, no impacts to floodplains would occur due to construction of the East Refuse Disposal Area. Temporary impacts to floodplains could occur in the approximate 10,549-acre additional area to be subsided. Cumulatively, significant long-term impacts to floodplains from subsidence would not occur with implementation of the Action Alternative alongside other nearby mining actions, including the actions associated with the No Action Alternative, due to the application of corrective measures. One of the five existing or proposed refuse disposal areas associated with the Action Alternative and other mining actions considered within the same watershed is located in a floodplain without a known base flood elevation, thus resulting in approximately 400 acres of permanent impacts to floodplains.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Water quality	No direct or indirect impacts to water quality would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in temporary, insignificant effects to surface water quality due to surface disturbances and subsidence of an approximately 25,847-acre area. Impacts will be minimized with the implementation of sediment and erosion control best management practices (BMPs), as required by the NPDES permit, by groundwater seepage controls associated with the East Refuse Disposal Area, and through the IDNR-OMM-required water quality monitoring programs.	Temporary, insignificant effects to surface water quality due to surface disturbances and coal extraction-related effects within the additional 12,125-acre Shadow Area. Impacts would be minimized with the implementation of sediment and erosion control BMPs, as required by the NPDES permit, by groundwater seepage controls associated with the East Refuse Disposal Area, and through the IDNR-OMM-required water quality monitoring programs. Cumulatively, with consideration to the Action Alternative and other nearby mining actions, including activities associated with the No Action Alternative, significant impacts to water quality due to the overall 265,191-acre coal extraction area and disturbances within the overall 12,974-acre surface effects area would be avoided by implementation of groundwater monitoring, water quality sampling, and the reclamation plan.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Water supply	No direct or indirect impacts to water supply would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in temporary, minor impacts to water supply in the 25,847-acre shadow area. Decreases in water supply associated with ongoing mining, if they occur, would be remediated by Sugar Camp.	Temporary, minor impacts to water supply in the 12,125-acre Shadow Area associated with the additional TVA-owned coal reserves. If they occur, decreases in water supply associated with mining the additional TVA coal would be remediated by Sugar Camp. Cumulatively, moderate, short-term impacts would occur to groundwater supply as a result of planned subsidence associated with the Action Alternative and other mining operations considered within the same watershed, including activities associated with the No Action Alternative. Cumulative impacts to groundwater supply would be temporary due to implementation of IDNR-OMM-required groundwater monitoring and remediation of any decreases in water supply. Cumulative impacts to Rend Lake as a result of water withdrawal for supplemental makeup water for the Coal Preparation Plant, combined with potential Rend Lake withdrawal by other mine operations, are anticipated to be minimal over the life of the Project and would not significantly change daily or annually.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Air quality	No direct or indirect impacts to air quality would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Direct and indirect emissions of air pollutants that would have negligible effects. • Lower emissions of air pollutants under the No Action Alternative than under the proposed Action Alternative.	Emissions of air pollutants from the operation of equipment associated with the mining of the additional TVA-owned coal are anticipated to have negligible effects. The additional emissions of air pollutants associated with the Action Alternative would result in immeasurably small impacts on air quality. Cumulatively, direct and indirect emissions of each criteria pollutant and select hazardous air pollutants (HAPs) due to the Action Alternative, combined with other active mining operations within 20 miles, including activities associated with the No Action Alternative, are estimated to be between 0.0005 percent and 0.17 percent of the total U.S. emissions of these pollutants in 2014 projected for the life span of the Action Alternative.
Greenhouse gases	No direct or indirect greenhouse gas emissions would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Direct and indirect emissions of GHGs. • Negligible GHG emissions associated with operation of the equipment to support ongoing mining. • Lower GHG emissions under the No Action Alternative than under the proposed Action Alternative.	The total direct and indirect emissions of approximately 225 million metric tons of CO2e associated with the Action Alternative represents approximately 0.27 percent of total U.S. GHG emissions for 2017 and 0.03 percent of total global GHG emissions. Cumulatively, emissions of GHGs from mining associated with the Action Alternative and other active mining operations within 20 miles, including activities associated with the No Action Alternative, would total about 1,316.9 million metric tons of CO_2e.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Vegetation	No direct or indirect impacts to vegetation would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Temporary impacts to existing plant communities at the locations of the four associated bleeder shaft facilities and the East Refuse Disposal Area, also associated with the Action Alternative, but these areas would be reclaimed or capped with soils and seeded following their operational lives. • No impacts to vegetation as a result of subsidence of approximately 22,484 acres.	Temporary impacts to existing plant communities at the locations of the five Bleeder Shaft Facilities associated with the additional TVA-owned coal and the East Refuse Disposal Area, also associated with the No Action Alternative, but these areas would be reclaimed or capped with soils and seeded following their operational lives. Impacts to vegetation as a result of subsidence of approximately 10,549 additional acres are not anticipated to occur. Cumulatively, the Action Alternative, along with other nearby mining actions, including the activities associated with the No Action Alternative, would not result in adverse impacts to vegetation due to IDNR-OMM-required mitigation measures.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Wildlife	No direct or indirect impacts to wildlife would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in temporary impacts to wildlife at the locations of the four associated bleeder shaft facilities and the East Refuse Disposal Area, also associated with the Action Alternative. However, impacts to wildlife are subject to mitigation or minimization under Sugar Camp's integrated fish and wildlife reclamation plan. Sugar Camp will continue to comply with the MBTA and the BGEPA.	Temporary impacts to wildlife at the locations of the five Bleeder Shaft Facilities associated with the additional TVA coal and the East Refuse Disposal Area, also associated with the No Action Alternative. However, impacts to wildlife would be subject to mitigation under Sugar Camp's integrated fish and wildlife reclamation plan and would thus be minimized or mitigated. The Project would continue to comply with the MBTA and the BGEPA. The Action Alternative would not contribute to cumulative adverse impacts to wildlife. Permanent impacts to wildlife associated with the Action Alternative and other nearby mining actions, including the activities associated with the No Action Alternative, have been or would be avoided or mitigated, per the IDNR-OMM permit requirements. Wildlife has been or would be temporarily disturbed by surface disturbances, but displaced species likely have or would return with completion of reclamation activities. Effects to wildlife resulting from mining operations are subject to mitigation under integrated fish and wildlife habitat reclamation plans.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Aquatic life	No direct or indirect impacts to aquatic life would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • No impacts to aquatic life due to the associated bleeder shaft facilities, as impacts would be avoided, minimized, or mitigated, per permit requirements. • As with the Action Alternative, temporary, minor effects to aquatic life due to construction of the East Refuse Disposal Area. • Temporary, minor impacts to aquatic life due to subsidence of approximately 22,484 acres.	Impacts to aquatic life due to the Bleeder Shaft Facilities associated with extraction of additional TVA-owned coal would be avoided, minimized, or mitigated, per permit requirements. As with the No Action Alternative, temporary, minor effects to aquatic life due to construction of the East Refuse Disposal Area. Temporary, minor impacts to aquatic life due to subsidence of an additional 10,549 acres. The Action Alternative would not contribute to cumulative adverse impacts to aquatic life. Permanent impacts to aquatic life associated with the Action Alternative and other nearby mining actions, including the activities associated with the No Action Alternative, have been or would be avoided or mitigated, per the IDNR-OMM permit requirements. Aquatic life has been or would be temporarily disturbed by surface disturbances, but displaced species likely have or would return with completion of reclamation activities. Effects to aquatic life resulting from mining operations are subject to mitigation under integrated fish and wildlife habitat reclamation plans.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Federally listed threatened and endangered species	No direct or indirect impacts to federally listed species would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • No adverse effects on federally listed species due to subsidence of 22,484 acres. • Continued or upcoming coordination with USFWS on the effects of associated surface disturbances.	Coordination with USFWS is ongoing in relation to the East Refuse Disposal Area, also associated with the No Action Alternative, or would occur when the locations of the associated Bleeder Shaft Facilities are proposed. Subsidence of an additional 10,549 acres would likely not result in adverse effects on any federally listed species. Cumulatively, no adverse impacts to federally listed species are anticipated to result from the overall 256,191-acre coal extraction area associated with the Action Alternative and other nearby mining actions, including the activities associated with the No Action Alternative. Ongoing coordination with USFWS would determine cumulative effects due to surface disturbances associated with the subsidence area and the existing 2,420-acre surface effects area. However, effects to wildlife, including listed species, resulting from mining operations are subject to mitigation under integrated fish and wildlife habitat reclamation plans, per IDNR permit requirements.
State-listed species	No direct or indirect impacts to state-listed species would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining may result in temporary impacts to state-listed species due to associated surface disturbances or coal extraction-related effects. These impacts would be subject to mitigation under Sugar Camp's integrated fish and wildlife reclamation plan and would thus be minimized or mitigated.	Temporary impacts to state-listed species may occur due to surface disturbances or coal extraction-related effects associated with the additional TVA-owned coal. These impacts would be subject to mitigation under Sugar Camp's integrated fish and wildlife reclamation plan and would thus be minimized or mitigated. Cumulatively, no adverse impacts to state-listed species are anticipated to result from the overall 201,481-acre subsidence area or the overall 12,974-acre surface effects area associated with the Action Alternative and other nearby mining actions, including the activities associated with the No Action Alternative, due to implementation of the integrated fish and wildlife reclamation plan.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Natural areas	No direct or indirect impacts to natural areas would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining may result in indirect effects to natural areas near these activities due to planned subsidence of approximately 22,484 acres causing temporary effects to hydrologic patterns. However, with restoration, permanent impacts to these natural areas will not result.	Planned subsidence of approximately 10,549 additional acres could cause indirect effects to natural areas in the vicinity of the Project due to temporary effects to hydrologic patterns, but with restoration, permanent impacts to these natural areas would not result. Cumulatively, considering the Proposed Action combined with the other mining operations, including the activities associated with the No Action Alternative, moderate temporary indirect impacts to natural areas in the vicinity could occur as a result of planned subsidence of approximately 201,481 acres and actions on the approximately 12,974 acres associated with surface effects areas. However, no long-term adverse impacts to natural areas are anticipated due to no direct impacts being anticipated and indirect impacts being subject to post-subsidence reclamation activities.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Land use	No direct or indirect impacts to land use would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Minor, temporary or permanent land use impacts due to the construction of associated bleeder shaft facilities and the 389-acre East Refuse Disposal Area. As with the Action Alternative, the effects of construction of the East Refuse Disposal Area will be permanent, as the land may no longer support cultivated crops but could likely be used for pasture land and potentially other land uses. • Temporary, minor impacts on land use in a 22,484-acre area due to subsidence, as the subsided area would be restored.	Minor, temporary or permanent land use impacts would result due to the construction of the approximately five Bleeder Shaft Facilities associated with the additional TVA-owned coal and the 389-acre East Refuse Disposal Area. As with the No Action Alternative, the effects of construction of the East Refuse Disposal Area would be permanent, as the land may no longer support cultivated crops but could be used for pasture land and potentially other land uses. Temporary, minor impacts on land use to approximately 10,549 additional acres could occur as a result of subsidence, as these areas would be restored following subsidence. Cumulatively, the Action Alternative, combined with the effects of nearby mining operations, including the activities associated with the No Action Alternative, would result in moderate temporary impacts to land use due to subsidence of approximately 265,191 acres and surface disturbances within the overall 12,974-acre surface effects area. However, these would be mitigated by reestablishment of drainage patterns, compensation to farmers, or reclamation. Overall, permanent changes to agricultural uses resulting from the approximately 6,400 acres associated with existing and proposed refuse disposal areas would have a minor effect, as cultivated crops are prevalent in Franklin County and throughout the state.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Transportation	No direct or indirect impacts to transportation would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Minor, temporary effects to local roadways and the Canadian National Railway due to construction and operations. • As with the Action Alternative, temporary or permanent closure of North Bobtail Road due to the construction of the East Refuse Disposal Area. • Subsidence of approximately 22,484 acres has the potential to impact roads and bridges; however, any damage would be repaired, per IDNR-OMM requirements.	Minor, temporary effects to roadways in the Project Area and the Canadian National Railway due to construction and operations associated with the Action Alternative. As with the No Action Alternative, temporary or permanent closure of North Bobtail Road as a result of construction of the East Refuse Disposal Area. Subsidence of approximately 10,549 additional acres has the potential to impact roads and bridges; however, any damage would be repaired, per IDNR-OMM requirements. Cumulatively, implementation of the Action Alternative, with consideration to other nearby mining activities, including the activities associated with the No Action Alternative, would result in moderate, temporary impacts to local roadways during construction activities or possibly as a result of subsidence of the overall 201,481 acres associated with these activities. Any damage associated with subsidence would be repaired, per IDNR-OMM requirements. Some local road closures could also occur due to the Action Alternative and other mining activities, resulting in moderate, temporary or permanent cumulative effects. However, as required by the IDNR-OMM permitting process, Sugar Camp and other mine operators would coordinate with the road authorities to minimize impacts.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Utilities	No direct or indirect impacts to utilities would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Permanent impacts to an existing water line segment within the East Refuse Disposal Area that would be mitigated through relocation of the water line, as with the Action Alternative. • Minor impacts to utilities due to subsidence of approximately 22,484 acres. However, these impacts will be mitigated through agreements with governmental bodies and utility companies.	As with the No Action Alternative, permanent impacts to an existing water line segment within the East Refuse Disposal Area that would be mitigated through relocation of the water line. Minor impacts to utilities would occur as a result of subsidence of approximately 10,549 additional acres, but these impacts would be mitigated through agreements with governmental bodies and utility companies. Cumulatively, with consideration to the Action Alternative along with nearby mining actions, including the activities associated with the No Action Alternative, effects to utilities due to the planned subsidence of approximately 265,191 acres and disturbances on the overall 12,974 acres associated with surface effects areas would be minor and short-term due to preventive planning with governmental bodies and utility companies and subsequent repair.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Cultural resources	No direct or indirect impacts to cultural resources would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining may result in: • Impacts to cultural resources due to construction of surface facilities; however, these would be minimized or mitigated in consultation with IHPA. • Minor, temporary effects on abovegound cultural resources due to subsidence of 22,484 acres; however, these effects would be minimized by repair or compensation to property owners for structural damage.	Impacts to cultural resources may occur due to surface disturbances associated with the Action Alternative. TVA would consult with IHPA and interested tribes regarding the effects of the Bleeder Shaft Facilities, once sited, on cultural resources. Subsidence of 10,549 additional acres would have no effect on archaeological sites and may have minor, temporary effects on aboveground cultural resources; however, these effects would be minimized by repair or compensation to property owners for structural damage. Cumulatively, considering the Action Alternative along with nearby mining actions, including the activities associated with the No Action Alternative, impacts to cultural resources in relation to the overall 265,191-acre coal extraction area and disturbances in the approximately 12,974 acres associated with surface effects areas, such as impacts to the viewsheds of aboveground resources, structural damage to architectural resources, or effects to National Register of Historic Places (NRHP)-eligible archaeological sites, would be avoided, minimized, or mitigated, per IDNR-OMM requirements, and in consultation with IHPA and interested tribes.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Solid and hazardous waste	No direct or indirect solid and hazardous materials impacts would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in no adverse effects to waste; this is because: • Sugar Camp maintains a Spill Prevention, Control, and Countermeasure (SPCC) Plan for onsite bulk oil in containment and reports usage to USEPA, in accordance with applicable regulations. • Subsidence does not generate additional solid or hazardous waste.	Solid and hazardous waste-related impacts in association with the Action Alternative would be avoided or minimized. Sugar Camp maintains a SPCC Plan for onsite bulk oil in containment and reports usage to USEPA, in accordance with applicable regulations. Subsidence does not generate additional solid or hazardous waste. Cumulatively, solid and hazardous waste-related impacts associated with the Action Alternative, combined with other nearby mining actions, including the activities associated with the No Action Alternative, would be avoided or minimized by maintaining SPCC plans. No cumulative impacts would occur in the overall 201,481-acre subsidence area associated with these actions, as subsidence does not generate additional solid or hazardous waste.
Human health and safety	No direct or indirect health and human safety impacts would occur in association with the Proposed Action. Operations related to ongoing private/TVA-approved coal mining will continue to comply with MSHA and OSHA regulations, IDNR Mine Safety and Training Division, and other relevant regulatory programs and, thus, avoid, minimize, or mitigate health and human safety risks.	The Proposed Action would comply with MSHA and OSHA regulations, IDNR Mine Safety and Training Division, and other relevant regulatory programs and, thus, avoid, minimize, or mitigate health and human safety risks. Cumulatively, the Action Alternative, along with other nearby actions, including the activities associated with the No Action Alternative, would not contribute to adverse impacts to human health and safety due to compliance with regulatory safety programs and landowner coordination.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Socioeconomics and environmental justice	No direct or indirect adverse or beneficial effects to socioeconomics or environmental justice would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in positive socioeconomic impacts. Environmental justice impacts would continue to be avoided due to compliance with IDNR permit requirements to avoid, minimize, or mitigate adverse effects.	Minor, beneficial effects on socioeconomics from the mining of additional TVA-owned coal would occur. While low-income populations are present in the Project Area, the Action Alternative would not disproportionately adversely affect environmental justice populations. Adverse environmental justice impacts would be avoided due to compliance with IDNR permit requirements to avoid, minimize, or mitigate adverse effects. Implementation of the Action Alternative would have beneficial socioeconomic effects; therefore, the Action Alternative could benefit environmental justice populations by providing new economic opportunities. Overall, moderate, short- to long-term, cumulative beneficial economic impacts would result from implementation of the Action Alternative in combination with other nearby actions, including the activities associated with the No Action Alternative. Indirect, cumulative economic effects would also occur from the expenditure of wages earned by the workforce involved in construction activities and mining operations. No cumulative adverse impacts would occur to environmental justice populations present in the analysis area; however, moderate cumulative beneficial impacts may be realized.

Resource Area	Impacts from No Action Alternative	Impacts from Action Alternative
Noise & Visual resources	No direct or indirect effects to noise and visual resources would occur in association with the Proposed Action. SBR No. 6 activities related to private/TVA-approved coal mining will result in: • Minor, temporary visual and noise impacts in the vicinity of the associated bleeder shaft facilities and the East Refuse Disposal Area, also associated with the Action Alternative. During construction of the associated bleeder shaft facilities, noise impacts will be avoided or mitigated, per IDNR permit requirements. • No noise or visual impacts in subsidence areas.	Minor, temporary visual and noise impacts would occur in the vicinity of the Bleeder Shaft Facilities associated with the proposed extraction of additional TVA-owned coal and the East Refuse Disposal Area, also associated with the No Action Alternative. During construction of the Bleeder Shaft Facilities, noise impacts would be avoided or mitigated, per IDNR permit requirements. Noise and visual impacts would not occur in subsidence areas. Overall, cumulative impacts have altered the soundscape and scenery in the vicinity of Sugar Camp Mine No. 1 due to long-term mining activities, but with implementation of IDNR-OMM-required reclamation plans, the localized noise and visual impacts in relation to the Proposed Action and other nearby mining actions, including those associated with the No Action Alternative, are not expected to result in significant permanent cumulative adverse impacts.

2.5. Identification of Mitigation Measures

Sugar Camp mining operations would be carried out in compliance with Illinois Regulatory Program 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, acidic, and toxic materials, soils, landform, and vegetation, among others, 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 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 in conjunction with future bleeder shaft development; these would be provided in future TVA environmental documents.

Permit conditions would be enforced by the State of Illinois; TVA does not regulate the mining activities of Sugar Camp. 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 or compensation 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.

2.6. The Preferred Alternative

TVA's preferred alternative is the Action Alternative. The purpose and need of the Proposed Action is to recover TVA's investment by approving the proposed SBR No. 6 mining plan

under the terms of the coal lease agreement made with Sugar Camp in 2002. The Action Alternative is preferred because it is the most economical way to meet TVA's purpose and need. Other alternatives are not economically feasible, are expected to have similar environmental impacts, and do not meet the purpose and need.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The affected environment and environmental consequences are described in the following sections for each environmental resource considered in this EIS. The environmental resources consist of the physical, biological, social, and cultural resources that could be affected by the No Action and Action Alternatives. TVA determined that these resources consist of geology and soils; floodplains; groundwater/aquifers; surface water; water quality; water supply; wetlands; air quality; greenhouse gases and climate; wildlife; vegetation; aquatic life; threatened and endangered species; natural areas; land use; transportation; utilities; cultural resources; solid and hazardous waste; safety; socioeconomics/environmental justice; and noise and visual resources. TVA determined that certain resources would not be affected by the Action Alternative due to the location and nature of the proposed activities. These resources consist of recreation and Wild and Scenic Rivers.

The description of the environmental consequences associated with the Action Alternative is divided into surface disturbances and coal-extraction related disturbances. As described in Section 2.1.2, surface disturbances consist of actions associated with the construction of the Bleeder Shaft Facilities, construction and operation of the proposed East Refuse Disposal Area, and any new effects from processing, storing, and transporting TVA-owned coal at the existing facilities. Coal-extraction related disturbances consist of the planned subsidence that would follow the extraction of approximately 186 million tons of unprocessed TVA coal.

3.1. Geology and Soils

The geology and soils of the Project Area were identified using a combination of the U.S. Geological Survey (USGS) topographic maps and National Hydrography Dataset (NHD) digital data, aerial photographs, USDA soil surveys, USFWS National Wetlands Inventory (NWI), and literature references.

3.1.1. Affected Environment

The Project Area lies within rolling uplands with elevations ranging from approximately 450 feet to 540 feet above mean sea level. The soils and landforms were created by erosion of the bedrock and glacial deposits, and were likely 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 Illinoisan Till Plain ecoregion, which is characterized by 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.

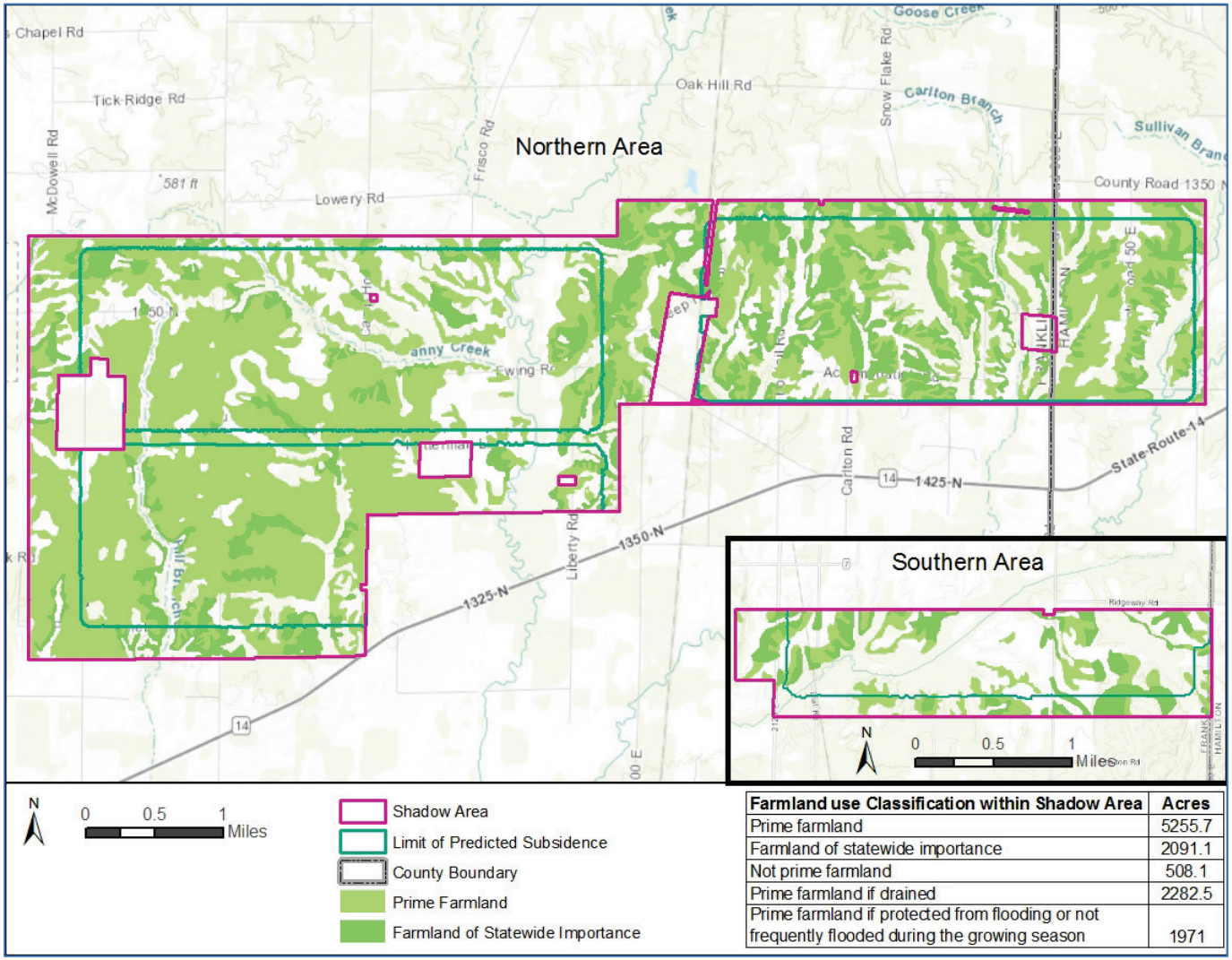
The Project Area is located in the southern portion of the Illinois Basin coalfield. The Herrin No. 6 coal seam, which is proposed to be mined, lies from 650 feet to more than 900 feet below ground. The Herrin No. 6 coal seam is part of the Carbondale formation, which is of Middle Pennsylvanian age (300 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. Water yields are low in the range of the one to ten gallons per minute (HMG Engineers 2018). Use of these aquifers is minimal due to depth from the surface and the resulting requirements for deep wells. Additional details on these and other aquifers are provided in the groundwater discussion.

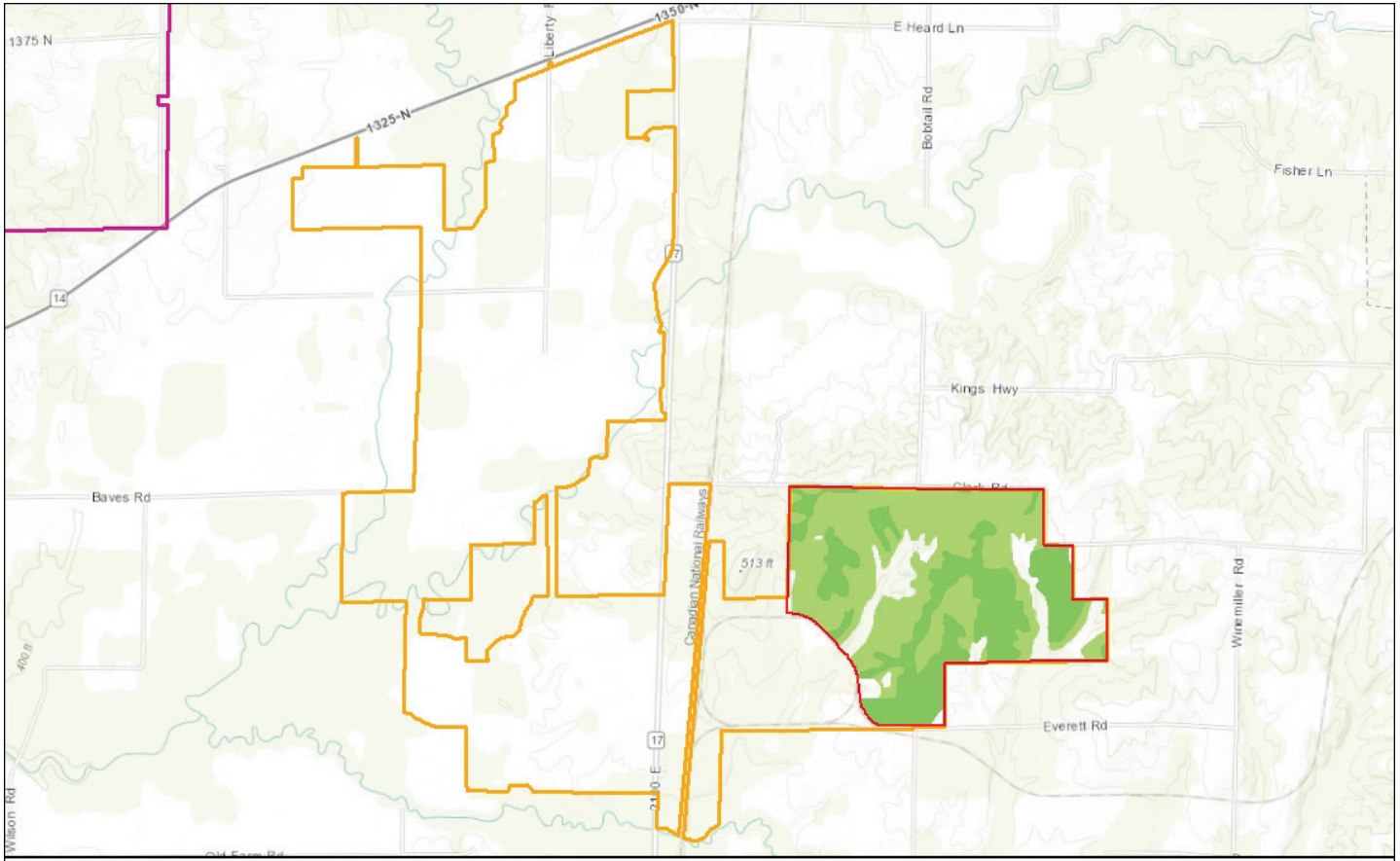
The Project Area is located in an area with a high seismic risk according to USACE (USACE 2016). The effective peak horizontal acceleration due to earthquake forces is 0.12g (Algermissen et al., 1982; ATC 1978). A 0.1g earthquake is expected to have strong perceived shaking with light potential for damage.

A total of 39 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 is designated as prime farmland. The term “prime farmland” is assigned by the USDA to 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. The Farmland Protection Policy Act (FPPA) requires federal agencies to consider the adverse effects of their actions on prime farmland, unique farmland, and farmland of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. The land can be forested land, pastureland, cropland, or other land, but it cannot be water or urban built-up land. The purpose of the FPPA is “to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.” FPPA does not authorize federal agencies to regulate the use of private or non-federal land, or in any way affect the property rights of owners. Based on soils data obtained from the USDA Web Soil Survey, approximately 8,276 acres (65 percent) of the Project Area that would be newly affected is designated as prime farmland or farmland of statewide importance. Figures 3-1 and 3-2 illustrate the prime farmland and farmland of statewide importance within the newly affected areas of the Project Area.



Farmland use Classification within Shadow Area	Acres
Prime farmland	5255.7
Farmland of statewide importance	2091.1
Not prime farmland	508.1
Prime farmland if drained	2282.5
Prime farmland if protected from flooding or not frequently flooded during the growing season	1971

Figure 3-1. Prime Farmland within the Shadow Area



Farmland use Classification within new East Refuse Disposal Area	Acres
Prime farmland	187.3
Farmland of statewide importance	264.1
Not prime farmland	15.2
Prime farmland if drained	3.4
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	54.2

Figure 3-2. Prime Farmland within the New East Refuse Disposal Area

3.1.2. Environmental Consequences

3.1.2.1. The No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to geology or soils. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR permit requirements.

These impacts consist of temporary impacts to soils due to surface disturbances and planned subsidence and permanent impacts to soils and prime farmland in the location of the East Refuse Disposal Area. Since the private/TVA-approved shadow area would be restored to agricultural use, permanent impacts would not occur to prime farmland as a result of subsidence. Ongoing mining operations would result in a permanent change to the geology of the private/TVA-approved shadow area due to removal of approximately 9.6 percent of the total available acreage of the Herrin No. 6 coal seam and fracturing of the overburden due to subsidence.

3.1.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan. This would result in temporary impacts to soils due to surface disturbances and planned subsidence. Long-term impacts from the Project would occur due to construction of the East Refuse Disposal Area. The Project would result in a permanent change to the geology of the Project Area due to removal of a portion of the Herrin No. 6 coal seam and fracturing of the overburden due to subsidence.

Although the Shadow Area would not be subject to FPPA due to plans to fully restore it to agricultural use (USDA 2019), TVA opted to consider the effects of the Action Alternative on prime farmland and farmland of statewide importance.

Surface Disturbances

Based on soils data obtained from the USDA Web Soil Survey, approximately 7,798 acres (approximately 54 percent) of the Shadow Area is designated as prime farmland or farmland of statewide importance. During construction and operations, farmland would be temporarily disturbed at the locations of the Bleeder Shaft Facilities (approximately 27 acres). The Bleeder Shaft Facility locations would be restored to IDNR-OMM-approved post-mining conditions involving re-contouring to restore the hydrology, as described in Section 2.1.2.3. Therefore, no permanent impacts to soils or farmland are anticipated in these areas.

Approximately 451 acres (approximately 86 percent) of the East Refuse Disposal Area site is designated as prime farmland or farmland of statewide importance. The East Refuse Disposal Area would not be fully removed; instead, the disposal area would be filled to capacity, capped with soils, and made to adequately drain, as described in Section 2.1.2.3. Due to the lack of full restoration, permanent effects to prime farmland on approximately 164 acres (approximately 31 percent) of the 525-acre disposal area site are anticipated. However, this area could likely be used as pasture land following partial restoration. Overall, these effects to prime farmland would be minor due to being a small percentage in farmland across Franklin County (less than 0.3 percent) and the state (less than 0.002 percent; USDA 2017).

Coal Extraction-Related Effects

The Project would result in a permanent change to the geology of the Project Area due to removal of a small portion of the Herrin No. 6 coal seam. Overall, these effects would be minor as the Project would extract approximately 4.5 percent of the total available acreage of the Herrin No. 6 coal seam. The subsidence resulting from the coal removal would also result in the long-term fracturing of the overburden.

Subsidence could temporarily affect approximately 5,519 acres of prime farmland and farmland areas of statewide importance within the Shadow Area due to changes in surface drainage patterns and soil moisture. 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 six-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.

The permanent impact to prime farmland post-reclamation would be minor due to planned reclamation efforts to return the area to IDNR-OMM-approved post-mining drainage patterns. Per IDOA, “Agriculture Department staff serve as advisors to the coal mining industry and the IDNR 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 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). IDOA reviewed the SBR No. 6 permit application and expressed no concerns given that the subsided area would be restored.

IDNR-OMM ensures that the 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 would be 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 the affected fields, and

- Alteration or construction of additional waterways would be compensated by paying the fair market value for the acreage removed from production, or

- Other reasonable compensation that may be mutually negotiated with a landowner on a case-by-case basis.

Cumulative Effects

Cumulatively, the Action Alternative along with other mining operations within 20 miles of the Project, including the activities associated with the No Action Alternative, would result in permanent removal of approximately 57 percent of the Herrin No. 6 coal seam. Permanent, cumulative effects to prime farmland due to existing and proposed refuse disposal areas within the surface effects area would impact approximately 6,400 acres in Franklin County. These permanent changes to farmland would affect approximately 0.02 percent of farmland across the state (USDA 2017).

3.2. Water Resources

This section describes the potentially affected environment and environmental consequences for groundwater, surface water, wetlands, floodplains, water quality, and water supply. Water resources were identified using a combination of the USGS topographic maps, aerial photographs, USDA soil surveys, USGS NHD, USFWS NWI, literature references, onsite observations during field surveys of portions of the Project Area, and mail surveys administered by Sugar Camp.

3.2.1. Groundwater/Aquifers

3.2.1.1. Affected Environment

The Project Area is located in the glaciated upland area of northeastern Franklin County and western Hamilton County, 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 Big Muddy River Valley, west of the Project Area. The glacial deposits are generally thin and are not water-yielding (ISGS 1956).

Minor scattered sand and gravel surficial aquifers with potential surficial sources exist in the Middle Fork Big Muddy River Valley and its larger tributaries, such as Sugar Camp Creek, Ewing Creek, Akin Creek and Jordan Creek. These aquifers produce some low-yield water supplies.

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 into these formations are usually less than 10 gallons per minute, with yields less than five gallons per minute common. 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 are generally not developed. Recharge to these bedrock aquifers is primarily from precipitation that percolates into and through the overlying unconsolidated materials. Recharge primarily takes place at outcrop areas for the various bedrock units. Several landowners reported using wells installed in Pennsylvanian sandstone ranging from 200 to 360 feet in depth (less than a third as deep as the Herrin No. 6 coal seam). Yields of less than 5,000 gallons per day are generally reported for domestic wells finished in these formations. A bedrock aquifer associated with Pennsylvanian strata in the depth range of 200 to 360 feet 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.

The Mt. Simon Sandstone, Trivoli Sandstone, and the Anvil Sandstone bedrock strata discussed in Section 3.1.1 are potential water bearing bedrock strata. The Mt. Simon Sandstone is highly saline in Southern Illinois and is not used as a potable aquifer. Even though the Trivoli Sandstone is a widespread unit, rapid lateral facies changes occur which limits the Trivoli's utility as a reliable aquifer (Willman 1975) and is quite saline.

As a result of the existing longwall mining operations, Sugar Camp has reportedly experienced water diminishment in wells within the Project Area; however, IDNR has not been contacted by any resident regarding well water issues. Due to this diminishment, Sugar Camp provided well owners with public water supply connections and has a plan in place to continually monitor water levels in these wells.

3.2.1.2. Environmental Consequences

3.2.1.2.1. The No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to groundwater. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR-OMM permit requirements.

Surface disturbance activities are not anticipated to impact groundwater quantity as no consumptive uses of groundwater are planned. As a result of the formation of subsidence fractures, temporary, short-term groundwater quantity impacts could potentially occur in the 22,484-acre subsidence area associated with the private/TVA-approved shadow area. The No Action Alternative would be subject to Sugar Camp's groundwater monitoring program, which necessitates routine monitoring and compliance. Therefore, minor, temporary impacts to groundwater would occur under the No Action Alternative.

3.2.1.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan. Surface disturbance activities are not anticipated to impact groundwater quantity as no consumptive uses of groundwater are planned. Temporary, short-term groundwater quantity impacts from subsidence could potentially occur resulting from the formation of subsidence fractures.

Sugar Camp's groundwater monitoring program is designed to provide sufficient lead time for identification of any potential impacts, as well as to provide ample time for the investigation and mitigation of any impacts. Sugar Camp is required to monitor the groundwater throughout the life of the mine, up to and including the time of final bond release. IDRN-OMM reserves the right to add monitoring parameters or monitoring locations should the need arise.

Surface Disturbances

Due to the use of casings that would isolate the ventilation shafts from groundwater, the construction and operation of Bleeder Shaft Facilities would not adversely affect groundwater. Other components associated with the Bleeder Shaft Facilities would also not impact groundwater.

The East Refuse Disposal Area would be subject to Sugar Camp's groundwater monitoring program, which necessitates routine monitoring and compliance, as described above. Non-

compliance with the groundwater monitoring program would be investigated and mitigated appropriately.

Overall, impacts to groundwater resulting from the surface disturbances would be minor and insignificant.

Coal Extraction-Related Effects

While unlikely in the areas where the room-and-pillar method is used, planned subsidence of up to 5.5 feet would occur in areas where longwall mining methods are used. Any subsidence could potentially alter any water-bearing strata. Subsidence can either cut off groundwater flow by the compression of rock layers or increase groundwater flow because the rock layers are fractured, giving water more passages to move through (Owili-Eger 1983). In some cases, poor (water quality and quantity) aquifers can improve after mining because of this increased groundwater flow (Booth and Spande 1991).

Since no major aquifers exist in the area, the fracturing of rock layers during subsidence would not likely cause a significant change in underground hydrologic patterns. Groundwater quantity is expected to recover to pre-mining levels through time. No significant, detrimental impacts on drinking, domestic and residential water supplies are anticipated.

Per IDNR-OMM requirements, wells would be monitored during subsidence operations and any decrease in water quality and/or quantity would be remediated by Sugar Camp, and adequate clean water would be supplied to the parties affected until the remediation is completed.

Cumulative Effects

Cumulatively, short-term, moderate groundwater quantity impacts from subsidence would occur from the formation of subsidence fractures associated with the Action Alternative and other mining actions within 20 miles of the Project, including the activities associated with the No Action Alternative. However, significant cumulative impacts to groundwater would not occur due to implementation of the IDNR-OMM-required groundwater monitoring program and reclamation plan. A cumulative hydrologic impact assessment done by IDNR for the entire UCM Permit No. 382 shadow area and nearby permitted areas found that the mining operations were designed to prevent material damage to the hydrologic balance in the permit areas and surrounding vicinities.

3.2.2. Surface Waters and Wetlands

Surface waters and wetlands in the Project Area were identified using a compilation of data from the NHD, NWI, and non-digitized field survey results. The field surveys were conducted between 2005 and 2007 by Alliance Consulting, Inc., and their sub consultant HDR/Cochran and Wilken, Inc., and in 2012 by EcoSource, Inc. In 2019, Alliance Consulting compiled the results of these efforts into one report for Sugar Camp's use in the SBR No. 6 permitting process (Appendix D; Alliance Consulting 2019a). The compilation of the 2005, 2007, and 2012 field surveys would require approval by USACE prior to or concurrently with the completion of CWA Section 404 and 401 permit applications.

3.2.2.1. Affected Environment

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 six sub-watersheds of the Middle Fork Big Muddy River watershed: Sugar Camp Creek (Hydrologic Unit Code [HUC] 071401060402), Carlton Branch-Middle Fork Big Muddy River (HUC 071401060403), Jordan Creek-Middle Fork Big Muddy River (HUC 071401060405), Sullivan Branch-Middle Fork Big Muddy River (HUC 071401060401), Akin Creek (071401060404), and Ewing Creek (HUC 071401060407).

Seven named streams, Granny Creek, Carlton Branch, Web Hill Branch, Sugar Camp Creek, Campbell Branch, Sullivan Branch, Ewing Creek, and Middle Fork Big Muddy River as well as multiple unnamed tributaries and creeks flow through the Project Area (Table 3-1 and Figure 3-2). The Middle Fork Big Muddy River is listed as impaired for chloride, iron, mercury, and sedimentation/siltation on the 303d list of impaired waters (IEPA 2018; see Section 3.2.4). According to the NHD, there are approximately 317,749 linear feet of streams in the Shadow Area and approximately 64,991 linear feet of streams in the surface effects area. Surveys for surface water at the East Refuse Disposal Area location identified a total of 34 stream channels (27,806 linear feet), consisting of 17 ephemeral streams (11,059 linear feet) and 17 intermittent streams (16,647 linear feet).

Table 3-1. Named Streams within the Project Area

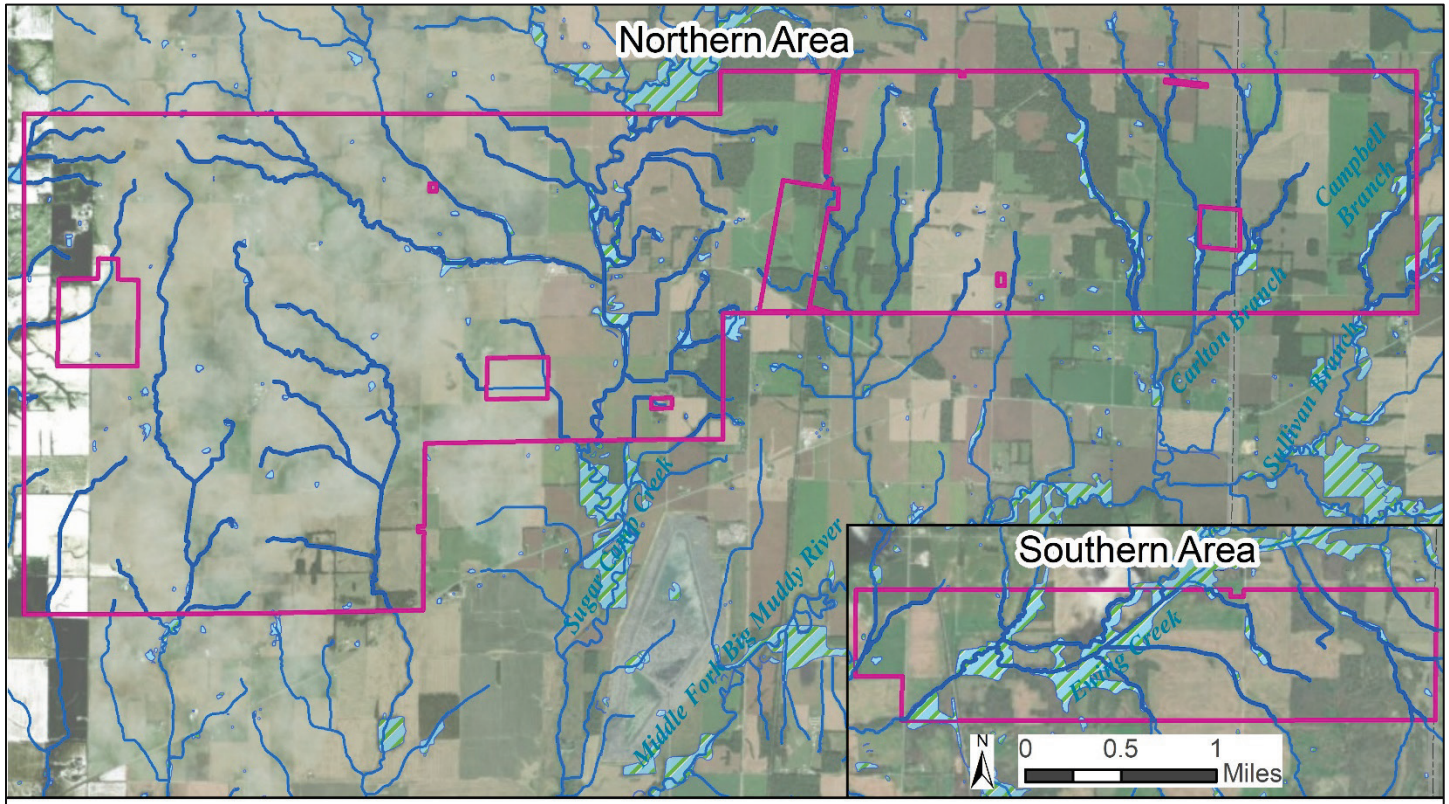
Named Waterbody	Shadow Area	Surface Effects Area
Granny Creek	X	
Carlton Branch	X	
Web Hill Branch	X	
Sugar Camp Creek	X	X
Campbell Branch	X	
Sullivan Branch	X	
Ewing Creek	X	
Middle Fork Big Muddy River		X

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

The NWI is produced by USFWS and provides information on the characteristics, extent, and status of wetlands and deepwater habitats in the U.S. NWI mapping is broad scale, providing approximate locations of wetlands one acre or larger. NWI data was obtained from the USFWS online wetland mapper.

Within the Shadow Area, NWI data indicate that there are approximately 33.8 acres of ponds, 353 acres of freshwater forested/shrub wetlands, and 3.9 acres of emergent wetlands (Figure 3-3). Within the surface effects area, NWI data indicate that there are approximately 6.4 acres of ponds, 49.5 acres of freshwater forested/shrub wetlands, and

12.5 acres of emergent wetlands (Figure 3-4). Surveys for wetlands and ponds at the East Refuse Disposal Area location identified a total of six wetlands (1.4 acres) and one pond (0.2 acres).



Shadow Area

National Hydrography Dataset	Frequency	Feet
Streams	136	317,749

National Wetland Inventory	Frequency	Acres
Emergent Wetlands	9	4
Forested/Shrub Wetlands	28	353
Freshwater Ponds	70	34

Figure 3-3. Surface Waters and Wetlands within the Shadow Area, per NHD and NWI

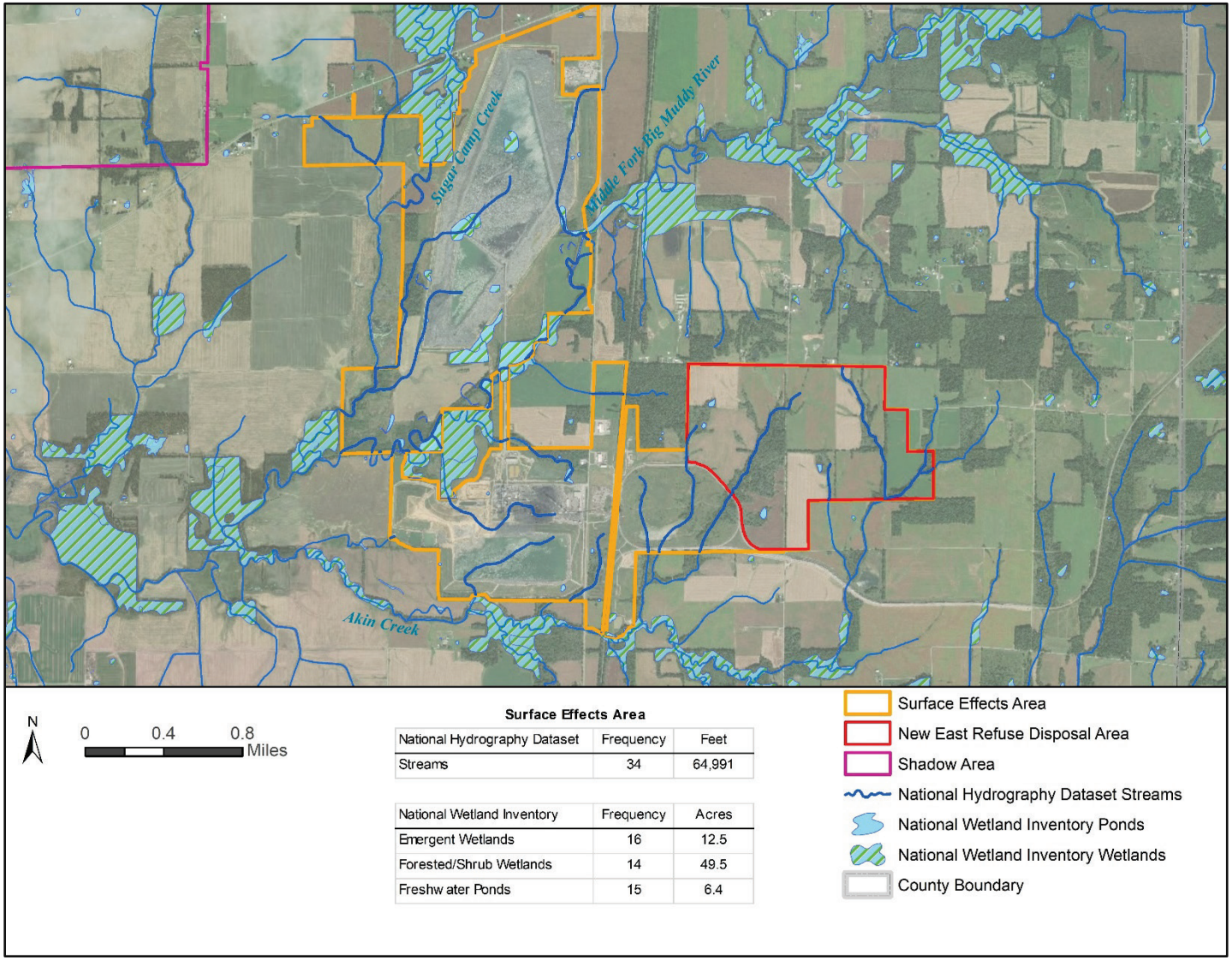


Figure 3-4. Surface Waters and Wetlands within the Surface Effects Area, per NHD and NWI

3.2.2.2. Environmental Consequences

3.2.2.2.1. The No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to surface waters and wetlands. Per IDNR-OMM permit requirements, Sugar Camp has secured or would secure all necessary approvals from appropriate agencies, including, but not limited to, USACE, IEPA, and IDNR-OWR and implement the IDNR-OMM-approved mitigation plans. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these would continue to be minimized or mitigated, per IDNR-OMM permit requirements.

According to Sugar Camp, the bleeder shaft facilities associated with the No Action Alternative have been or would be located to avoid Waters of the U.S. to the maximum extent practicable. Construction on the site of the East Refuse Disposal Area would impact 27,806 linear feet of ephemeral and intermittent streams, 1.4 acres of wetlands, and one pond totaling 0.2 acres. As described in Section 1.5.2, these impacts to Waters of the U.S. would be subject to USACE 404 permits and IEPA 401 WQCs and mitigated, if and as required by Section 404 and 401 permit conditions. As required and approved by IDNR-OMM, the subsidence mitigation plan is site specific and consists of re-establishing pre-mining drainage patterns by grading and/or tiling to drain areas of trapped or standing water, as necessary, with input from the surface property owner and applicable government agencies. Therefore, temporary impacts could occur to surface waters and wetlands, including Waters of the U.S. as a result of subsidence, but hydrology and drainage would be restored under the No Action Alternative with no permanent impacts to wetlands and surface water.

3.2.2.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan. This would result in insignificant impacts to surface waters and wetlands due to surface disturbances and temporary impacts due to planned subsidence in the Shadow Area, as described below.

Surface Disturbances

The effects of construction and operation of the Bleeder Shaft Facilities on surface waters and wetlands would be reviewed by TVA prior to construction, as the exact locations of these facilities are currently unknown. If surface waters occur at the proposed locations of these facilities, direct impacts to streams would be avoided or mitigated. If wetlands are present at the Bleeder Shaft Facilities, there may be permanent impacts to these waterbodies due to surface disturbances. Major impacts to surface water and wetlands are not expected and would be avoided to the maximum extent practicable.

Construction on the 525-acre site of the East Refuse Disposal Area would impact 27,806 linear feet of ephemeral and intermittent streams, 1.4 acres of wetlands, and one pond totaling 0.2 acres (Alliance Consulting 2019a). As described in Section 1.5.2, impacts to Waters of the U.S. would be subject to USACE 404 permits and IEPA 401 WQCs. Impacts to streams and wetlands, including Waters of the U.S., would be mitigated as required by these permits.

Coal Extraction-Related Effects

As a condition of the subsidence mitigation plan associated with SBR No. 6, Sugar Camp must return water flow patterns to pre-subsidence patterns through stream mitigation activities. Additionally, if a man-made pond were to be affected by subsidence, Sugar Camp would be required to reconstruct the ponds to their original configuration.

Subsidence can affect surface water by altering stream elevations and gradients, thus affecting drainage patterns. Sugar Camp is required by IDNR-OMM 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 as the State of Illinois and USACE. No change in the availability of surface water in the Shadow Area and adjacent area is anticipated.

Prior to reclamation, there could be temporary impacts to the approximately 403 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 changes in groundwater and subsurface flow due to subsidence could create increased temporary wetland vegetation in new areas of standing water (Nawrot et al. 2003). As a part of the IDNR permitting process, drainage must be corrected following subsidence in order to restore the hydrology of the subsided area to IDNR-OMM-approved post-mining topographic conditions. After landscape re-contouring, the flow would largely be restored to pre-mining conditions, and the newly-created ponded areas would decrease. Figure 3-5 indicates areas that would be likely to pond and locations where drainage corrections would be necessary. Once hydrology is restored, no permanent impacts would remain and overall impacts to surface waters and wetlands from subsidence would be insignificant.

Cumulative Effects

Cumulatively, moderate temporary impacts to surface waters and wetlands could occur due to the overall subsidence associated with the Proposed Action and other mining actions within a 20-mile radius, including the activities associated with the No Action Alternative. No significant cumulative impacts in association with the surface effects areas of the Action Alternative and other mining actions are anticipated due to avoidance of surface water and wetlands to the maximum extent practicable. Any impacts to Waters of the U.S. are subject to USACE 404 permits and IEPA 401 WQCs and are mitigated as required by these permits. Any impacts to Waters of the U.S. due to subsidence are also subject to the subsidence mitigation plan as required and approved by IDNR-OMM.

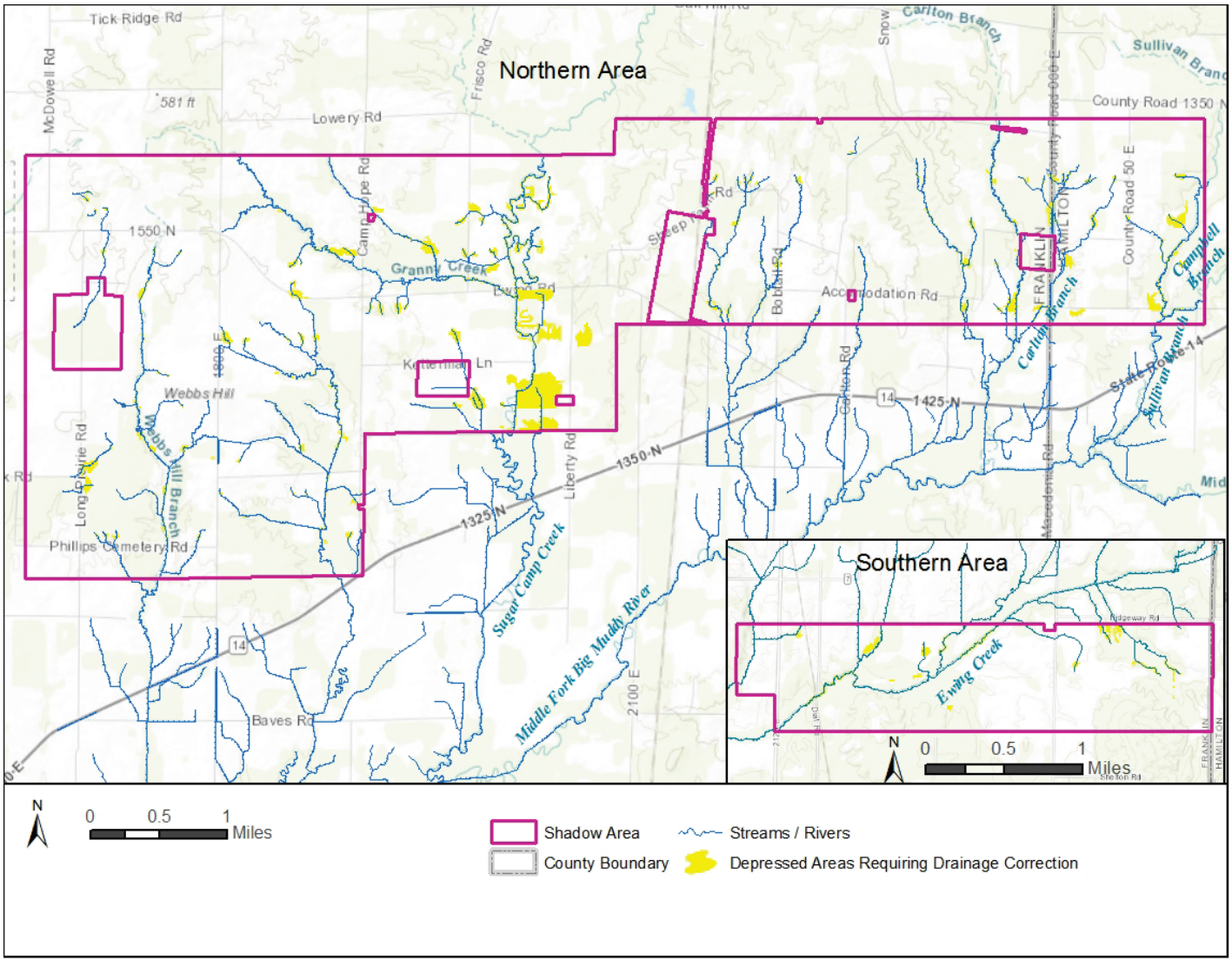


Figure 3-5. Depressed Areas within the Shadow Area Requiring Drainage Correction

3.2.3. Floodplains

3.2.3.1. Affected Environment

Floodplains are 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 one-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.

Five floodplain areas occur in the Project Area. Three are in the northern portion of the Shadow Area (see Figure 3-6). They are associated with Granny Creek/Sugar Camp Creek, Carlton Branch, and Sullivan Branch/Campbell Branch. One floodplain area is in the southern portion of the Shadow Area (see Figure 3-6), and it is associated with Ewing Creek. The fifth floodplain area is associated with the Middle Fork Big Muddy River and is where the surface effects area is located. The 100-year floodplain covers approximately 1,307 acres within the Shadow Area. The 100-year floodplain also covers approximately 747 acres within the surface effects area.

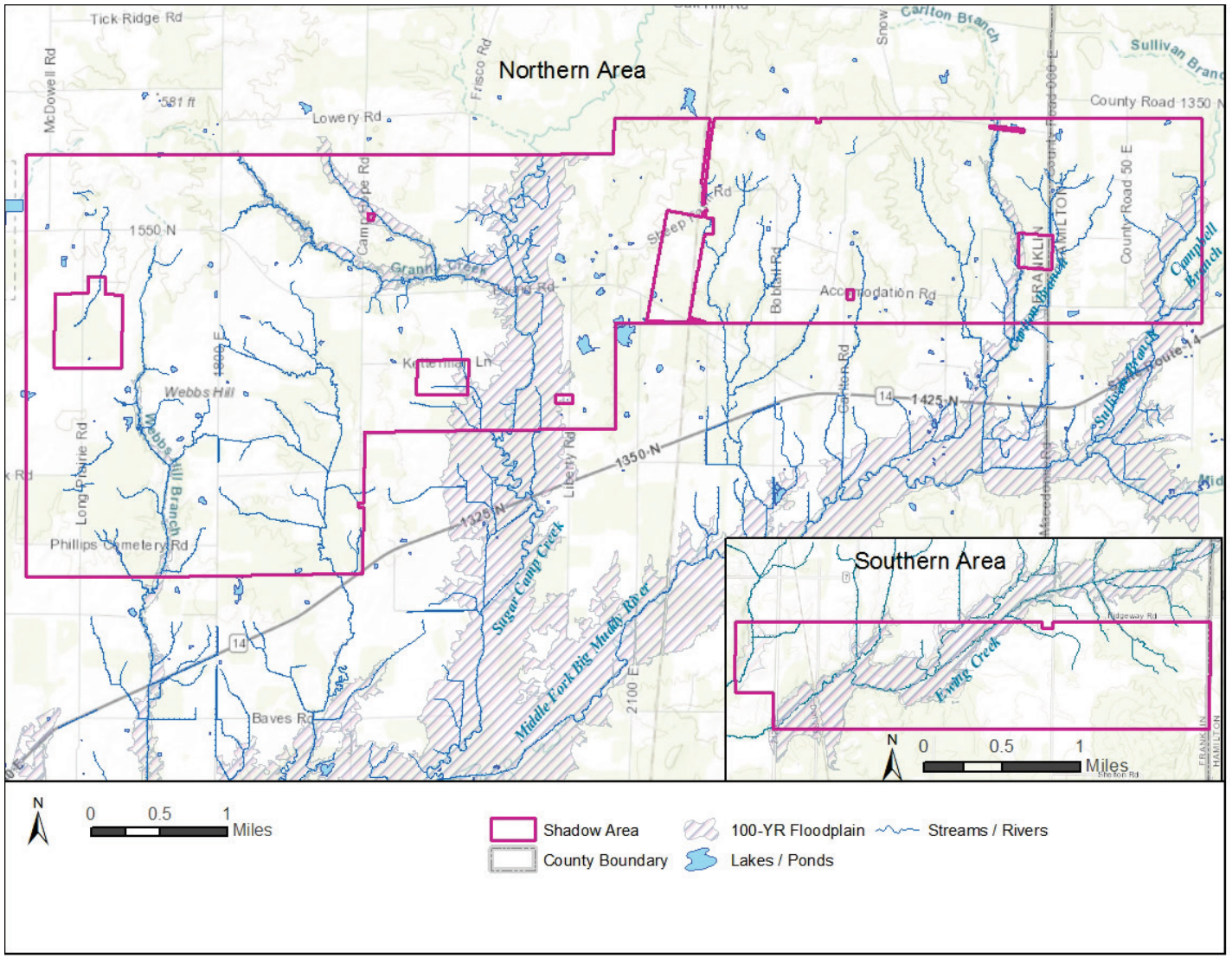


Figure 3-6. Floodplains within the Shadow Area

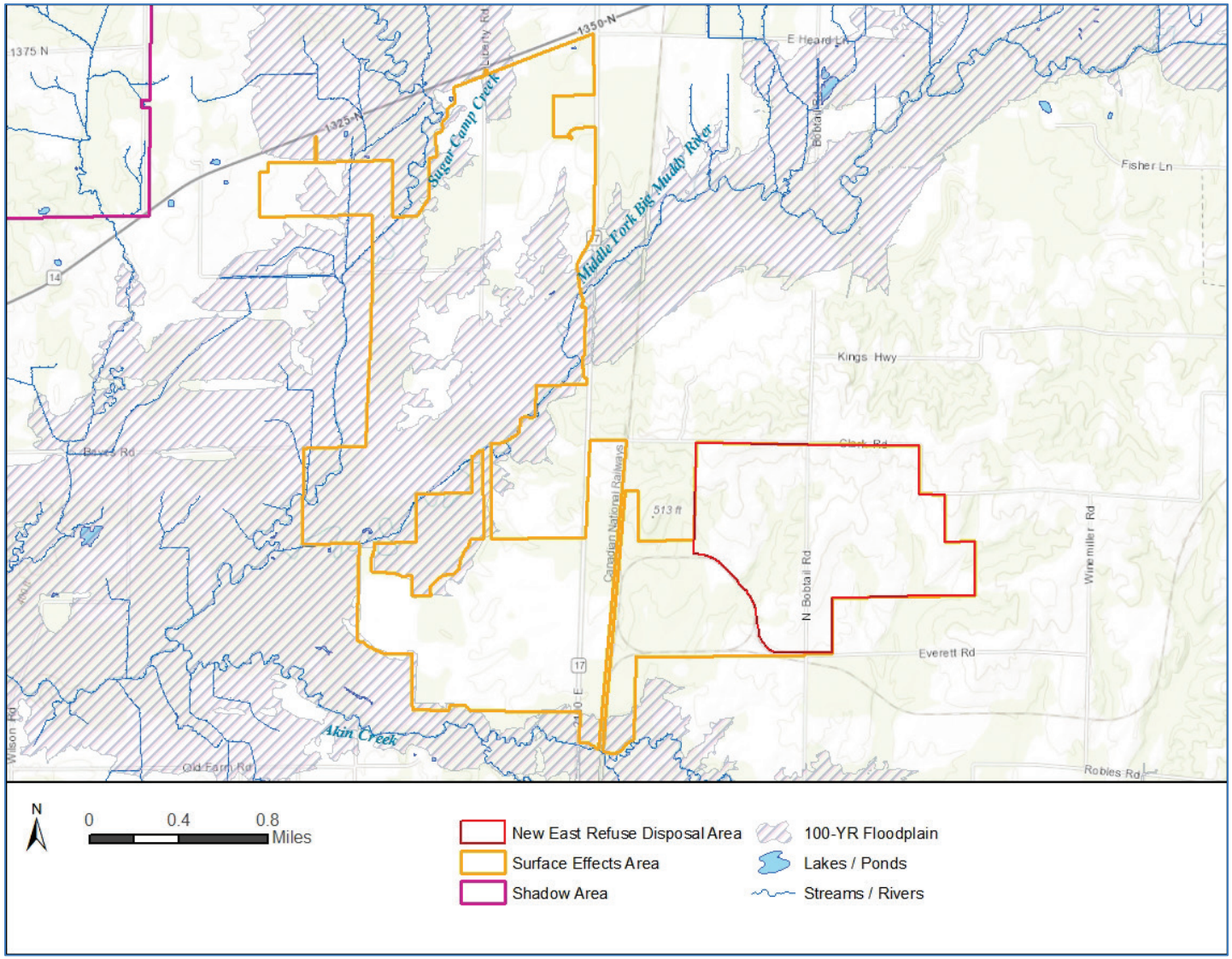


Figure 3-7. Floodplains within the Surface Effects Area

3.2.3.2. Environmental Consequences

As a federal agency, 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 11998, 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.

3.2.3.2.1. The No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to floodplains. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR-OMM permit requirements (see Section 1.3 for previous environmental reviews that analyzed impacts from previously approved TVA-owned coal).

3.2.3.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan, which would result in surface disturbances and coal extraction-related effects. Subsidence from coal extraction could temporarily increase the size of floodplains and flood depths and alter drainage patterns. The East Refuse Disposal Area would have no impacts to floodplains, while the Bleeder Shaft Facilities have not yet been sited and, therefore, could have impacts to floodplains. By adhering to the following mitigation measure, TVA's approval of the proposed mining plan and alteration of the terms of the coal lease agreement would comply with EO 11988, and there would be no significant impacts to floodplains and their natural and beneficial values.

- In future environmental reviews, TVA would analyze floodplain impacts, including the Floodplains No Practicable Alternative analysis, if applicable, prior to construction of each of the five Bleeder Shaft Facilities, and potential impacts would be avoided or minimized.

Surface Disturbances

Surface disturbances would include the construction of five bleeder shafts, use of an existing Coal Preparation Plant, and use of a proposed East Refuse Disposal Area.

The exact locations of the five Bleeder Shaft Facilities are not known at this time, as the locations are largely dictated by the underground mining operations as they occur. In a subsequent environmental review, TVA would analyze floodplain impacts of siting the five Bleeder Shaft Facilities, including the Floodplains No Practicable Alternative analysis, if applicable, prior to construction, and potential impacts would be avoided or minimized. Because Bleeder Shaft Facilities are not one of the repetitive actions evaluated in the *Class Review of Repetitive Actions in the 100-Year Floodplain* (TVA 1981), the Floodplains No Practicable Alternative analysis would need to be completed for any Bleeder Shaft Facilities that are proposed to be constructed in 100-year floodplains.

While floodplains occur within the surface effects area, the East Refuse Disposal Area is located outside of floodplains. Thus, no effects to floodplains are expected as a result of construction and operations of the East Refuse Disposal Area.

Coal Extraction-Related Effects

At the completion of longwall mining, subsidence would occur within the floodplains of Granny Creek/Sugar Camp Creek, Carlton Branch, and Sullivan Branch/Campbell Branch and several tributaries within the Shadow Area. Prior to reclamation, subsidence from underground mining could temporarily increase the size of floodplains due to the decrease in surface elevation and alteration of drainage patterns. In addition, flood depths in existing floodplain areas could temporarily increase. Per IDNR-OMM requirements, Sugar Camp must 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 other structures within potentially flooded areas (IDNR 2008).

Cumulative Effects

During the siting of surface facilities, Sugar Camp and other mine permit applicants evaluate the potential effects of proposed activities within the 100-year floodplain. One of the five existing or proposed refuse disposal areas associated with the Action Alternative and other mining actions considered within the same watershed, including the past and known future activities associated with the No Action Alternative, is located within a floodplain without a known base flood elevation, thus resulting in permanent impacts to floodplains. Subsidence-induced flooding and drainage changes in floodplains require correction by IDNR-OMM. Thus, significant long-term, cumulative impacts to floodplains would not occur with implementation of the Action Alternative due to the application of corrective measures.

3.2.4. Water Quality

3.2.4.1. Affected Environment

CWA requires that states set water quality standards for all contaminants in surface waters. These standards are typically based on criteria recommended by USEPA. CWA also regulates the discharge of pollutants in surface waters. Section 303(d) of CWA requires states to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. Additionally, IDNR-OMM works closely with the IEPA Mine Pollution Control Unit to address environmental matters concerning mine operations, ensure permit requirements are met, and control pollution from mining activities.

IEPA has established water quality standards and designated uses for streams and lakes across the state, and issues periodic reports on waterbodies not meeting these standards and uses. Generally, characteristics considered during the assessments are temperature, dissolved oxygen, pH, nutrients, sedimentation, siltation, loss of habitat and contaminants. As part of this program, IEPA issues a list of impaired waters called the “303(d) List,” referring to Section 303(d) of the federal CWA. The Middle Fork Big Muddy River located within the Project Area is listed as impaired on the 2018 303(d) list due to dissolved oxygen, chloride, iron, mercury, and sedimentation/siltation (IEPA 2018).

Potential groundwater bearing bedrock strata in the Project Area include the Mt. Simon Sandstone, the Trivoli Sandstone, and the Anvil Sandstone. The Mt. Simon Sandstone is highly saline in Southern Illinois and is not used as a potable aquifer. Even though the Trivoli Sandstone is a widespread unit, rapid lateral facies changes occur which limits the Trivoli’s utility as a reliable aquifer (Willman 1975) and is quite saline. During the IDNR mine permitting

process, residents in the area reported water quality to be good (HMG Engineers 2018). Additionally, the Illinois Groundwater Protection Act (IGPA) outlines a prevention-orientated process for monitoring and establishing groundwater protection standards. IGPA establishes partnerships with agencies like IPEA and IDNR to assist in compliance and enforcement of groundwater quality standards, as necessary (IGPA 2014).

IEPA and IDNR previously approved high chloride water treatment methods used at existing Sugar Camp Mine Number 1 facilities. As the longwall operation progress and the roof rock fractures, high chloride water is draining into the mine workings. The water is then pumped to the surface and treated at a reverse osmosis plant. Approximately two million gallons per day (75 percent) of the treated water are pumped directly to a settling pond, where it is then utilized by the existing Coal Preparation Plant. Approximately 675,000 gallons per day (25 percent) of the treated water is disposed of in existing on-site deep injection wells or is deposited to the existing refuse disposal areas in the surface effects area. As another measure, Sedimentation Pond 003, located at the existing south refuse disposal area, is managed by pumps to reduce discharges from Outfall 003 that may potentially contain high chloride water. The existing refuse disposal areas were constructed with a low permeability liner that restricts the groundwater flow into and out of the refuse disposal areas. The design of the existing refuse disposal areas, including the low permeability liner, was approved by IDNR-OMM.

Sugar Camp Mine holds an individual NPDES permit issued by IEPA to discharge water from 14 existing outfalls from sedimentation ponds associated with the existing refuse disposal areas and one existing sanitary wastewater discharge (Appendix D). The NPDES permit covers discharge limitations, monitoring, and reporting requirements and details specific conditions for each outfall. The individual NPDES permit also requires monitoring and reporting requirements for 21 groundwater monitoring wells associated with the existing refuse disposal areas.

3.2.4.2. Environmental Consequences

3.2.4.2.1. The No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to water quality. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be mitigated, per IDNR-OMM permit requirements.

The mining and processing of previously approved TVA-owned coal and privately owned coal would continue to operate and discharge water via the 15 outfalls permitted by the NPDES permit and as monitored by IEPA. In considering the SBR No. 6 permit application, IDNR-OMM concluded that the surface and groundwater monitoring programs set forth in the NPDES permit held by Sugar Camp were designed to sufficiently address water quality impacts. IDNR-OMM further concluded that mining operations were designed to prevent material damage to the hydrologic balance in the permit areas and surrounding vicinities. Overall processing capacity of the existing Coal Preparation Plant and associated permitted discharges that are covered under the current NPDES permit would not increase under the No Action Alternative. A revision to the NPDES permit would be required to add additional surface water discharge outfalls; this revision could require the installation of additional groundwater monitoring wells to monitor the potential effects of the East Refuse Disposal Area. Thus, water quality impacts associated with the current mining and processing of previously approved TVA-owned coal and privately owned coal would continue to be monitored and subject to the NPDES reporting requirements. Any violation of effluent exceedances would result in noncompliance with the NPDES permit and

would be subject to formal enforcement action. As of July 2020, all previously reported effluent exceedances had been abated.

3.2.4.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining. This may result in temporary impacts to water quality due to surface disturbances, mining operations, and planned subsidence and mineralization in the Shadow Area and adjacent areas.

Regular and ongoing water quality sampling at the 15 existing outfalls within the surface effects area is conducted per certain conditions detailed in the NPDES permit. Conditions of the permit require that wells be monitored for potential effects to groundwater from the 15 permitted discharges. When a release of water from a permitted discharge point registers one or more parameters above the water quality standard, mine personnel correct the non-compliant situation and also provide applicable reports to IEPA. Any violation of effluent exceedances would result in noncompliance with the NPDES permit and would be subject to formal enforcement action.

Surface Disturbances

Construction and operations activities related to the Bleeder Shaft Facilities and the East Refuse Disposal Area have the potential to affect surface water quality via stormwater runoff. Erosion and sediment loading leaving these areas could affect the quality of small streams. However, with proper sediment and erosion controls, sediment loading and the introduction of pollutants to the receiving waters would be minimized. During the initial construction, sediment would be managed through the use of erosion and sediment control BMPs, as required by the NPDES permit. 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., sedimentation 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 mining operations. Thus, effects to surface water quality due to construction activities related to new surface disturbances would be insignificant.

The East Refuse Disposal Area would be constructed similarly to the existing refuse disposal areas by installing a low permeability liner and would be approved by IDNR-OMM. The liner would restrict the groundwater flow into and out of the East Refuse Disposal Area. No leachate would be anticipated. A revision to the NPDES permit would be required to add additional surface water discharge outfalls, groundwater wells to monitor the potential effects of the East Refuse Disposal Area, and any new outfalls associated with existing refuse disposal areas on surface water and groundwater quality. IEPA would review and approve the NPDES permit revision and would take appropriate enforcement actions to remedy any violations.

Sugar Camp has established a surface water quality monitoring program as part of the UCM Permit No. 382 to provide sufficient lead time for notification of any potential impacts, as well as to provide ample time for investigation and mitigation of any impacts prior to reaching off-site surface waters. The monitoring program is dynamic as such, that IDNR reserves the right to add monitoring parameters and locations should the need arise. IDNR-OMM's hydrogeologic assessment concluded that the proposed operations within the Shadow Area would not have negative impacts on surface water regimes.

Coal Extraction-Related Effects

Mining can affect surface water quality by increasing sedimentation, nutrient and pesticide loading, and acidic drainage (caused by increasing sedimentation, nutrient loads, manganese, or total dissolved solids from the mined material and reclamation activities). UCM Permit No. 382 SBR No. 6 states that the potential mining-related impacts to surface water in the area encompass approximately 4 to 8 percent of the Middle Fork Big Muddy River Watershed. Water quality impacts would be negligible due the volume of water contributing to the Middle Fork Bid Muddy River at the confluence with both Akin Creek and Sugar Camp Creek. Sugar Camp has established a stream sampling point downstream of the three streams to monitor surface water quality.

The proposed longwall mining in the Shadow Area is expected to cause surface subsidence of approximately 10,549 acres. The mining panels run east to west, while local streams in the northern Shadow Area tend to flow north to south toward Middle Fork Big Muddy River and Akin Creek. Ewing Creek flows northeast to southwest in the southern Shadow Area. Local streams north of Ewing Creek tend to flow north to south, and local streams south of Ewing Creek tend to flow south to north. The subsidence troughs would be oriented either perpendicular to or diagonal to the direction of stream flow in the northern and southern Shadow Areas. Prior to reclamation, subsidence related changes to the topography of the Shadow Area may produce short term surface depressions with localized ponding of surface water or interception of groundwater where the water table is near the surface. Sugar Camp has developed a subsidence mitigation plan that will re-approximate pre-mining drainage patterns by grading and/or filling to drain areas with standing waters.

Per IDNR-OMM requirements, surface water and groundwater quality would be routinely monitored, and any impacts to water quality would be corrected by Sugar Camp. Adequate clean water would be supplied to the parties affected until corrected.

Cumulative Effects

Cumulatively, significant impacts to water quality due to implementation of the Action Alternative along with other mining actions within the same watershed, including the activities associated with the No Action Alternative, would be avoided with implementation of the IDNR-OMM-required groundwater monitoring program, water quality sampling activities, and reclamation plan. A cumulative hydrologic impact assessment done by IDNR for the entire UCM Permit No. 382 shadow area and nearby permitted areas found that the mining operations were designed to prevent material damage to the hydrologic balance in the permit areas and surrounding vicinities.

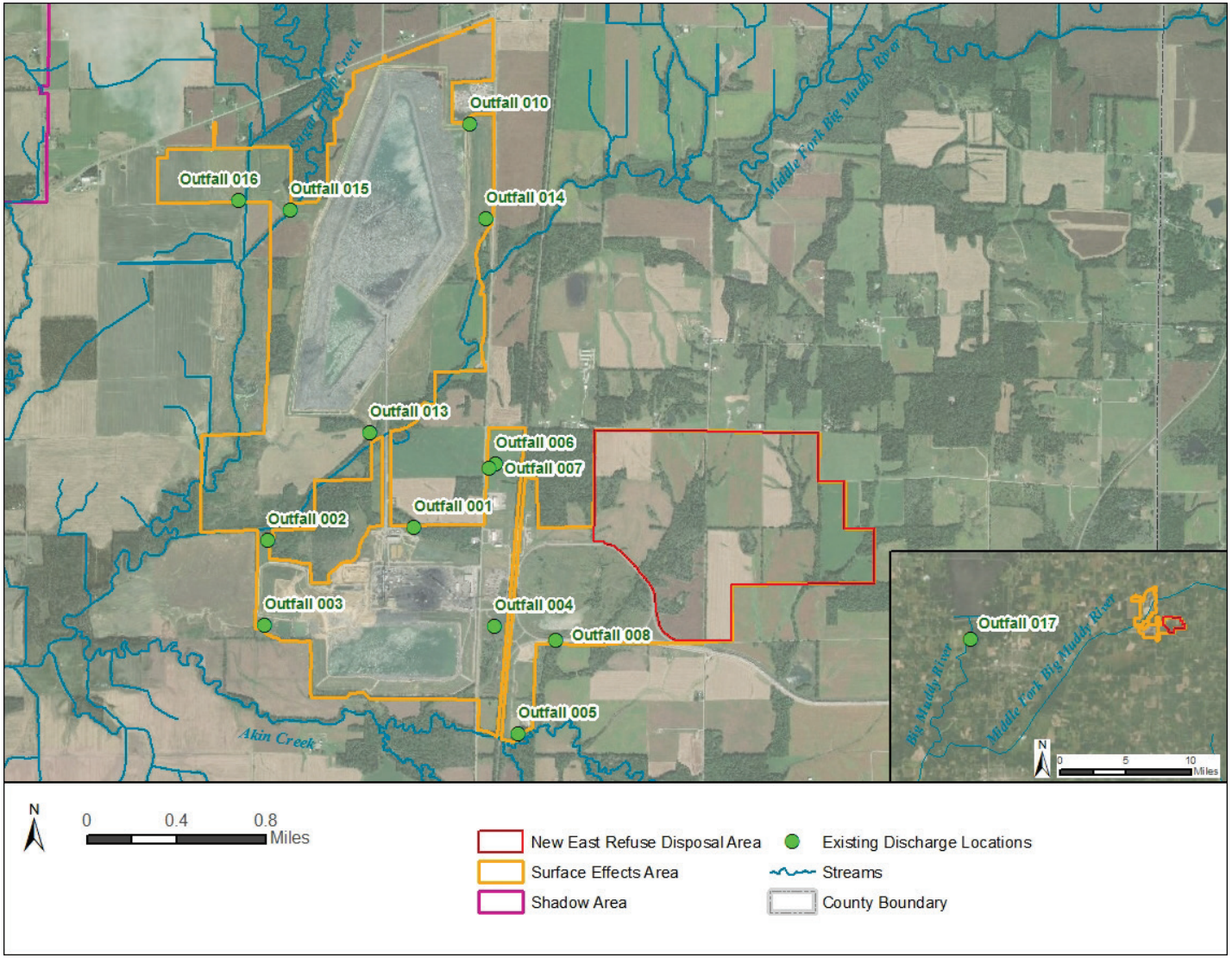


Figure 3-8. Existing Discharge Locations associated with Sedimentation Ponds within Surface Effects Area

3.2.5. Water Supply

3.2.5.1. Affected Environment

The Project Area is served by public utility water by the Macedonia Water System, the Ewing-Ina Water Commission, Akin Water District, and Hamilton County Rural Water District. The source of the water supply for these water districts is Rend Lake, located approximately three miles west of the northern 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. Public water supply lines occur within the Project Area, as discussed in Section 3.8.

Of the 55 wells and 17 cisterns reported in the Shadow Area, 39 were reported to be used for household or drinking water, and 11 were reported to be used for livestock, gardening, or agricultural uses (Table 3-2; Figure 3-9; HMG Engineers 2018). Twenty-two of the wells or cisterns were reported as no longer used. One well was reported within the surface effects area (see Figure 3-15 in Section 3.8.2.2).

Table 3-2 lists the wells and cisterns located within the Shadow Area.

Table 3-2. Water Usage in the Shadow Area

Type	Frequency
Domestic wells (drinking or household use)	39
Wells (purposes other than drinking or household use)	8
Wells (no longer used)	8
Cisterns (purposes other than drinking or household use)	3
Cisterns (no longer used)	14

Source: HMG Engineers 2018

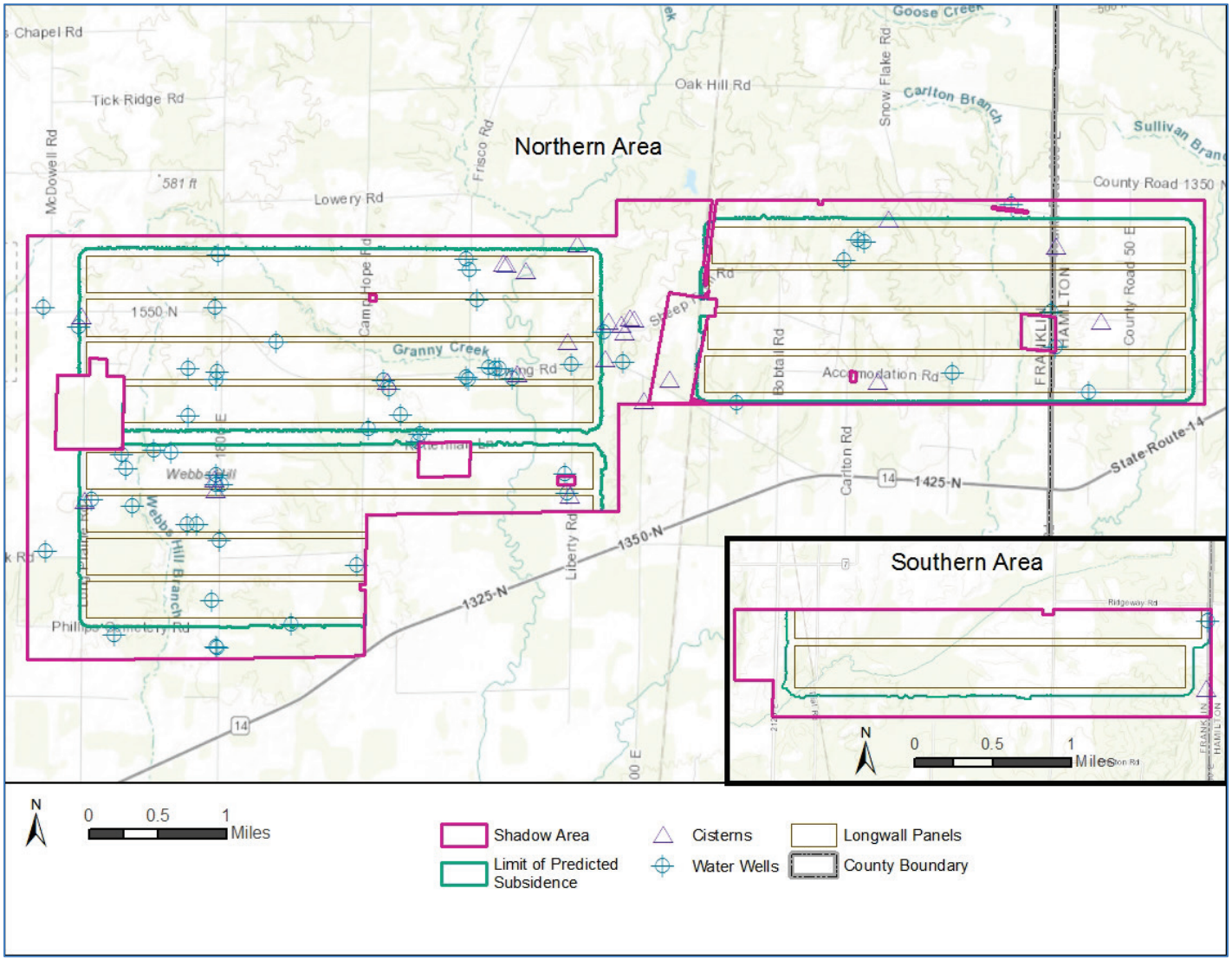


Figure 3-9. Wells and Cisterns within the Shadow Area

3.2.5.2. Environmental Consequences

3.2.5.2.1. The No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to water supply. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR-OMM permit requirements.

The mining and processing of previously approved TVA-owned coal and privately owned coal would continue to utilize water supplied from Rend Lake. Additionally, Sugar Camp would monitor wells to detect decreases in water supply. Sugar Camp would remediate adverse effects to the water supply sources in their permitted mining areas. This remediation could include supplying residents and businesses with adequate clean water.

3.2.5.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining. This may result in temporary impacts to water supplies due to planned subsidence in the Shadow Area. Potential effects to water supplies or availability would be mitigated, per IDNR-OMM requirements.

Surface Disturbances

No effects to water supplies would occur from surface disturbances related to the construction and operations of the Bleeder Shaft Facilities and the East Refuse Disposal Area. The existing Coal Preparation Plant utilizes water supplied mostly from mine dewatering activities, which is added to the sediment ponds, utilized for the Coal Preparation Plant, and recirculated to be used again. The withdrawal of supplemental makeup water from Rend Lake was approved by USACE in 2011 (USACE 2011). The use of this supplemental makeup water is anticipated to be minimal as underground coal mines in Illinois typically produce enough water to meet preparation plant needs. As the Coal Preparation Plant is likely to operate for a longer period of time but not increase in treatment capacity, water withdrawals from Rend Lake may occur over more years but would not significantly change daily or annually and would only occur for supplemental water needs.

Coal Extraction-Related Effects

Subsidence could cause either an increased or decreased flow to water wells, depending on how the rock layers fracture. No major surficial aquifers have been recorded within the Project Area vicinity; 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. These wells pump water from the overburden area that would be fractured by the planned subsidence.

The water level in the Project Area 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 IAC 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 potential impacts due to subsidence (IDNR 2008). Per the UCM application process, Sugar Camp signed an affidavit confirming that all documents and rights bestowed to

legally conduct subsidence would be provided by IDNR-OMM. This would include any missing agreements for water wells and the associated sampling.

Cumulative Effects

Cumulatively, temporary, moderate impacts would occur to groundwater supply as a result of subsidence of the Proposed Action and other mining operations considered within the Middle Fork Big Muddy River Watershed, including those associated with the No Action Alternative. Cumulative impacts to groundwater supply would be temporary due to implementation of IDNR-OMM-required groundwater monitoring and remediation of any decreases in water supply. Cumulative impacts to Rend Lake as a result of water withdrawal for supplemental makeup water for the Coal Preparation Plant, combined with any other mine operation withdrawal, are anticipated to be minimal over the life of the Project and would not significantly change daily or annually. A cumulative hydrologic impact assessment done by IDNR for the entire UCM Permit No. 382 shadow area and nearby permitted areas found that the mining operations were designed to prevent material damage to the hydrologic balance in the permit areas and surrounding vicinities.

3.3. Air Quality and Greenhouse Gases

This section describes the potential affects to air quality and greenhouse gases. Potential effects were identified using a combination of USEPA data and literature references.

3.3.1. Air Quality

3.3.1.1. Affected Environment

As required by CAA and its amendments, USEPA 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), particulate matter (including inhalable particulate matter [particulate matter with an aerodynamic diameter below 10 micrometers (µm), or PM_{10}] and 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 primary and secondary NAAQS are provided in Table 3-3.

Table 3-3. National Ambient Air Quality Standards

Pollutant	Primary / Secondary	Averaging Time	Level	Form
Carbon monoxide (CO)	primary	8 hours	9 parts per million (ppm)	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)	primary and secondary	Rolling 3 month average	0.15 microgram (µg)/m^3 [1]	Not to be exceeded
Nitrogen dioxide (NO_2)	primary	1 hour	100 parts per billion (ppb)	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	primary and secondary	Annual	53 ppb [2]	Annual Mean

Pollutant	Primary / Secondary	Averaging Time	Level	Form
Ozone (O_3)	primary and secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate matter ($PM_{2.5}$)	primary	Annual	12.0 µg/m^3	annual mean, averaged over 3 years
	secondary	Annual	15.0 µg/m^3	annual mean, averaged over 3 years
	primary and secondary	24-hours	35 µg/m^3	98th percentile, averaged over 3 years
Particulate matter (PM_{10})	primary and secondary	24-hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide (SO_2)	primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	secondary	3-hours	0.5 ppm	Not to be exceeded more than once per year

Source: USEPA 2019a.

1 In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.
2 The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

CAA requires USEPA to determine whether an area is in attainment (regions where a given pollutant's concentration is at or below the established NAAQS) or nonattainment (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 dispersion modeling. Franklin and Hamilton counties are currently designated as in attainment for all NAAQS (USEPA 2019b).

3.3.1.2. Environmental Consequences

3.3.1.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Therefore, the direct and indirect emissions of air pollutants associated with the proposed mining of the approximately 186 million tons of unprocessed TVA-owned coal, with approximately half (i.e., 92.8 million tons) of that coal sent to market as processed coal, would not occur. Direct and indirect emissions of air pollutants from the ongoing mining of approximately 359 million tons of unprocessed previously approved TVA-owned coal and privately owned coal would continue, under terms of the SBR No. 6 permit issued by IDNR-OMM.

3.3.1.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed plan to extract TVA-owned coal primarily during the years 2024 to 2031 and 2036 to 2040. With approval of the mining plan, an estimated 300 thousand processed tons of TVA-owned coal would be produced each year between 2021 and 2023, and approximately 7.1 million tons of processed TVA-owned coal would be produced each of the 13 years TVA coal is mined between 2024 and 2040, resulting in a total production of approximately 92.8 million tons of processed TVA coal. Mining of privately

owned and previously approved TVA coal would occur simultaneously, along with other mining operations within a 20-mile radius of Sugar Camp Mine No. 1; together, these actions would result in a cumulative total of 453.2 million tons of processed coal.

Direct impacts to air quality from mining of the underground coal would continue in amounts similar to those currently experienced; several indirect impacts to air quality would also continue to occur. The main direct source of criteria pollutant emissions associated with the mining operations is the operation of the Coal Preparation Plant. Based on the USEPA emissions inventory database (USEPA 2019c), the Coal Preparation Plant emitted a total of 40.65 tons of PM_{10} and 10.814 tons of PM_{10} in 2017 (no other criteria pollutant emissions were reported). In that year the mine produced 12,812,197 tons of processed coal (USEIA 2019), which results in emission factors of 0.0063 pound (lb) PM_{10}/ton processed coal produced and 0.0017 lb $PM_{2.5}$/ton processed coal produced. Using these emission factors the direct PM_{10} and $PM_{2.5}$ emissions associated with the Action Alternative are approximately 22 tons per year and 6 tons per year, respectively.

Under the Action Alternative, the potential downstream consumers of this coal would burn that coal for energy generation or other industrial purposes resulting in indirect emissions of criteria and hazardous air pollutants (HAPs), as defined and regulated by USEPA. Transportation and handling of the coal to and by the end users would also continue to generate emissions of air pollutants.

During the period 2014 through 2018, between 53 percent and 77 percent of the coal produced by the mine has been shipped to a number of power plants located in the United States including facilities located in Alabama, Florida, Georgia, Indiana, Kentucky, Mississippi, and Ohio, with the remainder delivered to various global commodities firms (USEIA 2019). Some of the coal delivered to the commodities firms is likely exported from the U.S. However, any or all of the mined coal could be used by any combination of these facilities, other domestic facilities, or any international power plant or other user.

The indirect emissions resulting from transportation of the coal to end users were estimated based on information obtained from USEIA (2019) for coal shipments from the mine to domestic power plants in 2018, estimated rail distances to those sites (NS 2011), and rail locomotive emission factors developed by USEPA (USEPA 2009). The ultimate destination and shipment methods for the remainder of the coal mined in 2018 (i.e., purchased by commodities firms) is unknown and beyond the control of TVA. Any attempt to quantify the amount of this coal, if any, that is exported abroad would be highly speculative and add no value to the environmental review. To account for the transportation-related indirect emissions, the results for the 2018 domestically shipped coal were used to estimate transportation-related emissions of that portion of the coal mined, as there are data to estimate such emissions.

To analyze potential indirect emissions resulting from combustion of the mined coal, a range was developed for the indirect emissions to account for the variety of boiler and control equipment configurations in which the mined coal may be combusted. This range has a lower bound based on combustion of the coal in a modern, highly controlled facility (i.e., new domestic) and an upper bound based on combustion of the coal in a boiler equipped with control equipment required to comply with 40 CFR 60, Subpart Da (USEPA 2019d - older domestic boilers) and USEPA (1998). Emissions associated with coal combusted in foreign boilers or other combustion devices are assumed to be adequately represented by the upper bound values.

The range of direct and indirect criteria and select HAP (i.e., mercury, hydrogen chloride and hydrogen fluoride) emissions resulting from the transportation and downstream combustion of the average of 7.1 million tons per year of TVA-owned coal extracted from the Project Area are quantified in Table 3-4.

Table 3-4. Estimated Direct and Indirect Air Pollutant Emissions (tons per year)

Pollutant	Direct	Transpor-tation	Combustion	Total	2014 National Emissions Inventory	% of Total
NO_x	NA	273	6,195 – 53,101	6,468 – 53,374	12,595,526	0.05 – 0.42
CO	NA	260	11,505 – 17,750	11,765 – 18,010	65,646,029	0.02 – 0.03
PM_{10}	22	3.9	2,390 – 2,726	2,416 – 2,752	18,197,553	0.01 – 0.02
$PM_{2.5}$	6	3.9	2,390 – 2,726	2,399 – 2,736	5,391,936	0.04 – 0.05
VOC	NA	9.7	301 – 391	311 – 400	16,912,756	0.002 – 0.002
SO_2	NA	0.9	8,408 – 13,275	8,409 – 13,276	4,675,008	0.18 – 0.28
Hydrogen chloride	NA	NA	71 – 426	71 – 426	Not reported	NA
Hydrogen fluoride	NA	NA	35 – 53	35 – 53	Not reported	NA
Mercury	NA	NA	0.15 – 0.29	0.15 – 0.29	52	0.28 – 0.57

Table 3-4 also provides the corresponding emission level of these pollutants at the national level (where available) for 2014 (USEPA 2019e, the most recent year for which information is available). Comparing the direct and indirect emissions of these pollutants from the Action Alternative to the corresponding emissions of the same pollutants at the national level provides a reasonable proxy for assessing potential downstream air quality impacts at a regional or larger scale. The direct and indirect emissions of each criteria pollutant and select HAPs as a result of coal mining and the downstream combustion of the extracted coal is estimated to be between 0.002% and 0.57% of the total US emissions of those pollutants in 2014.

The downstream combustion of the mined coal is, and would continue to be, subject to applicable regulations under CAA and corresponding state statutes and regulations addressing air quality, including the New Source Performance Standards, Mercury and Air Toxics Standards, Regional Haze rules, and standards developed under respective State Implementation Plans (SIPs) to achieve and maintain the NAAQS.

Cumulative Effects

The following table summarizes the anticipated cumulative amount of coal mined during the 16-year life span of the Project, along with the amount of coal expected to be extracted by the active mining operations located within 20 miles of the project, including the private/TVA-approved coal associated with the No Action Alternative.

Table 3-5. Cumulative Coal Extracted during Project Life (tons per year)

Entity, EIA Mine Name [a]	MSHA ID	Coal Extracted (ton)	
		Annual [b]	Cumulative [c]
Sugar Camp Energy, MC#1 Mine, Action Alternative	1103189	--	98,200,000
Sugar Camp Energy, MC#1 Mine, No Action			179,500,000
Williamson Energy, Mach #1 Mine	1103141	6,887,728	110,203,648
Hamilton County Coal, Mine No. 1	1103203	6,298,997	100,783,952
ADDCAR Systems, Addcar Systems 40 Hwm Ser # Lv2	1202445	412,507	6,600,112
Eagle River Coal, Eagle River Col LLC Mine No 1	1103212	968,909	15,502,544
Peabody Arclar Mining, Wildcat Hills Mine – Underground	1103156	2,026,081	32,417,296

[a] The mines listed represent active mines listed in the U.S. EIA U.S. Energy Mapping System (https://www.eia.gov/state/maps.php?v=Coal), accessed August 19, 2020, with shadow areas and/or surface effects impacts that are located within a 20 mile radius of the Sugar Camp mine location.
[b] Corresponds to the maximum annual mine production from the most recent five year period (2014 - 2018) listed in the EIA Coal Browser (https://www.eia.gov/coal/data/browser/), accessed August 19, 2020.
[c] Corresponds to the total coal that would be mined during the 16 year life of the Project.

Cumulatively, the direct and indirect emissions of each criteria pollutant and select HAPs as a result of mining and the downstream combustion of the extracted coal from the Action Alternative, combined with the coal extracted by the active mining operations within 20 miles of the Project, are estimated to be between 0.0005 percent and 0.17 percent of the total U.S. emissions of those pollutants in 2014 projected for the life span of the Action Alternative.

3.3.2. Greenhouse Gases and Climate

3.3.2.1. Affected Environment

Greenhouse gases (GHGs) are chemical compounds in the atmosphere that absorb a portion of the outgoing longwave radiation and emit it back to the surface, thus affecting the Earth's energy balance. For purposes of quantifying their emissions and potential effects, the various GHGs are frequently 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. For calculation purposes, the methane GWP of 28 found in USEPA's greenhouse gas reporting program (GHGRP) implemented by 40 CFR Part 98 was used. 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 2018). 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, USEPA estimates that CMM emissions decreased by 40 percent between 1990 and 2015 (USEPA 2018).

In 2009, USEPA implemented the 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 to potentially assist in developing a cap and trade system. The GHGRP applies to certain specifically listed source types, any facility in a listed source category whose GHG 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 2017 the emissions reported by over 8,000 facilities under the GHGRP accounted for 85-90% of total U.S. GHG emissions (USEPA 2019f). The existing Sugar Camp Energy LLC mine site is currently subject to the GHGRP.

GHG emissions have the potential to affect both global and regional climate. Not only do GHGs affect climate, but changes in climate can affect the extent of atmospheric dispersion and photochemical production of air pollutants. For example, higher temperatures tend to increase the photochemical production of ozone.

Based on climate data from Mt. Vernon, Illinois, approximately 20 miles north of the Project Area, the coldest month is January, with average maximum and minimum temperatures of approximately 38 degrees Fahrenheit (°F) and 21°F, respectively. The warmest month is typically July, with average maximum and minimum temperatures of approximately 86°F and 67°F, respectively. Annual precipitation averages 43.4 inches per year, with April and May tending to have the highest monthly precipitation (National Oceanic and Atmospheric Administration [NOAA] 2020a). Average annual snowfall is around 14 inches per year at Mt. Vernon. On average, approximately 54 tornados occur in Illinois in a year (NOAA 2020b).

Figure 3-10 is a chart of annual average temperatures over the 124-year period of record (1896 through 2019) for Mt. Vernon, Illinois, based on the NOAA database maintained by the Iowa Environmental Mesonet (IEM 2020). The trend line on the chart, as indicated by the embedded line slope equation, shows a decrease of approximately 2°F in average temperature over the period of record. Annual average precipitation has increased over the period of record by approximately 10 percent, based on data reported for Mt. Vernon (IEM 2020).

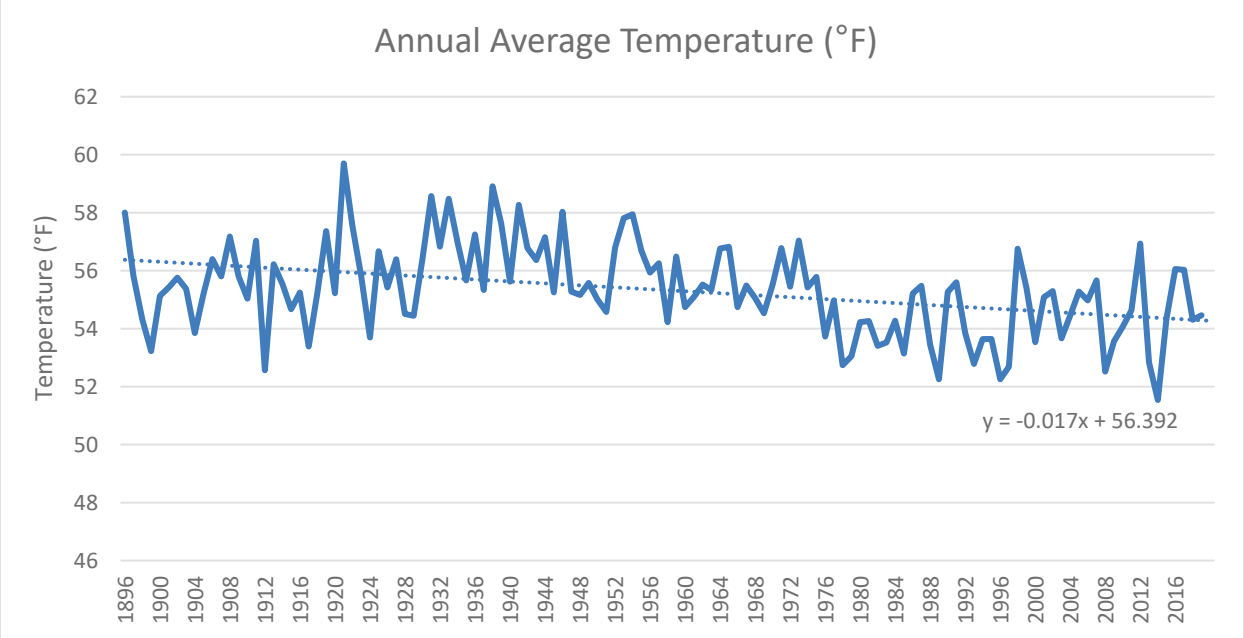


Figure 3-10. Annual Average Temperature for Mt. Vernon, IL over 124-Year Record (Source: IEM 2020)

Statewide, the average annual temperature has increased by about 1°F since the beginning of the twentieth century (Frankson et al. 2017, Angel 2020). Most of this increase has been during

the winter and spring, when average temperatures have increased 2°F. Average summer temperatures have shown little change and the number of very hot summer days has decreased, as have very cold winter nights. Statewide annual precipitation has varied widely but has been above average since 1990.

3.3.2.2. Environmental Consequences

3.3.2.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed SBR No. 6 mining plan for the extraction of TVA-owned coal in the Shadow Area. Therefore, the direct emissions of GHGs associated with the proposed mining of the approximately 186 million tons of TVA-owned coal, with approximately half (i.e., 92.8 million tons) of that coal sent to market as processed coal, would not occur. Similarly, the associated indirect emissions of GHGs from the transportation and combustion of the coal would also not occur. Direct and indirect emissions of GHGs from the ongoing extraction of approximately 359 million tons of unprocessed TVA- coal previously approved for mining and privately owned coal would continue under terms of the mining permit issued by IDNR-OMM.

The majority of the energy that would have been produced by the proposed TVA-owned coal would most likely be replaced by alternate energy sources, including privately owned and TVA-approved coal from the mine as well as coal from other production areas. While the production and consumption of those replacement energy sources would have associated GHG 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 could result in actions to be taken by Sugar Camp and other entities, ranging from complete replacement of the coal mined from the Project Area to no replacement. However, over the long term an increasing proportion of the replacement sources of energy would likely be comprised of lower GHG-emitting sources, given the continuing shift by electric utilities towards such energy sources. TVA anticipates that GHG emissions would be less under the No Action Alternative than under the proposed Action Alternative because, typically, coal combustion is more carbon intensive per unit energy than other forms of fossil fuels, or non-fossil energy sources.

3.3.2.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed plan to extract TVA-owned coal primarily during the years 2024 to 2031 and 2036 to 2040. With approval of the mining plan, an estimated 300 thousand processed tons of TVA-owned coal would be produced each year between 2021 and 2023, and approximately 7.1 million tons of processed TVA-owned coal would be produced each of the 13 years TVA coal is mined between 2024 and 2040, resulting in a total production of approximately 92.8 million tons of processed TVA coal. Mining of privately owned coal and previously approved TVA coal would occur simultaneously, with a cumulative total of 453.2 million tons of processed coal mined within a 20-mile radius of Sugar Camp Mine No. 1 during the study period.

This would result in emissions of GHGs from the coal extraction, transportation of the coal to end users, and the eventual combustion of the extracted coal. The following emissions analysis provides an estimate of GHG emissions as (1) a percentage of GHG emissions reported through the GHGRP; (2) a percentage of total U.S. GHG emissions; and (3) a percentage of total global GHG emissions. This proportionate estimate of GHG emissions serves as a reasonable proxy for assessing potential climate change impacts. The current state of climate science does not allow for specific linkage between particular GHG emissions and particular localized climate impacts.

The use of the information currently available (i.e., use of the emissions analysis described below as a proxy for climate impacts) is consistent with 40 CFR § 1502.22(b) of CEQ NEPA regulations. While GHG emissions from the mining of the TVA-owned coal and the downstream combustion of that coal would affect climate, the pro-rata effect cannot be determined with precision. Even so, other information (i.e., emissions analysis at national and global level) that can credibly be calculated is included to serve as a reasonable proxy of the Proposed Action's contribution to climate change.

TVA also considered using the social cost of carbon (SCC) metric in the assessment of climate change impacts on downstream GHG emissions resulting from combustion of coal. However, after due consideration, TVA believes that the SCC metric is not an appropriate measure or proxy of Project-level climate change impacts and their significance under NEPA. The SCC metric is not appropriate or informative because (1) the SCC tool does not measure the actual incremental impacts of a project on the environment and (2) there are no established criteria identifying the monetized values considered significant for NEPA purposes.

Direct Emissions – Mining Operations

In 2018, the GHGRP information submitted by Sugar Camp Energy, LLC reported emissions of 972,861 metric tons CO_2e ($MTCO_2e$) (USEPA 2019g) and separately reported total coal production of 14,460,951 short tons (tons) of processed coal (USEIA 2019), including both TVA-owned and privately owned coal. Based on this information, the CMM emissions rate by existing mine operations is estimated as 0.07 $MTCO_2e$/ton processed coal produced.

The operation of mining coal equipment would also generate GHG emissions. The GHG emissions associated with operation of the mining equipment are anticipated to be negligible compared to the CMM and coal combustion emissions and are not quantified.

Indirect Emissions – Coal Combustion

Assuming that all of the coal extracted from the mine is combusted downstream, the associated GHG emissions were calculated using emission factors and GWP values for bituminous coal, as provided in the GHGRP rule at 40 CFR Part 98. The GHG emissions associated with the rail transport were estimated using the methodology described in Section 3.3.1 for criteria air pollutants.

Total GHG Emissions

Table 3-6 summarizes the maximum projected annual GHG emissions associated with the Action Alternative. The total life-of-mine direct and indirect GHG emissions associated with the 92.8 million tons of processed coal is 224,970,018 $MTCO_2e$.

The projected direct annual CMM emissions associated with the Action Alternative represent approximately 0.013% of the 2.99 billion $MTCO_2e$ of U.S. GHG emissions reported through the GHGRP (USEPA 2019h) for 2018 and 0.006% of the estimated 6.46 billion $MTCO_2e$ of total U.S. GHG emissions (USEPA 2019i) for 2017. The total annual (i.e., direct and indirect) emissions from the Action Alternative represent approximately 0.22% of the total US GHG emissions for 2017 and 0.03% of the estimated 51.8 billion $MTCO_2e$ of total global GHG emissions (excluding land-use change contributions) for 2018 (Olivier and Peters 2019).

Table 3-6. Action Alternative GHG Emissions

Anticipated Annual Average Coal Production			7,100,000	ton
Bituminous Coal Heat Content:			24.93	MMBtu/ton [a]
Total Heat Content:			177,003,000	MMBtu
GHG	GWP [b]	Emission Factor [c]	Emissions (tpy) (MT)	Emissions (tpy) ($MTCO_2e$)
Direct Emissions - Mining Operations [d]				
CH_4	25	0.07 MTCO2e/ton coal		477,653
Indirect Emissions - Combustion				
CO_2	1	93.28 kg/MMBtu	16,510,840	16,510,840
CH_4	25	1.1E-02 kg/MMBtu	1,947	48,676
N_2O	298	1.6E-03 kg/MMBtu	283	84,395
CO_2e				16,643,911
Indirect Emissions - Transportation				
CO_2e				90,582
CO_2e (Total)				17,212,146

[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.
[d] Calculated using information from USEIA 2019 and USEPA 2019e.

Climate Effects

Given the Proposed Action's very small percentage increase in national and global GHG emissions, the effects of the action's GHG emissions on national or global climate would be immeasurably small. Microclimate or regional climate effects can also occur with changes in land use, for example, as with urban heat islands. Because the Proposed Action would cause only very minor changes in land use over relatively small areas, no significant heat island or other local climate changes are expected with implementation of the Proposed Action.

Cumulative Effects

Cumulatively, the emissions of GHGs from mining associated with the Proposed Action and other active mining operations within 20 miles of the Project would total about 1,316.9 million metric tons of CO_2e.

3.4. Biological Environment

This section describes the potentially affected environment for wildlife, vegetation, aquatic life, and threatened and endangered species. Biological resources were identified using a combination of the IDNR Natural Heritage Database, USFWS Information for Planning and

Consultation (IPaC), the 2016 National Land Cover Database (NLCD) maintained by USGS, field surveys, and literature references.

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 Granny Creek, Carlton Branch, Web Hill Branch, Sugar Camp Creek, Campbell Branch, Sullivan Branch, Middle Fork Big Muddy River, Ewing Creek, and ponds.

3.4.1. Vegetation

3.4.1.1. Affected Environment

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 forested areas are now largely confined to side slopes and river bottoms that are unsuitable for farming (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-rick soils of poorly drained uplands.

Two globally rare flatwoods terrestrial plant communities are found in this region: the Pin Oak (*Quercus palustris*) – Post Oak (*Quercus stellata*) Lowland Flatwoods bottomland community and the Post Oak Flatwoods community. The Pin Oak – Post Oak Lowland Flatwoods bottomland community occurs on terrace “flats” in the floodplains of major rivers, primarily the Ohio River and the Mississippi River and tributaries (Natureserve 2019). This bottomland community is thought to have less than 20 occurrences throughout its range within southwest Indiana, southern Illinois, and southeast Missouri. Due to damming, higher water levels in their preferred locations may have eliminated post oak from most occurrences of this community (Carey 1992, Natureserve 2019). These lowland flatwoods have been classified as having a vulnerable to imperiled global conservation status (Natureserve 2019). The Post Oak Flatwoods community also has a vulnerable to imperiled global conservation status with fewer than 50 occurrences throughout its range (Natureserve 2019). Some occurrences have been destroyed or degraded by clearing and selective logging, and some have been degraded by grazing. This community typically has a dominant tree layer with an average canopy cover of 80 percent or more. Trees may be stunted due to the unfavorable soil conditions.

Based on the 2016 NLCD, approximately 2,099 acres of deciduous forests (17 percent) occur within the Project Area. Most of the forested areas are heavily fragmented and concentrated around streams, with several bottomland forests present. Dominant species across the Project Area include northern red oak, silver maple, and various hickory species (Alliance Consulting 2018). Species such as sycamore, red maple, sweet gum, and river birch are also common along stream corridors in this region. Most of the forested areas range in size from less than one acre to 60 acres. Common understory species include coralberry, Japanese honeysuckle, and Christmas fern, with American beech saplings being common along the north facing slopes. At the location of the East Refuse Disposal Area, vegetation is generally mixed mesophytic forests of second or third growth timber, dominated by red oak, hickory species, and silver maple (Alliance Consulting 2019b). No uncommon or rare plant communities have been documented during field surveys in the Project Area.

Based on the 2016 NLCD, the majority (48 percent; 6,069 acres) of the Project Area is in cultivated crops. Pasture lands and fields in hay compose approximately 30 percent (3,785

acres) of the Project Area. Remaining vegetative cover in the portions of the Project Area that would be disturbed by the Project consists of herbaceous plants (one percent; 139 acres and woody wetlands (less than one percent; 2.8 acres).

3.4.1.2. Environmental Consequences

3.4.1.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to vegetation. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR-OMM permit requirements.

Existing plant communities at each of the associated 5.3-acre bleeder shaft facility locations and the 525-acre East Refuse Disposal Area site would be eliminated for the construction and operations of these mine components. The locations of these facilities would be reclaimed or capped, respectively, as described in Section 2.1.2.3. Impacts to vegetation as a result of subsidence are not anticipated.

3.4.1.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan. This would result in impacts to vegetation due to surface disturbances and planned subsidence.

Surface Disturbances

Existing plant communities at each of the 5.3-acre Bleeder Shaft Facility locations and the 525-acre East Refuse Disposal Area would be eliminated for the construction and operations of these Project components. While the locations of the Bleeder Shaft Facilities are not yet known, the footprint of the East Refuse Disposal Area would have long term impacts to approximately 190 acres of agricultural fields, 147 acres of hay/pasture land, and 40 acres of deciduous forest. The remaining 11 acres is developed land.

Once the Bleeder Shaft Facilities and the East Refuse Disposal Area are constructed, the portions of land that are not covered by hard surfaces (i.e., graveled areas, access roads, buildings) would be seeded with the approved temporary seed mixture to minimize the potential for wind and water erosion. With completion of the operational lives of these Project components, the Bleeder Shaft Facility locations would be restored based on the IDNR-OMM approved post-mining topographic conditions. The East Refuse Disposal Area would be capped with soils and made to adequately drain, as described in Section 2.1.2.3. Following this partial restoration, this area could likely be used as pasture land.

No uncommon terrestrial plant communities or otherwise unusual vegetation have been identified in the Project Area, including where surface disturbances are proposed; thus, no impacts to these vegetative communities are anticipated in association with the Project.

Coal-Extraction Related Effects

Plant communities in the area of planned subsidence may be temporarily impacted by ponded water but would return to IDNR-OMM approved post-mining topographic conditions following reclamation. Thus, long-term impacts to vegetation in the subsided areas would not occur.

Cumulative Effects

The Action Alternative would not contribute to cumulative adverse impacts to vegetation. Permanent impacts to biological resources associated with the Action Alternative and other mining actions within 20 miles of the Project have been or would be avoided or mitigated, per the IDNR-OMM permit requirements.

3.4.2. Wildlife

3.4.2.1. Affected Environment

With the exception of those bird species able to either subsist on crops (e.g., American crow, ring-necked pheasant, various species of blackbirds) or to nest among them (e.g., horned lark, killdeer), relatively few bird species are able to use monocultural cropland habitat, which composes approximately 48 percent of the Project Area where disturbances are proposed. Other species that cannot subsist in the cropland areas are restricted to early successional habitats or forested habitats along the rivers and streams in the Project Area. 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 forested areas, provide habitat for many species of mammals, reptiles, amphibians, and Neotropical migrant and permanent resident birds breeding in the region. There is an abundance of farm ponds, strip mine ponds, and lakes scattered throughout the Middle Fork Big Muddy River Watershed, and most are remnants of pre-1980s coal mining operations, prior to current reclamation practices (IDNR 2002). Canada geese, mallards, killdeer and occasionally spotted sandpipers 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. Migratory songbirds such as flycatchers, vireos, warblers, tanagers, and orioles frequently nest and forage in riparian woodlands associated with these ponds and lakes. Several species of amphibians and reptiles can be found in small farm ponds.

The Project Area is within the boundaries of the Middle Fork Big Muddy River Watershed, which lies within a major avian flight corridor. The Mississippi River is approximately 44 miles to the west-southwest of the Project Area, and the Ohio River is approximately 36 miles to the east of the Project Area. For this reason, the Middle Fork Big Muddy River watershed is optimally situated for major influxes of migrating birds. These migratory birds include geese, ducks, and other water birds that are attracted to flooded fields and large lakes in the area. Migratory birds of conservation concern, as identified by USFWS (USFWS 2008) and likely occurring in the Project Area, include the red-headed woodpecker and loggerhead shrike (present year-round), wood thrush (summer resident), and several spring and fall migrants including the solitary sandpiper, blue-winged warbler, cerulean warbler, and Kentucky warbler.

3.4.2.2. Environmental Consequences

3.4.2.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to wildlife. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be mitigated, per IDNR-OMM permit requirements.

Wildlife present at the time of construction of the associated bleeder shaft facilities and the East Refuse Disposal Area may relocate to nearby areas of similar habitat for the duration of the Project. Wildlife that prefer forested areas would have sufficient adjacent and nearby lands of this type. Any effects resulting from subsidence or mining would be subject to mitigation under Sugar Camp's integrated fish and wildlife habitat reclamation plan; the impacts to terrestrial wildlife and migratory birds would be insignificant after mitigation.

3.4.2.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan. This would result in temporary, localized impacts to wildlife due to surface disturbances and planned subsidence.

Effects to wildlife resulting from mining would be subject to mitigation under Sugar Camp's integrated fish and wildlife habitat reclamation plan; as such, the impacts to terrestrial wildlife would be insignificant after mitigation. Similarly, migratory bird flight patterns and stopovers would not be significantly impacted.

Surface Disturbances

Surface disturbances associated with the Action Alternative would affect to wildlife. Any wildlife present at the time of construction of the Bleeder Shaft Facilities and the East Refuse Disposal Area may relocate to nearby areas of similar habitat for the duration of the Project. These species would likely return with completion of reclamation activities. If the Bleeder Shaft Facilities are constructed in forested areas, wildlife species that utilize forested habitats would be impacted. These effects would be evaluated by TVA once their locations are known.

According the 2016 NLCD, the 525-acre site of the East Refuse Disposal Area contains forested areas that have the potential to be cleared for the Project. This would displace or eliminate wildlife dependent on this forested area. With reclamation, the East Refuse Disposal Area would be capped with soils and seeded with the approved temporary seed mixture to minimize the potential for wind and water erosion. While the area would not immediately support species that prefer deciduous forested areas, wildlife that utilize open grassland and pasture lands would return to these areas following restoration. Wildlife that prefer forested areas would have sufficient adjacent and nearby lands of this type, and over time, these species could eventually return to the site of the East Refuse Disposal Area with potential field succession. Thus, overall, impacts to wildlife habitat associated with the East Refuse Disposal Area would be temporary and negligible to minor.

Coal Extraction-Related Effects

The temporary inundation of some subsided areas would affect wildlife by displacing some upland species such as the eastern meadowlark and providing additional habitat for wildlife using wetland habitats, including several species of amphibians, reptiles, herons, waterfowl, and shorebirds. These effects would occur short-term, prior to the restoration of the subsided areas to IDNR-OMM-approved post-mining land contours and hydrology.

Cumulative Effects

The Action Alternative would not contribute to cumulative adverse impacts to the biological environment. Permanent impacts to biological resources associated with the Action Alternative and other mining actions within 20 miles of the Project, including the activities associated with the No Action Alternative, have been or would be avoided or mitigated, per the IDNR-OMM

permit requirements. Wildlife has been or would be temporarily disturbed by surface disturbances, but displaced species likely have or would return with completion of reclamation activities. Effects to wildlife resulting from mining operations are subject to mitigation under integrated fish and wildlife habitat reclamation plans.

3.4.3. Aquatic Life

3.4.3.1. Affected Environment

As described in Sections 3.2.2, seven named streams and multiple unnamed intermittent and ephemeral tributaries and ponds are present in the Project Area (Figures 3-2 and 3-4). All of these water bodies support aquatic life. Four of the named streams are perennial: Middle Fork Big Muddy River, Sugar Camp Creek, Sullivan Branch, and Ewing Creek.

3.4.3.2. Environmental Consequences

3.4.3.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to aquatic life. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR-OMM permit requirements.

Bleeder shaft facilities would be located to avoid Waters of the U.S. to the maximum extent practicable. Construction on the site of the East Refuse Disposal Area would potentially impact 27,806 linear feet of ephemeral and intermittent streams, 1.4 acres of wetlands, and one pond totaling 0.2 acres. These waterbodies likely contain aquatic life. Impacts to streams or other waterbodies in subsidence areas would be subject to Sugar Camp's mitigation plan, and long-term impacts to aquatic life would be minimized.

3.4.3.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining. This would result in insignificant impacts to aquatic life due to surface disturbances and minimal impacts due to planned subsidence in the Shadow Area.

Surface Disturbances

While it is not anticipated that the Bleeder Shaft Facilities would affect waterbodies, the construction and operation of these Project components would be reviewed by TVA for their potential effects on aquatic life.

Construction on the site of the East Refuse Disposal Area would potentially impact 27,806 linear feet of ephemeral and intermittent streams, 1.4 acres of wetlands, and one pond totaling 0.2 acres. As described in Section 1.5.2, impacts to Waters of the U.S. would be subject to USACE 404 permits and IEPA 401 WQCs. Existing streams would be impounded, made to flow through culverts, or filled and, their flows, rerouted around the developed areas. Disturbances to these waterbodies would affect aquatic life.

Coal Extraction-Related Effects

Prior to reclamation, aquatic life could be affected by the alteration of habitat conditions within streams and changes to riparian conditions due to 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 in the subsided areas through reclamation, as discussed in Section 2.1.2.3.

Cumulative Effects

The Action Alternative would not contribute to cumulative adverse impacts to the biological environment. Permanent impacts to biological resources associated with the Action Alternative and other mining actions within 20 miles of the Project, including the activities associated with the No Action Alternative, have been or would be avoided or mitigated, per the IDNR-OMM permit requirements. Aquatic life has been or would be temporarily disturbed by surface disturbances and coal extraction-related effects, but displaced species would likely return with completion of reclamation activities. Effects to aquatic life resulting from mining operations are subject to mitigation under integrated fish and wildlife habitat reclamation plans.

3.4.4. Threatened and Endangered Species

The Illinois Threatened and Endangered Species by County list (IDNR 2018) was reviewed to determine the threatened and endangered species known to occur in the counties of the Project Area. Collectively, Franklin and Hamilton counties contain three federally listed and nine state-listed threatened and endangered species, including four plants, one fish, two reptiles, three birds, and two mammals (Table 3-7). Aerial photographs, soil data, data compiled during field surveys, and land cover within the Project Area were compared to known habitat preferences for listed species. The information in the various SBRs and IBRs associated with UCM Permit No. 382, as described in Section 1.3, has been subject to consultation and review by IDNR-OMM, IDNR Office of Realty and Environmental Planning, and USFWS (USFWS 2017; Appendix D). Limited suitable habitat is present in the Project Area for most listed species.

3.4.4.1. Federally Listed Species

3.4.4.1.1. Affected Environment

Federally listed threatened and endangered species determined during database research as having the potential to utilize the Project Area are shown in Table 3-7. These species consist of one bird and two mammals. Designated critical habitat for these species does not occur in the Project Area.

Table 3-7. Federally listed threatened and endangered species potentially occurring in the Project Area

Common Name	Scientific Name	Status	Preferred Habitat	Potential Habitat in Project Area
			Birds	
Piping plover	*Chardrius melodus*	E	Piping plover populations use wide, flat, open sandy beaches. In Illinois, mudflats associated with lakes, ponds, or impoundments may be used for stopover habitat during migration.	No

Common Name	Scientific Name	Status	Preferred Habitat	Potential Habitat in Project Area
			Mammals	
Indiana bat	*Myotis sodalis*	E	Indiana bats spend winter hibernating in caves and mines. Summer habitat consists of the presence of suitable (i.e., open enough for bats to access) drinking and foraging areas with Potential Roost Trees (PRTs). A PRT has exfoliating bark, cracks, crevices or cavities that are greater than 5-inch diameter at breast height (DBH).	Yes
Northern long-eared bat	*Myotis septrentrionalis*	T	Northern long-eared bats spend winter hibernating in caves and mines. Summer bat habitat consists of the presence of suitable (i.e., open enough for bats to access) drinking and foraging areas with PRTs. A PRT has exfoliating bark, cracks, crevices or cavities that are greater than 3-inch DBH.	Yes

The piping plover is a small shorebird. Three geographically distinct summer breeding locations are recognized in the U.S. These consist of 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 2017). 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 habitat along beaches and other areas has led to the listing as threatened. While traditional coastal habitat associated with the piping plover is not present in the Project vicinity, the piping plover may stop 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.

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 acres 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 2019b).

Mist net surveys conducted between 2010 and 2014 and in 2017 at Sugar Camp Mine No. 1 captured Indiana bats within the surface effects area and adjacent to and in the vicinity of the

Project Area (Alliance Consulting 2015, 2017a, 2017b, 2017c, 2017d). These captures were expected due to Sugar Camp Mine No. 1 being approximately 2.5 miles of known maternity roost habitat and the presence of bat boxes installed in the surface effects area as mitigation measures. Mist net surveys at the location of the East Refuse Disposal Area conducted in 2019 resulted in no capture of Indiana bats (Alliance Consulting 2019b; Appendix D). According to USFWS, the Shadow Area is not within designated critical habitat for this bat (USFWS 2017).

Northern long-eared bat summer roosting and maternity habitat consists primarily of live or dead tree species and/or snags greater than or equal to three inches DBH that have exfoliating bark, cracks, crevices, and/or hollows; they also use bat-houses, buildings, and other anthropogenic structures (Amelon and Burhans 2006). Winter roosting and 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).

Prior to 2015, surveys conducted by Alliance Consulting for Sugar Camp captured northern long-eared bats at five sites in Franklin County. One site is located at the edge of the surface effects area, and three sites are located less than one mile from the surface effects area. The fifth site is 10 miles southwest of the Project Area. Mist net surveys conducted adjacent to and in the vicinity of the Project Area in 2017 and at the location of the East Refuse Disposal Area and 2019 did not result in any captures of northern long-eared bats (Alliance Consulting 2015, 2017a, 2017b, 2017c, 2017d, 2019b; Appendix D). The Shadow Area is located outside of designated critical habitat for this bat, per USFWS (2017).

3.4.4.1.2. Environmental Consequences

3.4.4.1.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to federally-listed species. As a standard practice, Sugar Camp coordinates with USFWS for both surface disturbances and coal extraction-related impacts. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR-OMM permit requirements.

The No Action Alternative is unlikely to affect federally listed species. Coordination with USFWS and IDNR is ongoing for surface disturbances. Habitat disturbances resulting from coal extraction or planned subsidence would be mitigated under Sugar Camp's integrated fish and wildlife habitat reclamation plan. In their correspondence with IDNR regarding the UCM Permit No. 382 application, USFWS determined that the subsidence and associated reclamation activities would have no effect on federally listed bats (Appendix D).

3.4.4.1.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining. As described below, overall, the Action Alternative is unlikely to affect federally listed species. Any habitat disturbances resulting from the mining or planned subsidence would be subject to restoration under Sugar Camp's integrated fish and wildlife habitat reclamation plan, per IDNR permit requirements.

Surface Disturbances

Prior to the construction of the Bleeder Shaft Facilities, TVA would conduct additional reviews to determine the effects of the construction and operation of these facilities on federally listed bat species. As a standard practice for surface disturbances, Sugar Camp would coordinate with USFWS to conduct additional presence/absence survey to determine the potential effects of the

construction and operations of the Bleeder Shaft Facilities on federally listed bats or assume bat presence. If bat habitat is identified during surveys or bat presence is assumed, Sugar Camp would limit tree clearing to between October 15 and March 31 to minimize impacts to federally listed bats.

Mist net surveys conducted in 2019 at the location of the East Refuse Disposal Area did not capture any Indiana bats or northern long-eared bats (Alliance Consulting 2019b; Appendix D). Coordination with USFWS on the effects of the construction and operation of the East Refuse Disposal Area is ongoing.

Coal Extraction-Related Effects

In their correspondence with IDNR regarding the SBR No. 6 application, USFWS determined that the subsidence and associated reclamation activities would not be likely to adversely affect any federally listed species (USFWS 2017; Appendix D).

Cumulative Effects

The Action Alternative would not contribute to cumulative adverse impacts to federally listed species. Coordination with USFWS on the effects of proposed mine operations and components associated with the Action Alternative and other mining actions within 20 miles of the Project, including the activities associated with the No Action Alternative, has determined or would determine the effects of the proposed mine operations and components and avoidance and minimization measures would be taken, accordingly and in compliance with the Endangered Species Act. Effects to wildlife, including federally listed wildlife species, resulting from mining operations are subject to mitigation under integrated fish and wildlife habitat reclamation plans.

3.4.4.2. State-Listed Species

3.4.4.2.1. Affected Environment

Database research indicated that nine state-listed species of conservation concern may occur in the area. These species are presented in Table 3-8.

Table 3-8. State-listed species of conservation concern potentially occurring in the Project Area

Common Name	Scientific Name	Preferred Habitat	Potential Habitat in Project Area
Barn owl	*Tyto alba*	Inhabits open areas, including agricultural fields, grasslands, and marshes	Yes
False bugbane	*Cimicifuga racemosa*	Habitat includes mesic deciduous forests.	Yes
Green trillium	*Trillium viride*	Rich woodlands and deciduous forests	No
Little blue heron	*Egretta caerulea*	Inhabits freshwater swamps, lagoons, coastal thickets and islands.	No
Ornate box turtle	*Terrapene ornata*	Habitat includes prairies and open fields in former prairies.	No
River cooter	*Pseudemys concinna*	Found in backwaters and oxbow lakes of large rivers and reservoirs.	No

Common Name	Scientific Name	Preferred Habitat	Potential Habitat in Project Area
River redhorse	*Moxostoma carinatum*	Inhabits deep, swift, gravel riffles of small and medium-sized rivers and is tolerant of silty bottoms, turbid water, and intermittent flow.	No
Spotted pondweed	*Potamogeton pulcher*	Found in shallow water, emergent marshes, and on muddy shores.	No
Storax	*Styrax americana*	Found in very poorly drained habitats associated with other wetland species.	Yes

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 2012). In relationship to the Project Area, the closest known observation was in 1998, approximately three miles northwest of the northern portion of the Project Area at Rend Lake in Franklin County. The types of wetlands it inhabits are absent from the surface effects area and most of the Project Area.

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 nesting attempts 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 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 was recently documented at four sites in Franklin County and seven sites in Hamilton County. The Franklin County sites are located 14 miles west of the northern portion of the Project Area, five and eight miles southwest of the southern portion of the Project Area, and four miles south of the Project Area, while the Hamilton County sites range from four to 17 miles east and seven to nine miles north of the Project Area. Suitable habitat is present in the Project Area.

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 (Illinois Natural History Survey [INHS] 2018). The species was recorded at one site in Franklin County at Wayne Fitzgerrell State Park, five miles northwest of the northern portion of the Project Area.

False bugbane, also known as black cohosh, is a flowering plant of the buttercup family. The species prefers mesic deciduous forested areas. The plant has a single identified location in Franklin County, 14 miles southwest of the surface effects area. Habitat may be present within the forested areas of the Project Area.

Green trillium prefers rich woodlands and prairie habitat. The species is known from a single occurrence in Franklin County, located 14 miles west and southwest of the Project Area. Given the distance to known occurrences and the lack of suitable habitat, this species is not likely to occur in the Project Area.

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 18 miles southwest of the northern portion of the Project Area. Spotted pondweed could occur but is not likely to occur in the Project Area. Potential habitat for this species exists along Sugar Camp Creek in the northern portion and along Ewing Creek in the northern portion of the Shadow Area.

Storax is a deciduous shrub and 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 water tupelo, water hickory, Virginia willow, and southern buckthorn (Mohlenbrock et al. 1961). Storax is known to occur at one site in Hamilton County, 12 miles northeast of the northern portion of the Project Area at a unit of Ten Mile Creek State Fish and Wildlife Area (SFWA). 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. NWI-mapped freshwater forested/shrub wetlands are present within the Project Area along Granny Creek, Sugar Camp Creek, Carlton Branch, Sullivan Branch, Campbell Branch, and Ewing Creek. Thus, storax has the potential to occur in the Project Area.

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 rivers and is intolerant of silty bottoms, turbid water, and intermittent flow. The species is known to occur 16 miles southwest from the 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.

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). 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 in a different watershed.

3.4.4.2.2. Environmental Consequences

3.4.4.2.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to state-listed species. Impacts from the ongoing mining of previously approved TVA-owned coal and privately

owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR-OMM permit requirements.

Temporary impacts to state-listed species of conservation concern may occur as a result of surface disturbances. Prior to the construction of the associated bleeder shaft facilities and the East Refuse Disposal Area, Sugar Camp would coordinate with IDNR to determine whether impacts to state-listed species are expected to occur. Any habitat disturbances resulting from the mining operations would be mitigated under Sugar Camp's integrated fish and wildlife habitat reclamation plan, per IDNR-OMM permit requirements. Thus, any impacts to state-listed species would be temporary.

3.4.4.2.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan. Temporary impacts to state-listed species of conservation concern may occur due to surface disturbances. These impacts and any temporary impacts associated with subsidence would be mitigated under Sugar Camp's integrated fish and wildlife habitat reclamation plan.

Surface Disturbances

Prior to the construction of the Bleeder Shaft Facilities, TVA would conduct future environmental reviews to determine whether impacts to state-listed species are expected to occur.

Construction and operation of the East Refuse Disposal Area, which would also be constructed under the No Action Alternative, with or without TVA approval, may result in impacts to the state-listed barn owl and false bugbane. The barn owl inhabits agricultural fields and grasslands, of which approximately 337 acres occur in the proposed footprint of the East Refuse Disposal Area. False bugbane prefers mesic deciduous forested areas. Deciduous forest would be impacted by construction of the East Refuse Disposal Area. Impacts to these state-listed species would likely be minor given the amount of similar habitat areas in the vicinity of the Project Area. No impacts to storax would result from construction and operations of the East Refuse Disposal Area because no wetlands would be impacted.

Habitat disturbances resulting from the mining operations would be mitigated under Sugar Camp's integrated fish and wildlife habitat reclamation plan, per IDNR-OMM permit requirements. Thus, impacts to state-listed species would be temporary and minimized or mitigated.

Coal Extraction-Related Effects

Due to the minimal disturbance from subsidence, the temporary nature of subsidence effects, and the limited existing habitat, no significant impacts to state-listed species are expected. Any effects resulting from mining and associated subsidence would be temporary and mitigated under Sugar Camp's integrated fish and wildlife habitat reclamation plan, per IDNR-OMM permit requirements.

Cumulative Effects

The Action Alternative would not contribute to cumulative adverse impacts to state listed species. Temporary impacts to state-listed species of conservation concern as a result of the Action Alternative and other nearby mining actions, including those associated with the No Action Alternative, may have occurred or could occur. However, effects to wildlife, including

listed species, resulting from mining operations are subject to mitigation under integrated fish and wildlife habitat reclamation plans, per IDNR permit requirements.

3.5. Natural Areas

This section addresses natural areas that are within 10 miles of the Project Area. Under the Illinois Natural Areas Preservation Act, a natural area is defined as “an area of land in public or private ownership which, in the opinion of the Commission, either retains or has recovered to a substantial degree its original natural or primeval character, though it need not be completely undisturbed, or has floral, faunal, ecological, geological, or archaeological features of scientific, educational, scenic or esthetic interest,” (Illinois General Assembly 2020). Water resources were identified using data obtained from IDNR.

3.5.1. Affected Environment

The Project Area is within the Middle Fork Big Muddy River Resource Rich Area (RRA) which includes portions of Franklin, Hamilton, and Jefferson counties. This RRA is recognized by the IDNR for its natural areas, including large tracts of forest, a 22-acre portion of the Ten Mile Creek SFWA, a 388-acre bottomland/swamp forest known as the Freeman Coal Company Forest Natural Area (NA), and several other smaller bottomland forest/swamps. Portions of the Ten Mile Creek SFWA are within three miles of the Project Area (Figure 3-11). This 5,820-acre area managed by IDNR is divided into four management units. Several of these units, which are utilized for hunting and wildlife management, are reclaimed mining sites. The privately owned and managed Freeman Coal Company Forest NA is located in Franklin County, approximately 9.5 miles southwest of the southern portion of the Project Area.

Wayne Fitzgerrell State Park is located in Jefferson and Franklin Counties, approximately 3.8 miles northwest of the northern portion of the Project Area. This 3,300-acre area at Rend Lake is owned by USACE and managed by IDNR. The site is utilized for hunting, fishing, camping, picnicking, horseback riding, hiking, and water sports. Additional natural areas within ten miles of the Project Area include Mt. Vernon Game Propagation Center and Rend Lake SFWA.

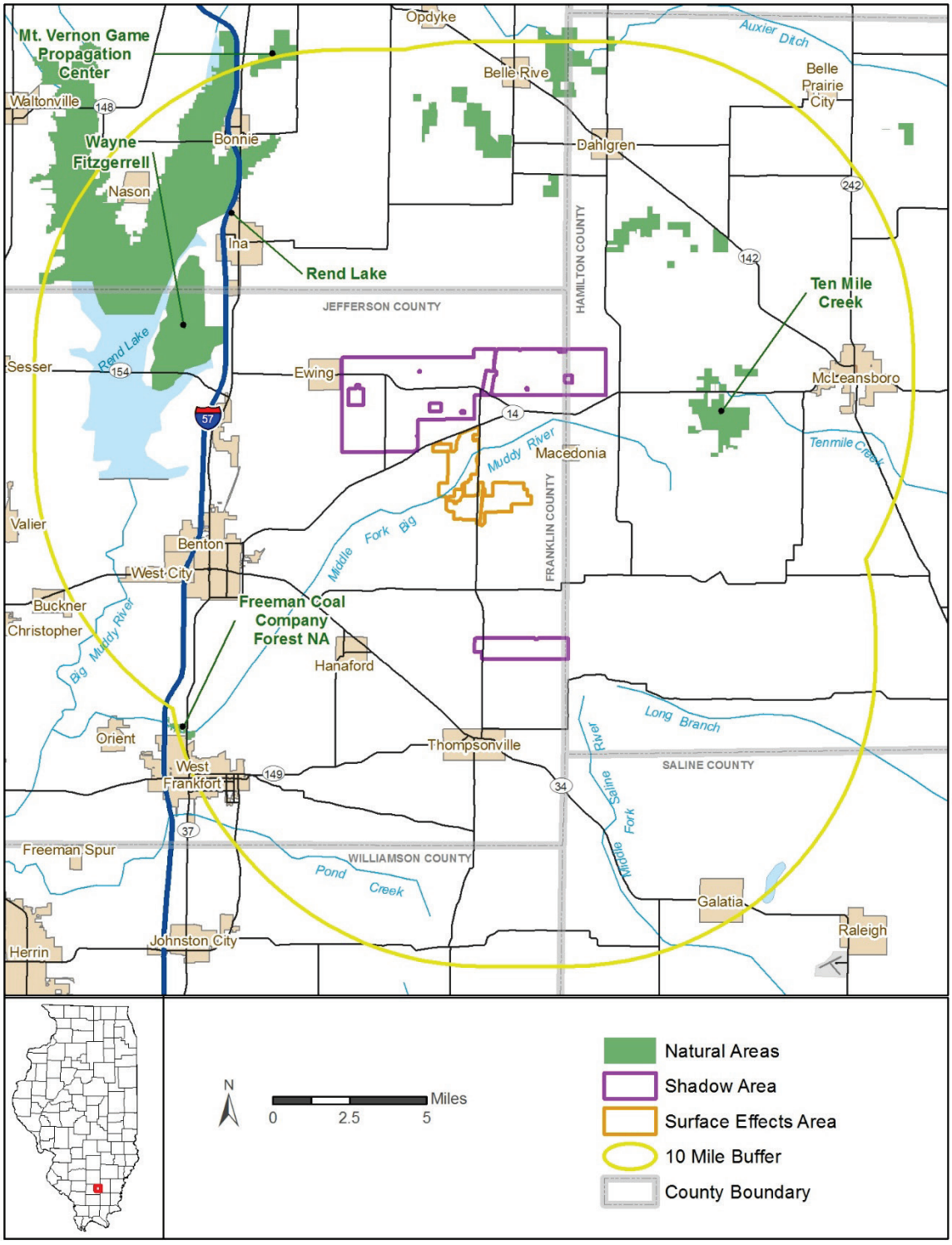


Figure 3-11. Natural Areas within 10 Miles of the Project Area

3.5.2. Environmental Consequences

3.5.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to natural areas.

Sugar Camp's actions related to ongoing mining of previously approved TVA-owned coal and privately owned coal would not result in direct adverse impacts to the Middle Fork Big Muddy River RRA or other natural areas in the vicinity. Planned subsidence of approximately 22,484 acres could cause indirect effects to natural areas in the vicinity of the SBR No. 6 mining activities due to temporary effects to hydrologic patterns, but with restoration, permanent impacts to these natural areas would not result.

3.5.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan. This may result in indirect impacts to natural areas due to planned subsidence in the Shadow Area. No impacts to natural areas would occur due to surface disturbances or coal extraction.

Planned Subsidence

The Middle Fork of the Big Muddy River RRA surrounds the Project Area. The Ten Mile Creek SFWA is located within three miles of the Project Area. The Rend Lake SFWA is within four miles of the Project Area. Ten Mile Creek SFWA and Rend Lake SFWA are either upstream from the Project Area or within a different stream drainage; therefore, no hydrologic impacts to the SFWAs are anticipated due to planned subsidence.

Potential indirect impacts to the Middle Fork of the Big Muddy River RRA and Freeman Coal Company Forest NA from subsidence could cause changes in stream and drainage patterns; these impacts could indirectly affect wetland functions of the bottomland and floodplain forests. As future mining activities within the Project Area would require the restoration of altered streams and drainage patterns to approximate pre-mining conditions, permanent impacts to hydrologic functions that support the RRA and NA would be avoided or minimized. As there are existing streams and tributaries not affected by subsidence that support the hydrologic functions of the RRA and NA, no further impacts to the Middle Fork of the Big Muddy River RRA and the Ten Mile Creek SFWA are anticipated.

Cumulative Effects

The Action Alternative would not contribute to direct cumulative adverse impacts to the Middle Fork Big Muddy River RRA or other natural areas in the vicinity, as no direct impacts associated with Sugar Camp's ongoing and proposed actions are anticipated. Minor, temporary indirect impacts may have occurred or could occur as a result of subsidence associated with the Action Alternative and other nearby mining actions and temporary effects to hydrologic patterns. These temporary impacts have been or would be subject to post-subsidence reclamation activities.

3.6. Land Use

This section addresses land uses within the Project Area and how they would be affected by the alternative actions.

3.6.1. Affected Environment

The National Land Cover Database was used to identify existing land uses within the portions of the Project Area where new Project elements are proposed (Table 3-9; Figures 3-12, 3-13).

Both the East Refuse Disposal Area location and the Shadow Area are dominated by agricultural land uses in hay/pasture and cultivated crops. Areas of deciduous forest are concentrated around streams within the Project Area, including Middle Fork Big Muddy River, Sugar Camp Creek and their tributaries. Additional land uses in the Project Area include small areas of developed land in residential and industrial/commercial land uses.

Because the exact locations of the Bleeder Shaft Facilities are not known, it is not possible to describe the current land uses of their sites. However, due to existing patterns of land use in the Shadow Area, they would most likely be sited on agricultural land and would occupy a total of about 27 acres in five separate locations.

The City of Benton, Illinois, and Rend Lake are located a few miles west of the Project Area. Current land use within much of the surface effects area is heavy industrial and includes operation of existing facilities for the processing, storage and transport of coal on an approximately 2,420-acre area in Franklin County. Existing facilities include the north refuse disposal area, the Coal Preparation Plant, and the south refuse disposal area (Figure 1-2). The site of the East Refuse Disposal Area is comprised of about 453 acres of cultivated cropland and hay/pasture, 54 acres of deciduous forest, 13 acres of developed open space (primarily roads), and smaller areas of other land uses. The East Refuse Disposal Area is within an unincorporated portion of Franklin County that is not currently zoned.

Table 3-9. Land Cover within Project Area

	East Refuse Disposal Area		Shadow Area	
	Acres	%	Acres	%
Open water	0.0	0.0%	10.9	0.1%
Developed, open space	13.4	2.5%	431.8	3.6%
Developed, low intensity	3.4	0.6%	106.9	0.9%
Developed, medium intensity	0.0	0.0%	8.2	0.1%
Developed, high intensity	<0.1	0.0%	1.1	0.0%
Deciduous forest	54.2	10.3%	2,045.1	16.8%
Herbaceous	1.5	0.3%	137.2	1.1%
Hay/pasture	187.3	35.6%	3,598.1	29.6%
Cultivated crops	265.7	50.6%	5,803.1	47.8%
Woody wetlands	0.0	0.0%	2.8	0.0%

3.6.2. Environmental Consequences

3.6.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to land use. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR-OMM permit requirements.

Forested and agricultural land would be converted to heavy industrial uses by the construction and operation of the Bleeder Shaft Facilities and the East Refuse Disposal Area. Permanent land use impacts would be minor, as reclamation would occur and cultivated crops are prevalent in Franklin County and throughout the state. Temporary, minor impacts on land use could occur as a result of subsidence, but Sugar Camp is responsible for mitigation measures to restore the permit areas to IDNR-OMM-approved post-mining land uses.

3.6.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan. This may result in minor temporary and permanent impacts to land use due to surface disturbances and planned subsidence in the Shadow Area.

Surface Disturbances

Forested and agricultural land would temporarily be converted to heavy industrial uses by the construction and operation of the five Bleeder Shaft Facilities and the East Refuse Disposal Area.

As described in Section 2.1.2.3, upon conclusion of mining of each longwall panel, as the use-life of Project components come to an end, and/or at the completion of the active mining operations, reclamation operations would commence. Reclamation activities would be completed by Sugar Camp in accordance with the approved reclamation plan and the permit conditions developed in accordance with 62 IAC 1700-1850, Permanent Program Rules and Regulations. Sugar Camp estimates that the full reclamation of Sugar Camp Mine No. 1 would begin in 2040.

All rough grading would be completed within 180 days following the removal of facilities, except the East Refuse Disposal Area (the reclamation for which is described below). Final grading and reclamation of topsoil and temporary cover crops completed within 12 months after closure of the active mining operation. The approved species of cover crops would be seeded to provide vegetative cover in accordance with IDNR-OMM-approved post-mining land use. Erosion and sediment control would be used to further stabilize the reclaimed Project Area.

If built, the East Refuse Disposal Area would not be fully reclaimed to existing conditions; instead, this disposal area would be filled to capacity, capped with soils, and made to adequately drain, as described in Section 2.1.2.3. Due to the lack of full reclamation, permanent effects to land use within the East Refuse Disposal Area site are anticipated because of the land could no longer be used for cultivated crops. However, this area could likely be used as pasture land following partial restoration. Overall, the Project would have minor effects on land use as cultivated crops are prevalent in Franklin County and the state.

Coal Extraction-Related Effects

Temporary, minor impacts to land use would occur as a result of subsidence. Examples of potential damage caused by subsidence include cracks in building foundations, road surfaces, or ponding of water from subsided streams, which would have localized, temporary, and minor impact impacts to land use within the Project Area. Subsidence does not normally directly affect the inherent productivity of the surface for typical land uses such as agriculture or forestry. Longwall mining results in predictable and uniform subsidence patterns. IDNR-OMM requires coal companies to reestablish drainage patterns and stream profiles affected by mining activities. 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. Measures that Sugar Camp would implement to mitigate the effects of subsidence are further described in Section 2.1.2.3. These measures are designed to ensure the land is returned to a condition capable of maintaining the value and reasonably foreseeable uses that the land was capable of supporting prior to subsidence. Consequently, no long-term impacts to land use are expected as a result of the underground extraction of coal.

Cumulative Effects

The Action Alternative would contribute to cumulative effects to land use in limited areas. Overall, permanent, cumulative changes to land use resulting from changes to agricultural uses due to existing and proposed refuse disposal areas associated with the Action Alternative and other nearby mining actions would have a minor effect overall, as cultivated crops are prevalent in Franklin County and throughout the state. Cumulatively, moderate temporary impacts to land use could occur in the subsided areas associated with the Action Alternative and other mining operations. However, these impacts have been or would be mitigated by reestablishment of drainage patterns or compensation to farmers.

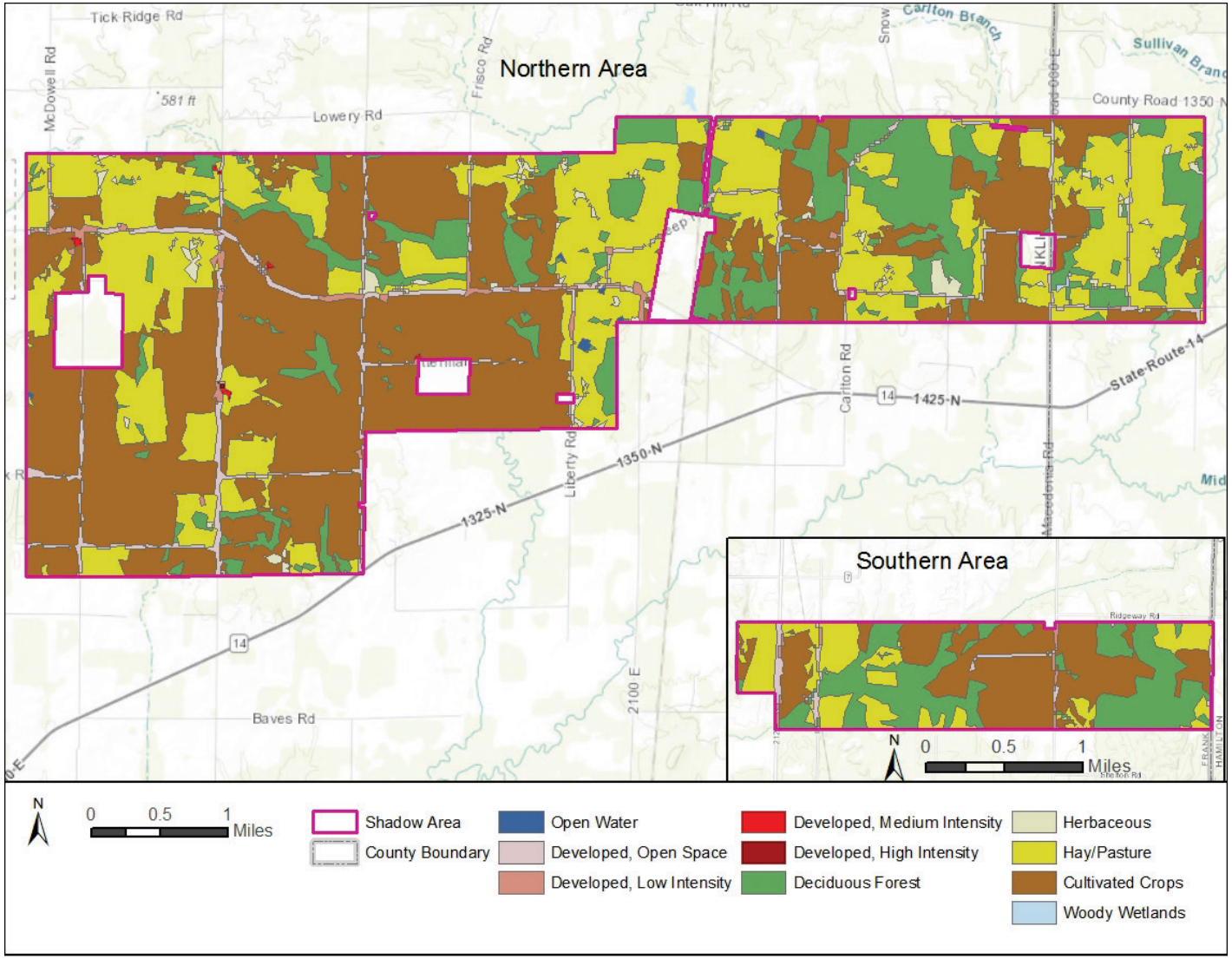


Figure 3-12. Land Use within the Shadow Area

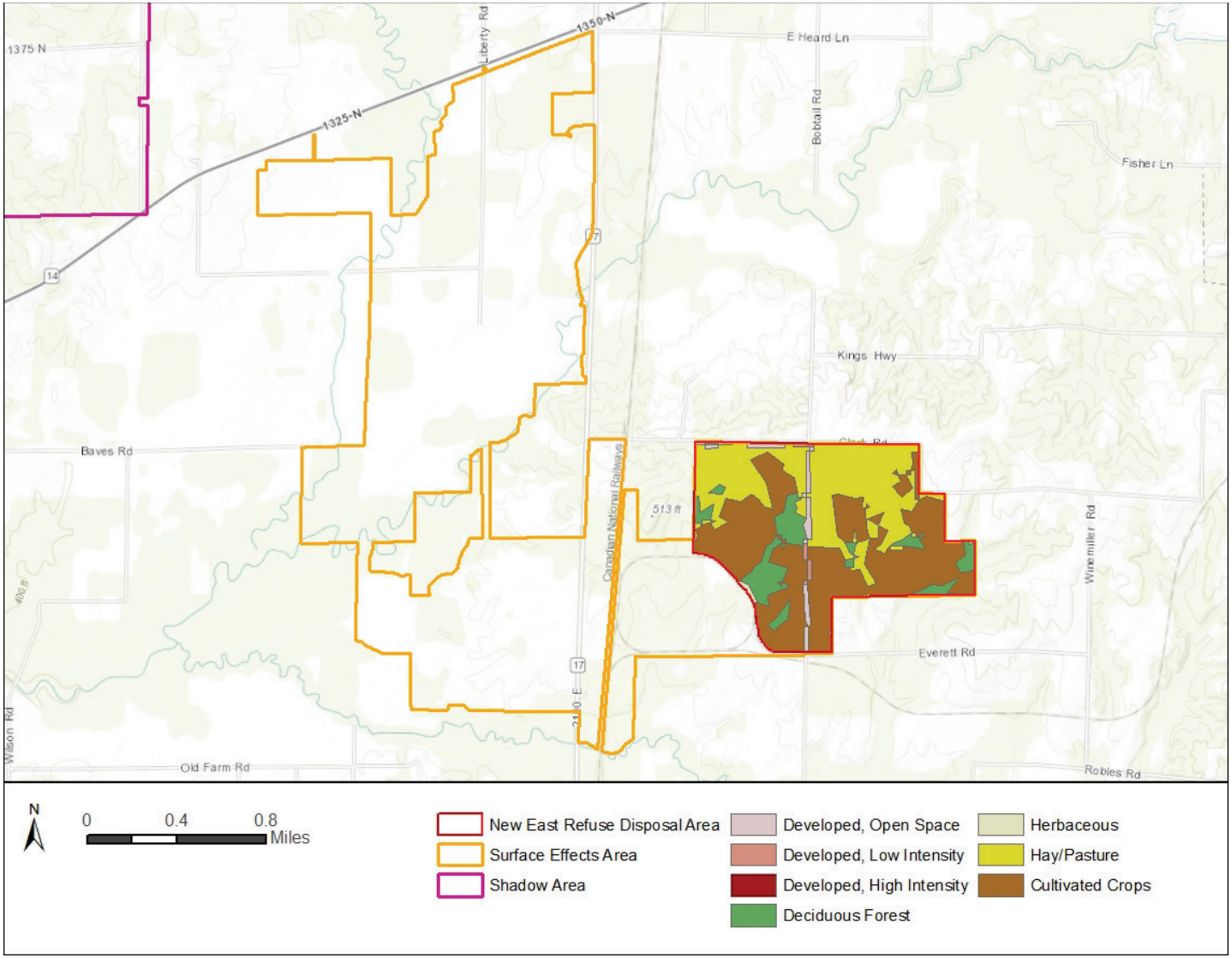


Figure 3-13. Land Use within the New East Refuse Disposal Area

3.7. Transportation

This section describes the potentially affected environment for the public roadways and railroads within the Project Area. The public roads and railroads were identified using county GIS data for Hamilton and Franklin counties.

3.7.1. Affected Environment

There are approximately 52 miles of local roads and three miles of railroad within the Project Area. Approximately four miles of these local roads are located within the surface effects area; all other roads are located in the Shadow Area. A complete listing of roads within the Project Area is included below in Table 3-10.

Table 3-10. Roads and Railroads within the Project Area

County	Road / Railroad Name	Miles in Shadow Area	Miles in Surface Effects Area
Franklin	Accommodation Rd	1.45	
Franklin	Bobtail Rd	0.85	
Franklin	Browning Ln	0.03	
Franklin	Camp Hope Rd	3.03	
Franklin	Carlton Rd	0.23	
Franklin	Clark Rd	0	0.24
Franklin	Co Hwy 12	4.68	
Franklin	Co Hwy 17	0.21	0.78
Franklin	Co Hwy 2	3.08	
Franklin	Co Hwy 7	0.69	
Hamilton	Co Rd 000 E	0.16	
Franklin	Co Rd 000 E	0.16	
Hamilton	Co Rd 100 E	0.10	
Hamilton	Co Rd 1200 N	1.12	
Hamilton	Co Rd 1250 N	0.16	
Hamilton	Co Rd 1250N Farm Access Rd	0.16	
Franklin	Co Rd 1525 N	0.18	
Franklin	Co Rd 1675 E	0.56	
Franklin	Co Rd 2050E	0.98	1.18
Hamilton	Co Rd 50 E	1.38	
Franklin	Dial Rd	0.35	
Franklin	E Accommodation Rd	0.29	
Franklin	E Frank Rd	0.40	
Franklin	E Sheep Farm Rd	0.23	
Hamilton	Evan Dale Ln	1.12	
Franklin	Ewing Rd	4.77	
Franklin	Frisco Rd	1.00	
Franklin	Happy Row Rd	0.03	
Franklin	Hen Ln	0	0.24
Franklin	Hoover Rd	0.69	

County	Road / Railroad Name	Miles in Shadow Area	Miles in Surface Effects Area
Franklin	Kearney Rd	0.55	
Franklin	Ketterman Ln	0.39	
Franklin	Liberty Rd	0.98	0.05
Franklin	Log Cabin Rd	0.58	
Franklin	Long Prairie Rd	1.99	
Hamilton	Macedonia Rd	1.28	
Franklin	Macedonia Rd	1.28	
Franklin	McDowell Rd	0.56	
Franklin	Meadows Ln	0.19	
Franklin	N Accommodation Rd	0.48	
Franklin	N Bobtail Rd	0.24	0.94
Franklin	N Thompsonville Rd	0.89	0.78
Franklin	Page Rd	0.24	
Franklin	Phillips Cemetery Rd	1.40	
Hamilton	Pr Dr Off 500 E	0.16	
Franklin	Richardson Rd	0.47	
Franklin	Sheep Farm Rd	1.13	
Franklin	Snow Flake Rd	1.45	
Franklin	Snowflake Rd	1.45	
Franklin	State Rte 14	0.03	
Hamilton	Unnamed Road	0.20	
Franklin	Unnamed Road	1.00	0.10
Franklin	Webb Hill Rd	2.50	
Franklin	Canadian National Railway	2.95	

3.7.2. Environmental Consequences

3.7.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to transportation. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR permit requirements.

The construction of the associated bleeder shaft facilities and the East Refuse Disposal Area would add a minimal amount of traffic to the roads in the vicinity of private and TVA-approved SBR No. 6 mining activities. Construction and operation of the East Refuse Disposal Area would result in temporary or permanent closure of a portion of North Bobtail Road, which extends north-south across the proposed footprint of the East Refuse Disposal Area. Subsidence has the potential to impact roads and bridges; damage to roads and bridges would be repaired as governed by the permit.

3.7.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining plan. As required by the IDNR permitting process, measures to minimize inconvenience to the users of public roadways

and necessary waivers from the authority governing the use of those roads would be obtained by Sugar Camp. Any temporary damage to roads would be repaired as governed by the permit. Temporary or permanent closure of a portion of North Bobtail Road would occur with construction of the East Refuse Disposal Area; however, this is a minor rural road among agricultural fields. Thus, if the Project results in a permanent closure, this would have a minor overall effect to transportation in the Project Area.

Surface Disturbances

Coal would be transported via conveyor belt from the mining areas to the existing Coal Preparation Plant in the surface effects area. Thus, these activities would not result in impacts to roads in the Project Area. The processed coal would be loaded onto rail cars at the existing rail loadout and transported from the site via the Canadian National Railway. The capacity of Canadian National Railway coal rail cars can range from 98 to 121 tons per coal rail car. The shipment of 7.1 million tons of processed TVA-owned coal per year by rail would require the addition of approximately 58,678 to 72,449 coal rail cars each year. Implementation of the Project would result in coal shipments via rail over a longer period of time.

The construction of the Bleeder Shaft Facilities and the East Refuse Disposal Area would add a minimal amount of traffic to the roads in the Project Area for the approximate nine-month and two-year construction periods, respectively. This traffic would consist of individual employee vehicles for approximately 35 people and trucks transporting rocks and other supplies to construct these facilities. Construction and operation of the East Refuse Disposal Area would result in temporary or permanent closure of a portion of North Bobtail Road, which extends north-south across the proposed footprint of the East Refuse Disposal Area. North Bobtail Road is a minor rural road primarily serving landowners in the vicinity, and nearby detour routes are available. Prior to its closure, coordination with the public authority governing the roadway would occur.

Coal Extraction-Related Effects

No increase in traffic would occur during the operation of the Project-related mining activities due to capacity limitations such that there would not be an increase in employee traffic. Temporary impacts to roads would occur due to planned subsidence in the Shadow Area. Approximately 37 miles of roads within the Project Area could be affected by subsidence, with approximately 32 miles of these roads within Franklin County and 5 miles, within Hamilton County. Increases in traffic associated with routine air quality testing of the Bleeder Shaft Facilities and inspection of the East Refuse Disposal Area are not expected to have a significant impact. As required by IDNR, measures to minimize inconvenience to users of public roadways would be taken such as routing around the planned subsidence areas. No permanent road closures are expected to occur in relation to subsidence.

Prior to mining under roads subject to subsidence, Sugar Camp would obtain the necessary waivers from the public authority governing those roads. Sugar Camp would monitor each roadway section as the longwall panel mining passes underneath it and implement temporary corrective measures, such as rerouting, minor re-grading, repairing pavement, to maintain safe roadways. Once the entire subsidence event passes, Sugar Camp would restore any damage to roads caused by subsidence, per IDNR-OMM requirements. Depending on the particular road segment, this could include repaving, reconstruction of culverts and drainage ditches, installation of new guard rail, and other measures.

Any bridges along roads within the coal extraction areas are considered to be structures, which would be evaluated by a structure survey before the underlying area is mined. Coordination with the appropriate public road authority would be necessary to remove and replace an affected bridge, or if it is along a state route, the state (IDOT) would replace an affected bridge. The need to replace bridges could result in temporary road closures with appropriate detours until the repair or replacement occurs.

USACE's Hydrologic Engineering Center River Analysis System, a software program that models flow, sediment transport, and water quality in given areas (USACE 2020), would be used in advance of critical areas located in or near the existing 100-year floodplain in relation to the mining sequence to direct pre-mitigation work to prevent or minimize the effects of planned subsidence. Less than 10 depressional areas requiring drainage correction are expected adjacent to roadways.

Planned subsidence may have an effect on the Canadian National Railway, which passes through the northern Shadow Area, the surface effects area, and the southern Shadow Area. Sugar Camp, in close coordination with the Canadian National Railway, would monitor the railway section as the longwall panel passes underneath it and implement temporary corrective measures to maintain a safe railway. Once the entire subsidence event passes, Sugar Camp, in close coordination with the Canadian National Railway, would restore any damage to the railway caused by subsidence, per IDNR-OMM requirements.

Overall, direct impacts to transportation resources associated with implementation of the Action Alternative would be anticipated to be minor to moderate and minimized or mitigated. The Action Alternative would not result in an increase in the annual quantity of coal produced and transported from the site by train.

Cumulative Effects

If mine components associated with the Action Alternative, the No Action Alternative, and nearby mines are constructed at the same time or if subsidence of different portions of the associated subsidence areas occur simultaneously, moderate, temporary cumulative effects could occur to existing roadways. Some local road closures have occurred or could occur due to area mining activities, resulting in moderate, temporary or permanent cumulative effects when considered with the Action Alternative. As required by the IDNR-OMM permitting process, Sugar Camp and other mine operators have taken or will take measures to minimize inconvenience to the users of public roadways and have obtained or will obtain the necessary waivers from the authorities governing the use of those roads. Beneficial effects to transportation from the proposed IDOT projects would offset some of the adverse cumulative effects from mining activities.

3.8. Utilities

This section describes the potentially affected environment for township, city and county utilities. Telephone, water, and electric utility lines were identified using public GIS data. Sugar Camp receives power from South Eastern Electric Power Coop and potable water from Akin Water District.

3.8.1. Affected Environment

There are gas, oil, electric, water, and communications utilities within the Project Area. The providers of these utilities include:

- Central Illinois Public Service Company
- Akin Water District
- Hamilton County Rural Water
- Hill City Water District
- Macedonia Water System
- Ewing-Ina Water Commission
- Hamilton County Telephone Electric Cooperative Association

As shown on Figures 3-14 and 3-1, within the Shadow Area, approximately 20 segments of communications lines, 14 segments of public water lines, one segment of a gas line, and a portion of an electrical line are present. Within the surface effects area, two segments of water lines and one segment of communications line are present.

3.8.2. Environmental Consequences

3.8.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to utilities. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized mitigated, per IDNR-OMM permit requirements.

A public water line segment within the footprint of the East Refuse Disposal Area would likely need to be relocated in order to maintain access to the line for routine maintenance and inspection. Relocation of the water line would be done in close coordination with the associated utility company. Minor impacts to utilities would occur as a result of subsidence. Sugar Camp would use existing agreements or pursue new agreements with governmental bodies and utility companies responsible for all utility services expected to be affected by subsidence. Sugar Camp would also be required to compensate utilities for repair of any damage caused by its mining activities.

3.8.2.2. Action Alternative

Under the Action Alternative, TVA would approve proposed mining plan. Permanent impacts would occur to an existing water line segment in the footprint of the East Refuse Disposal Area, but these impacts would be mitigated through its relocation. Utilities in the Shadow Area could be temporarily affected due to the resulting subsidence.

Surface Disturbances

One public water line segment is present in the footprint of the East Refuse Disposal Area. This water line would likely need to be relocated in order to maintain access to the line for routine maintenance and inspection. Relocation of the water line would be done in close coordination with the associated utility company and would, thus, mitigate Project effects.

Coal Extraction-Related Effects

Planned subsidence would result in temporary impacts to utilities in the Shadow Area. Utility components may become damaged, broken, or out of alignment as a result of subsidence.

Subsidence could temporarily affect communications, water, and electric utility lines that follow public roadways.

Sugar Camp has existing agreements or would pursue agreements with governmental bodies and utility companies responsible for all utility lines expected to be affected by subsidence. Such agreements, to be negotiated 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 utility infrastructure 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 subsidence on utilities would therefore be minimal and short-term after preventive planning with utility companies and subsequent repair.

Cumulative Effects

Cumulatively, effects on utilities due to the planned subsidence and surface disturbances associated with the Action Alternative and other mining actions within 20 miles of the Project, including the activities associated with the No Action Alternative, would be minor and short-term due to preventive planning with governmental bodies and utility companies and subsequent repair.

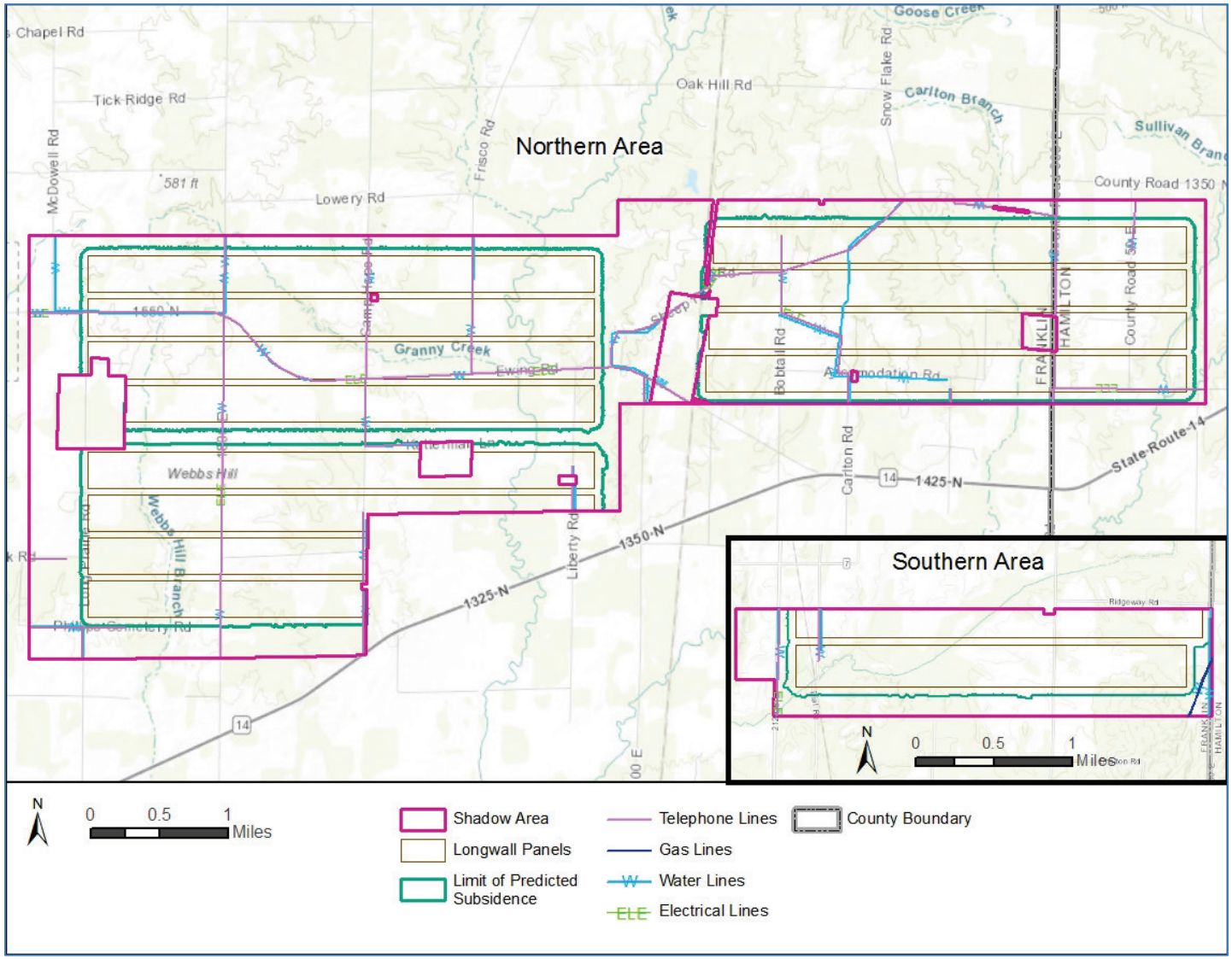


Figure 3-14. Shadow Area Infrastructure

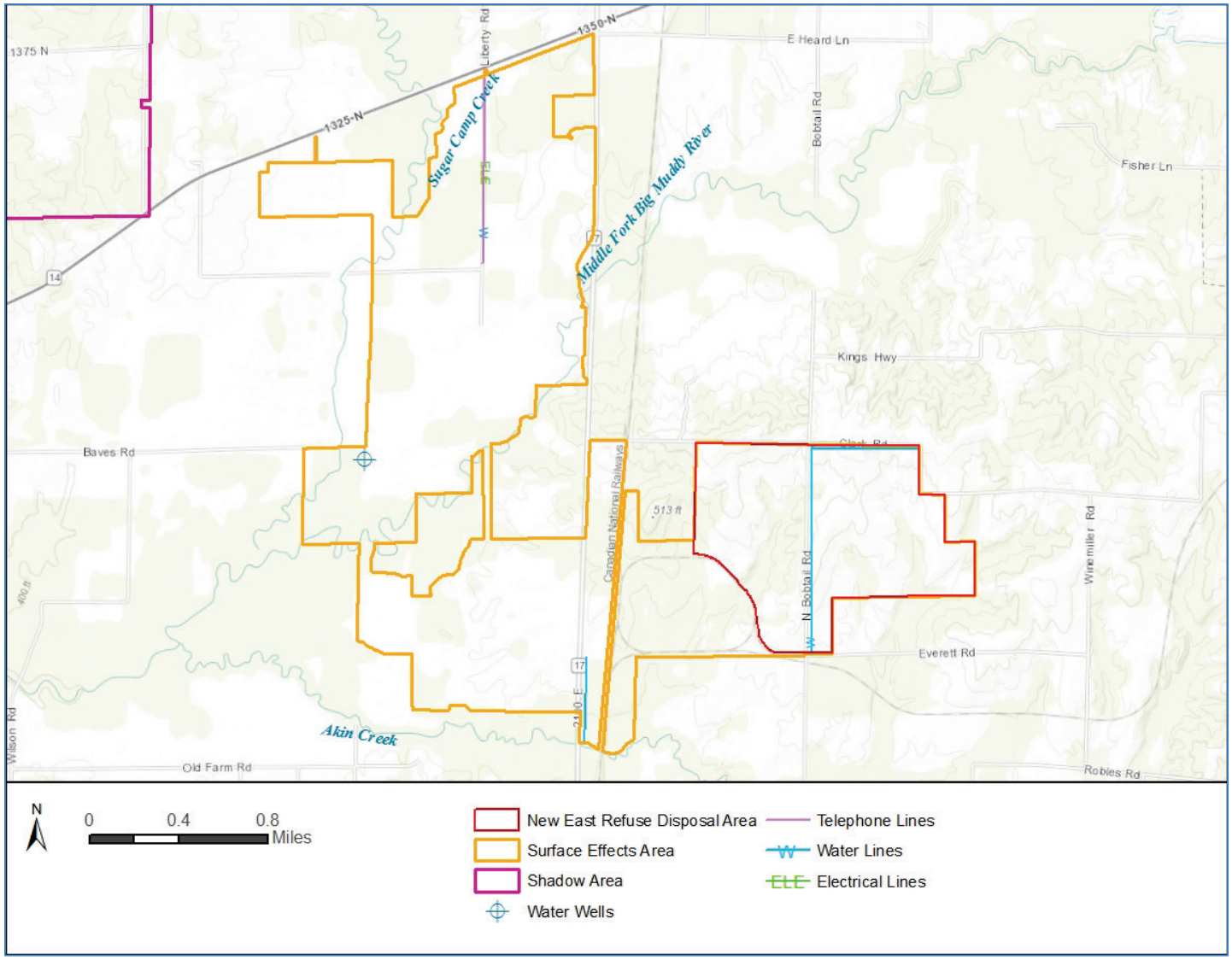


Figure 3-15. Surface Effects Area Infrastructure

3.9. Cultural Resources

This section describes the cultural resources in the Project Area and the effects of the alternative actions on those cultural resources. Cultural resources are properties and places that illustrate aspects of prehistory or history or have long-standing cultural associations with established communities and/or social groups. Cultural resources may include archaeological sites, unmodified landscapes and discrete natural features, modified landscapes, human-made objects, structures such as bridges or buildings, and groups of any of these resources, sometimes referred to as districts. Information sources utilized for this section include the National Register of Historic Places (NRHP) webmap maintained by the National Park Service, the IHPA Historic Architectural Resources GIS System (HARGIS), the Illinois Inventory of Archaeological Sites (IIAS), and the IDOT Historic Bridges of Illinois database. The results of a survey of potentially historic structures conducted by Sugar Camp for SBR No. 6 were also utilized.

3.9.1. Affected Environment

Once identified, cultural resources are evaluated for inclusion in the NRHP maintained by the National Park Service. Tangible cultural resources may qualify for inclusion in the NRHP if they are 50 years of age or older (unless in exceptional cases) and if found to embody one or more of four different types of values, or criteria, in accordance with 36 CFR § 60.4:

- *Criterion A:* association with events that have made a significant contribution to the broad patterns of our history.
- *Criterion B:* association with the lives of persons significant in our past.
- *Criterion C*: embodiment of the distinctive characteristics of a type, period, or method of construction; representative of the work of a master; possessing high artistic values; or representative of a significant and distinguishable entity whose components may lack individual distinction.
- *Criterion D*: cultural resources that have yielded, or may be likely to yield, information important in prehistory or history.

TVA has determined the area of potential effects (APE) to cultural resources as the footprint of the Shadow Area (12,125 acres) as well as the five Bleeder Shaft Facilities (27 acres in total within the Shadow Area), including the installation of associated utilities needed to operate the Bleeder Shaft Facilities, where physical effects could occur, as well as areas within a half-mile radius of the APE within which the Project would be visible, where visual effects on aboveground resources could occur. This area is referred to herein as the Viewshed. TVA initiated consultation with IHPA (Illinois SHPO) regarding the Project on November 7, 2019 (Appendix D). The IDNR Cultural Resources Manager responded on December 9, 2019, indicating to copy IDNR on correspondences with IHPA, as IDNR reviews mine-related cultural resources consultations and coordinates with IHPA on these (Appendix D).

Native Americans occupied southern Illinois beginning at least 12,000 years ago (Evans et. al, 1997; Moffat 2002). Fertile river floodplains and rich hunting grounds supported lifestyles that typically transitioned from nomadic hunting and gathering to settled agricultural. French explorers first encountered the Native American peoples of Illinois in the late 1600s, which led to alliances and conflicts. In the 1830s, most Native American groups were forced to move west of the Mississippi River. By the mid- to late 1800s, Euro-American settlement was occurring across the state. These immigrants built many of the farmsteads once scattered around the Project

Area and vicinity. Subsequent modern development has caused the alteration or removal of many of these farmstead structures; however, some do remain (Muller 1986; Schroder 2004). The remnants of many of these human occupations of southern Illinois could potentially be found in the Project Area.

According to the IIAS, the Project Area is located in an area with a relatively high probability for archaeological sites due to being in a rich watershed area. Ten archaeological sites have been recorded within the Project Area where new disturbances are proposed. All of these sites are located at or adjacent to the proposed footprint of the new East Refuse Disposal Area. Nine of these sites were recorded during surveys conducted by Sugar Camp in relation to their mining operations. All but one of the sites date to the historical period; the remaining site dates to the Precontact period. Based on research to date, as documented by the IIAS, none of these sites have been recommended eligible for the NRHP.

Database research indicated that there are three potentially historic buildings within the Project Area or the adjacent Viewshed. One of these buildings, the Webb Store (HARGIS No. 300664), is within the Project Area. The other buildings are residential and/or farmstead buildings recorded during the structure survey for SBR No. 6 and located in rural areas outside of Benton and Thompsonville, within the Viewshed associated with the Project. Five churches and three cemeteries of unknown age were also identified during the structure survey for SBR No. 6; these are present within the Shadow Area. If any of these are determined to be of potential historic age, they would be evaluated for NRHP eligibility. There are no known historic bridges in the Project Area.

Federal agencies are required to consult with Native American tribes that may have significant religious or cultural resources in a Project region. The tribes that may have interests in this are listed in Section 1.5.4.3. TVA initiated consultation with these tribes on November 7, 2019. Two responses were received, from the Miami Tribe of Oklahoma and Osage Nation (Appendix D). The Miami Tribe of Oklahoma did not indicate any sites or places of significance or importance within the Project Area. The Osage Nation expressed interest in the area and requested continued consultation as the Bleeder Shaft Facility locations are identified.

3.9.2. Environmental Consequences

3.9.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to cultural resources.

As the locations of the associated bleeder shaft facilities are identified, Sugar Camp would conduct Phase I cultural resources surveys of the potentially affected areas and provide the survey results to IHPA for consultation, as they have done for past mining activities. Sugar Camp is required by IDNR to repair or compensate owners for structural damage caused by subsidence. Impacts to historic properties from subsidence associated with the No Action Alternative would be minor and temporary.

3.9.2.2. Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This could result in impacts to cultural resources due to construction of surface facilities. Per an agreement between IHPA and IDNR, shadow areas are considered exempt activities that have no effect on historic properties (IDMM 1994). TVA would continue to consult with IHPA and interested tribes regarding Project effects to cultural resources throughout the environmental review process.

Surface Disturbances

The specific locations of the Bleeder Shaft Facilities within the Shadow Area are not currently known. Due to the size and scope of the Project, TVA indicated to IHPA that the approach to determining effects to cultural resources would proceed under phases, as provided under 36 CFR § 800.4(b)(2) and § 800.5(c)(1). Once the locations of the Bleeder Shaft Facilities and any associated components are identified, TVA would conduct a Phase I cultural resources survey of the APEs defined for these areas and provide to IHPA for consultation.

The construction of the East Refuse Disposal Area would directly impact seven known archaeological sites. Based on research conducted to date, none of these sites have been recommended eligible for the NRHP. TVA is now initiating coordination with IHPA for this portion of the Project Area.

The construction and operation of the Bleeder Shaft Facilities and the East Refuse Disposal Area would cause minor visual changes to the overall landscape viewshed. The Bleeder Shaft Facilities would be dismantled and their sites restored at the end of their useful lives, as described in Section 2.1.2.3. The East Refuse Disposal Area would be capped with soils and left in place at the end of its operational life and revegetated according to the reclamation plan.

Coal Extraction-Related Effects

Per the *Programmatic Agreement between the Illinois Historic Preservation Agency and the Illinois Department of Natural Resources*, “shadow areas in which there will be no surface disturbance” are a class of exempt activities that are “considered to have no effect on historic properties” (IDMM 1994). TVA agrees that no archaeological resources would be affected by subsidence, where no surface disturbance is proposed. Such surface disturbances may include re-contouring activities to restore drainage patterns altered by subsidence.

Subsidence can affect structures by causing cracks or shifts in building foundations. A pre-subsidence survey of structures has been conducted by Sugar Camp in regards to the Project, and a post-subsidence survey would be conducted to assess damage caused by subsidence. If needed, structures can be braced prior to subsidence to minimize damage and can be repaired afterward. Sugar Camp is required by IDNR to repair or compensate owners for structural damage caused by subsidence. Thus, any Project impacts to historic properties from subsidence would be temporary.

Cumulative Effects

Cumulative effects to cultural resources, such as impacts to the viewsheds of aboveground resources, structural damage to architectural resources, or effects to NRHP-eligible archaeological sites, have the potential to occur with implementation of the Action Alternative and consideration to other mining actions within 20 miles of the Project, including the activities associated with the No Action Alternative. However, impacts to cultural resources will continue to be avoided, minimized, or mitigated, per IDNR-OMM and IHPA requirements, and in consultation with IHPA and interested tribes.

3.10. Solid and Hazardous Waste

This section describes the current production and management of solid and hazardous wastes in the Project Area and how they would change under the alternative actions. Solid waste consists of a broad range of materials that include refuse, sanitary wastes, contaminated

environmental media, scrap metals, nonhazardous wastewater treatment plant sludge, nonhazardous air pollution control wastes, various nonhazardous industrial waste, and other materials (solid, liquid, or contained gaseous substances).

Hazardous materials are defined as substances or materials that have been determined to be capable of posing an unreasonable risk to health, safety and property. Hazardous material includes hazardous substances and hazardous wastes. Under the Resource Conservation and Recovery Act (RCRA), a waste is determined to be a hazardous waste if it is specifically listed on one of four lists (the F, K, P and U lists) found in title 40 of the CFR in sections 261.31 – 261.33. A waste can also be determined to be hazardous if it exhibits one or more of the following hazardous waste characteristics, as defined in 40 CFR 261.21 through 261.24: ignitability, corrosivity, reactivity, or toxicity.

Hazardous materials and management of these materials are regulated under a variety of federal laws including the Occupational Safety and Health Administration (OSHA) standards, Emergency Planning and Community Right to Know Act and RCRA subtitle C.

3.10.1. Affected Environment

The IDNR-OMM Permit No. 382 describes several methods for hazardous waste disposal throughout the Sugar Camp site, as well as the disposal of refuse from the coal preparation process.

Two refuse disposal areas are currently used for storage of Coal Preparation Plant refuse (see Figure 1-2) and have remaining capacity, though the actual capacities are unknown at this time. The most recent refuse disposal area located directly north of the existing Permit No. 382 area, is used almost exclusively for disposal of both coarse and fine coal refuse produced during the coal preparation process. Course refuse generally consists of inert non-coal (rock material) fragments separated from the unprocessed coal upon extraction via a series of shakers. Fine refuse typically exits the separation process as a slurry and generally shares many properties with the associated coal seam, including silicon, aluminum, and sulfur compounds.

In 2014, a reverse osmosis (RO) treatment plant was installed to process water with high chloride concentrations that was infiltrating the mine workings. The source of the high chloride water is presumably located directly above the No. 6 coal seam; as the longwall operation progresses and the rock roof fractures, this water drains into the mine workings. This high chloride water is pumped from the underground workings to two surface clarifying/settling ponds before being pumped to the RO treatment plant. The RO plant, located near the preparation plant, treats the high chloride water into two waste streams. About 75 percent of the treated water (approximately two million gallons per day) is pumped directly to Pond 001, where it is then utilized by the preparation plant. The second waste stream is a liquid concentrate, consisting of approximately 675,000 gallons per day. About half of this second waste stream is disposed of in the two on-site deep injection wells, while the remaining half is sent to the existing refuse disposal area. The RO treatment plant, combined with the deep injection wells, was the best available treatment option and has been approved by both the Illinois EPA and IDNR-OMM.

3.10.2. Environmental Consequences

3.10.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no solid or hazardous wastes would be produced as a result of the mining and processing of additional TVA-owned coal. Impacts from the ongoing mining of previously approved TVA-

owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per IDNR permit requirements.

The existing refuse disposal areas and the new East Refuse Disposal Area would store refuse from processing of previously approved TVA-owned coal and privately owned coal. The existing Coal Preparation Plant would continue to be managed under an SPCC Plan for onsite bulk oil in containment, in accordance with applicable regulations. Subsidence does not generate additional solid or hazardous waste.

3.10.2.2. Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan, which would include mining of approximately 185.6 million tons of unprocessed TVA-owned coal, at an average annual production rate of 7.1 million tons of processed TVA-owned coal per year during longwall mining. Preparation of the unprocessed coal is anticipated to produce approximately 92.8 million tons of coal refuse for disposal in the existing refuse disposal areas and the East Refuse Disposal Area.

Sugar Camp does not consider any of the refuse onsite as waste, except for bulk oil stored in underground containment for use in mining equipment. Sugar Camp maintains a SPCC Plan for onsite bulk oil in containment and report usage to USEPA, in accordance with applicable regulations. If TVA approves Sugar Camp's mining plan, quantities of bulk oil stored and used onsite are expected to exceed the quantities stored and used if the Proposed Action is not approved.

Surface Disturbances

The mining plan includes the construction of five Bleeder Shaft Facilities associated with the mining of TVA-owned coal. These planned activities would temporarily disturb approximately 25 acres of surface lands within the 12,125-acre Shadow Area at five different locations. 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. Therefore, construction of the five planned Bleeder Shaft Facilities would not result in generation of solid or hazardous waste requiring management other than what is described herein.

The extracted coal, both TVA-owned and privately owned, would be processed at the existing Coal Preparation Plant. The plant is located within the 2,420-acre surface effects area, outside of the 12,125-acre Shadow Area. The plant is currently operating and was approved by IDNR in 2008. Water used at the plant is treated on-site. Sugar Camp holds an NPDES permit to discharge water from 15 locations outside of the Shadow Area. The Coal Preparation Plant has a set capacity that would not increase with the addition of the 186 million tons of unprocessed TVA-owned coal, which would result in generation of approximately 92.8 million tons of coal refuse that would not have otherwise been generated if TVA does not approve the Proposed Action (Appendix D).

Sugar Camp proposes to construct an East Refuse Disposal Area to provide additional long-term storage of refuse from the Coal Preparation Plant (see Figure 2-4). If approved by IDNR-OMM, the East Refuse Disposal Area would be used to store refuse from the processing of privately owned and TVA-approved coal mined in the future, as well as TVA-owned coal mined under the Proposed Action. This new disposal area is necessary regardless of whether the TVA-owned coal is mined in the future.

Approval of the Action Alternative would result in an increase of coal refuse disposed in the East Refuse Disposal Area. Based on data provided by Sugar Camp, preparation of 186 million tons of unprocessed coal would result in generation of approximately 92.8 million tons of coal refuse to be disposed. Reclamation of the East Refuse Disposal Area would be completed as described in Chapter 2.

Coal Extraction-Related Effects

Planned subsidence within the Shadow Area would not generate additional solid or hazardous waste, and thus, no impacts would occur in relation to waste.

Cumulative Effects

Cumulative impacts would be avoided or minimized by Sugar Camp and other mine operators within 20 miles of the Project by maintaining SPCC plans at all ongoing and proposed coal facilities, including Bleeder Shaft Facilities and existing and proposed refuse disposal areas. No cumulative impacts would occur due to planned subsidence associated with the Action Alternative, with consideration to other mining actions within 20 miles, including the activities associated with the No Action Alternative, as subsidence does not generate additional solid or hazardous waste.

3.11. Human Health and Safety

This section describes the potentially affected environment and environmental consequences for human health and safety. In this section, safety is discussed in the context of relevant regulatory requirements under OSHA, Federal Mine Safety and Health Act, and other types of hazard assessment and prevention.

Scoping comments recommended that the EIS address occupational health and safety measures, including safety related to humans and infrastructure during subsidence. Subsidence and pollutant emissions are safety issues that could potentially occur at the facility. In the context of evaluating the project impacts, “safety” is interpreted as engineering design, operation, and handling of project infrastructure, equipment, and materials in a manner that seeks to reduce hazards and prevent the occurrence of incidents and accidents (IFC 2007).

3.11.1. Affected Environment

Mine safety is regulated by several agencies, including IDNR Mine Safety and Training Division, OSHA, and U.S. Department of Labor’s Mine Safety and Health Administration (MSHA). Safety requirements are a condition of obtaining regulatory permits and approvals to construct, operate, and close mines. Safety issues are typically addressed under state and federal regulatory programs designed to ensure physical safety pertaining to engineering design and structural integrity of the project components and infrastructure, and safe storage, use, transportation, and disposal of materials, product, and waste streams. It also includes operational safety for workers, and the safety of visitors to the facility and the general public in the vicinity.

MSHA works to prevent death, illness and injury from mining and promote safe and healthful workplaces for U.S. miners. MSHA carries out the provisions of the Federal Mine Safety and Health Act of 1977 as amended by the Mine Improvement and New Emergency Response Act of 2006. The agency develops and enforces safety and health rules for all U.S. mines regardless of size, number of employees, commodity mined, or method of extraction. MSHA also provides technical, educational and other types of assistance to mine operators. MSHA

regulates the health and safety of miners predominantly using 30 CFR part 75 for underground and 30 CFR part 77 on the surface.

3.11.2. Environmental Consequences

3.11.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the proposed mining of TVA-owned coal would occur to health and human safety. Impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur, but these impacts would continue to be minimized or mitigated, per MSHA and OSHA regulations and IDNR Mine Safety and Training Division.

Sugar Camp would avoid subsidence-related damages to private property or to reimburse affected parties for those damages by coordinating pre- and post-subsidence surveys with property owners.

3.11.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining. This may result in safety impacts due to the effects of surface disturbances or subsidence, but any impacts would be minimized or mitigated through compliance with MSHA, OSHA, IDNR Mine Safety and Training Division, and other relevant regulatory programs. These regulations require site-specific plans that will be submitted to and approved by MSHA before implementation.

Surface Disturbances

Sugar Camp complies with MSHA and OSHA through the implementation of numerous site-specific plans for each mining operation. Sugar Camp would follow CFR Part 70 for all underground components of the mine and CFR 30 Part 77 for mandatory safety standards for all surface components of the mine. Sugar Camp houses copies of their Ventilation Plan, Roof Control Plan, and Emergency Response Plan at each mining site. Plans for refuse disposal areas, shaft facilities, and seal installations are technically evaluated, reviewed, and approved by MSHA prior to construction. Sugar Camp also maintains a SPCC Plan and Emergency Management and Fire Fighting plans at the mining site.

As shown on Figure 2-1, fans would be installed at the top of the bleeder ventilation shafts associated with the Bleeder Shaft Facilities to increase the rate of circulation and reduce the risk of explosions and fires. Methane in concentrations between five and 15 percent can be explosive (Kissell 2006). Safety regulations usually require that methane levels be kept lower than one percent for health and safety of mine workers.

Sugar Camp would backfill and seal mine openings, such as bleeder shaft and boreholes, in accordance with pertinent state and federal regulations. The 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.

Coal Extraction-Related Effects

The operation of underground mining equipment could contribute to pollutant emissions that could pose a safety threat to workers in the underground longwall mining areas. In order to maintain safe levels of pollutants within the mine, 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.

In its application for UCM Permit No. 382, Sugar Camp was required to describe how mine stability is maximized to prevent unplanned subsidence. Sugar Camp used the Analysis of Retreat Mining Pillar Stability (ARMPS) program to calculate the stability factor by using the loads applied to and the load bearing capacities of coal pillars. The ARMPS program uses an empirical method with an extensive amount of case histories incorporated for calibration. It is the industry standard for pillar design. Site-specific strength values for coal pillars and floor are developed to ensure an adequate factor of safety for roof stability and to prevent unplanned subsidence. Plate testing would be conducted in conventional room-and-pillar sections within the first 1,000 feet of entering a mine area. Should any changes in mine stability or conditions be encountered, a more detailed study of floor, roof and pillars would be performed at that time. As stated in the UCM Application, “the subsidence control plan…will serve to avoid damage to any surface features to assure compliance with 62 Ill. Adm. Code 1817.121(d).”

Sugar Camp is required to avoid subsidence-related damages to private property or to reimburse affected parties for those damages. Planned subsidence is predictable, uniform, and minimizes damage to surface structures as mining proceeds. Sugar Camp would coordinate with property owners and the public authority governing roads in the potential impact area prior to and after subsidence as part of a pre- and post-subsidence survey of structures, such as buildings and bridges, as described in Section 2.1.2.3. Sugar Camp would also implement mitigation measures outlined in Section 2.5 to minimize potential safety impacts caused by subsidence. These mitigation measures include the repair of any damage to buildings or other structures, roads, utilities, or drainage caused by subsidence.

Cumulative Effects

Sugar Camp’s ongoing and proposed actions associated with the overall 37,972-acre SBR No. 6 mine expansion and in the existing 2,420-acre surface effects area would not contribute to cumulative adverse impacts to human health and safety due to compliance with regulatory safety programs.

3.12. Socioeconomics and Environmental Justice

This section gives an overview of existing socioeconomic and environmental justice conditions for Franklin and Hamilton counties and the potential impacts associated with the No Action and Action Alternatives. Components of socioeconomic resources that are analyzed include the local economy, employment, income, poverty status, population, and ethnicity. Components of environmental justice that are presented include the proportions of the local population that are minority and low-income and the potential for effects to these populations.

The Project Area is located in an unincorporated, primarily rural portion of eastern Franklin County and western Hamilton County, approximately five miles north-northwest of the Town of Somerville. The Project Area overlaps U.S. Census Bureau (USCB) 2010 Census Tract (CT) 412, in Franklin County, and a small portion of CT 9733, in Hamilton County. Generally, CT 412 encompasses the Project surface effects area, including the site of the East Refuse Disposal Area, and the majority of the Shadow Area. CT 9733 encompasses a small eastern portion of the northern Shadow Area (Figure 3-16).

Environmental justice is analyzed in accordance with EO 12898 (59 FR 7629), which directs federal agencies to identify and address, as appropriate, potential disproportionately high and

adverse effects of their programs, policies, and activities on minority and low-income populations. Although TVA is not subject to this EO, its policy is to consider environmental justice in its environmental reviews.

Council of Environmental Quality (CEQ) guidance directs identification of minority populations when either the minority population of the affected area exceeds 50 percent or the minority population percentage of the study area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). CEQ defines minority populations as people who identify themselves as Asian or Pacific Islander, American Indian or Alaskan Native, Black (not of Hispanic origin), or Hispanic. Due to including one of these minorities, those indicating two or more races are also considered minorities. Minority populations were defined as those exceeding 50 percent.

CEQ guidance specifies that low-income populations are to be identified using the annual statistical poverty threshold from the USCB Current Population Reports Series P-60 on Income and Poverty. The USCB-provided 2017 poverty threshold for individuals under age 65 was $12,752, and the official poverty rate for the United States (U.S.) as a whole in 2017 was 12.3 percent (USCB 2018). Low-income populations were defined as those with poverty rates that are above the U.S. poverty rate of 12.3 percent.

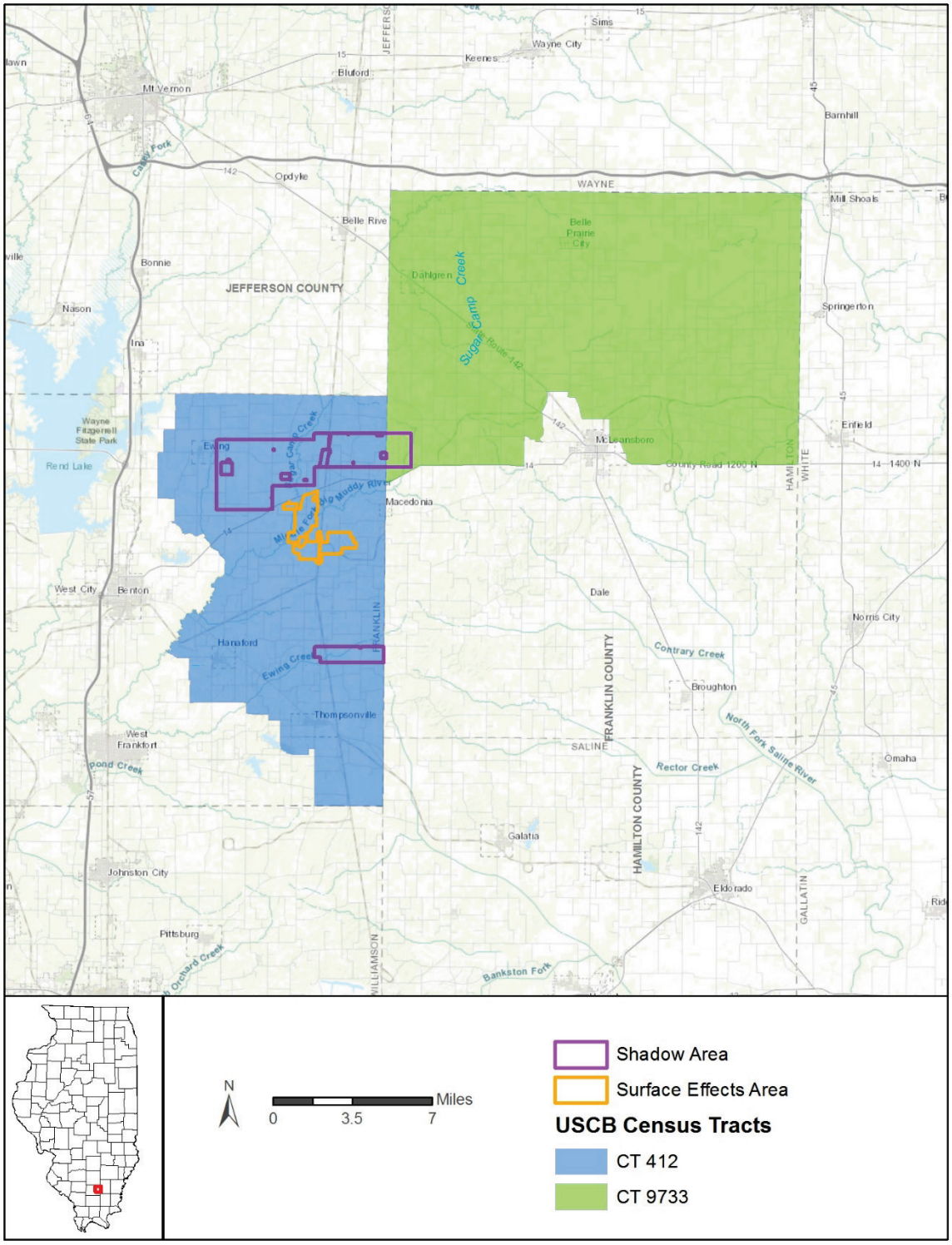


Figure 3-16. U.S. Census Bureau 2010 Census Tracts in the Project Area

3.12.1. Affected Environment

The coal mining industry has historically been significant to the economy of southern Illinois, including the Project Area counties, because of the rich mineral resources within the Illinois Coal Basin. Coal mining remains one of Franklin County's largest industries with two active underground mines. Several coal-related product and service companies are located in the county to meet the needs of underground mining (FREDCO 2020). A comparison of industries within Franklin and Hamilton counties and the State of Illinois is shown in Table 3-11. Private, non-farming industries include mining, retail, manufacturing, and professional services. While land use surrounding the Project Area is predominantly agricultural, farm employment comprises a smaller percentage than private, non-farming industries.

Table 3-11. 2018 Employment Data

Area	Total Employment	Farming	Private, Non-farming industries	Government
Franklin County	14,029	652	11,174	2,203
Hamilton County	3,821	618	2,652	549
State of Illinois	7,952,370	74,212	7,008,189	869,969

Source**:** U.S. Bureau of Economic Analysis (BEA) 2018

Franklin and Hamilton counties have lower median household incomes than across the state and nation (Table 3-12). CTs 412 and 9733 both have higher median household incomes and lower percentages of people below the poverty level as compared with their respective county. However, CT 412 has a poverty rate that, while lower than the county rate, is higher than the 2017 official U.S. poverty rate of 12.3 percent, as reported in the USCB Current Population Reports Series P-60 on Income and Poverty.

Table 3-12. Median Household Income and Poverty Status

Area	Median Household Income, dollars	Percentage of all people below poverty level in past 12 months
United States	57,652	14.6
State of Illinois	61,229	13.5
Franklin County	39,454	19.9
CT 412	45,885	16.8
Hamilton County	47,293	13.9
CT 9733	59,891	10.2

Sources: USCB 2013 – 2017 American Community Survey

Minority populations constitute just over one percent of the total population in Franklin and Hamilton Counties, as of the 2010 U.S. Census of Population (Table 3-13). This percentage is much lower than state and national levels. CTs 412 and 9733 are also predominantly Euro-American populations.

Table 3-13. Population and Percentage of Minority Populations

Area	Total Population	Minority Population	Percentage Minority Population
United States	308,745,538	76,183,200	24.7
State of Illinois	12,830,632	3,362,773	26.2
Franklin County	39,561	478	1.2
Census Tract 412	3,750	28	0.7
Hamilton County	8,457	93	1.1

Area	Total Population	Minority Population	Percentage Minority Population
Census Tract 9733	2,784	29	1.0

Source: USCB 2010

3.12.2. Environmental Consequences

This section describes the potential impacts to socioeconomic resources should the No Action or Action Alternative be implemented. Social and economic issues considered for evaluation include change in expenditures for goods and services and short and long-term impacts on employment and income.

This section also describes the potential environmental justice impacts should the No Action or Action Alternative be implemented. According to the CEQ, adverse health effects to be evaluated within the context of environmental justice impacts may include bodily impairment, infirmity, illness, or death. Environmental effects may include ecological, cultural, human health, economic, or social impacts. Disproportionately high and adverse human health or environmental effects occur when the risk or rate of exposure to an environmental hazard or an impact or risk of an impact on the natural or physical environment for a minority or low-income population is high and appreciably exceeds the impact level for the general population or for another appropriate comparison group (CEQ 1997).

3.12.2.1. The No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no impacts associated with the mining of additional TVA-owned coal would occur to socioeconomics and environmental justice. Positive socioeconomic impacts from the ongoing mining of previously approved TVA-owned coal and privately owned coal would continue to occur. Any environmental justice impacts would continue to be avoided due to compliance with IDNR permit requirements to avoid, minimize, or mitigate adverse effects.

Approximately 10 to 15 workers would be employed to construct the four bleeder shaft facilities over an approximate six to nine-month period. Construction of the East Refuse Disposal Area would provide employment for about 20 people over an approximate two-year period. These employment needs would likely create some new local job opportunities during construction of the Project, while mining operations would continue to have positive effects on the local economy through continued employment. While low-income populations are present in the vicinity of Sugar Camp Mine No. 1, the No Action Alternative would not disproportionately adversely affect environmental justice populations. In addition, the economic benefits may have a particular benefit to low-income populations in the mine vicinity.

3.12.2.2. Action Alternative

Under the Action Alternative, TVA would approve the proposed mining. Positive socioeconomic impacts from the mining of additional TVA-owned coal would occur. Any environmental justice impacts would be avoided due to compliance with IDNR permit requirements to avoid, minimize, or mitigate adverse effects.

Over an approximate nine-month period, about 15 workers would be employed to construct the five Bleeder Shaft Facilities in the Shadow Area. Construction of the East Refuse Disposal Area would provide employment for about 20 people over an approximate two-year period. These jobs would likely create some new local job opportunities during construction of the Project. The mining of TVA-owned coal and the processing of that coal would be carried out by current Sugar Camp employees, with no additional non-construction hiring attributable to the Project. The

mining of the TVA-owned coal under the Action Alternative would, however, provide employment for a longer period of time than would otherwise occur.

Overall, long-term beneficial economic impacts would result from implementation of the Action Alternative, including the purchase of materials, equipment, and services, and long-term increases in employment and income. These increases would be local or regional, depending on where the goods, services, and workers are obtained. Indirect economic effects would also occur with implementation of the Action Alternative. These would generally derive from the expenditure of wages earned by the workforce involved in construction activities and mining operations.

While low-income populations are present in the Project Area, the Project would not disproportionately affect environmental justice populations. The overall impacts of the Action Alternative, as described in other sections in this chapter, would be minor, and reasonably foreseeable off-site impacts would be negligible. As such, no disproportionately high or adverse direct or indirect impacts on minority or low-income populations due to human health or environmental effects are expected to result from the Action Alternative. In addition, the minor beneficial impacts to employment and income levels in the local region could provide additional opportunities to nearby environmental justice populations.

Consideration of the effects of siting of the Bleeder Shaft Facilities on potentially vulnerable populations would occur during the IDNR-OMM permitting process for these facilities and associated environmental reviews by TVA. Per IDNR Rules, these facilities may not be sited within 300 feet of any public building, school, church, community or institutional building, public park, or occupied dwelling, and landowners near the proposed facility location may state concerns about the proximity of these facilities to their properties. Such concerns would be taken into account by Sugar Camp, and siting adjustments would be made, as deemed appropriate.

Cumulative Effects

Overall, long-term, cumulative beneficial economic impacts would result from implementation of the Action Alternative in combination with other actions within 20 miles of the Project, including the activities associated with the No Action Alternative. Indirect, cumulative economic effects would also occur from the expenditure of wages earned by the workforce involved in construction activities and mining operations. No cumulative adverse impacts would occur to environmental justice populations present in the vicinity of Sugar Camp Mine No. 1; however, cumulative beneficial impacts to these populations may be realized.

3.13. Noise and Visual Resources

This section provides an overview of the existing ambient sound environment in the Project Area, and the potential impacts to the ambient sound environment that would be associated with the No Action and Action Alternative. This section also describes the visual resources in and surrounding the Project Area and the potential impacts on these visual resources that would be associated with the alternatives.

3.13.1. Affected Environment

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel

(dB). Sound on the decibel scale is referred to as sound level. The threshold of human hearing is approximately zero dB, and the threshold of discomfort or pain is around 120 dB.

Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (DNL). DNL is the community noise metric recommended by the USEPA and has been adopted by most federal agencies (USEPA 1974). A DNL of 65 A-weighted decibels (dBA) is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities such as construction. The A-weighted sound level represents the approximate frequency response characteristic of the average young human ear. Areas exposed to a DNL above 65 dBA are generally not considered suitable for residential use. A DNL of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974). For reference, approximate noise levels (measured in dBA) of common activities/situations are provided in Table 3-14.

Table 3-14. Noise Levels of Common Activities/Situations

Activity/Event	dBA
Lowest audible sound to person with average hearing	0
Quiet rural, nighttime	25
Quiet urban, nighttime	45
Large business office	60
Normal speech at three feet	70
Noisy urban area, daytime	75
Food blender at three feet	90
Gas lawn mower at three feet	100
Jet flyover at 1,000 feet	110

Source: Caltrans 2013

Noises occurring at night generally produce a greater annoyance than do noises of the same levels occurring during the day. People generally perceive intrusive noise at night as being 10 dBA louder than the same level of noise during the day. This perception is largely because background environmental sound levels at night in most areas are about 10 dBA lower than those during the day (USEPA 1974).

Ambient noise at the Project Area consists mainly of agricultural, road and rail transportation, rural, and natural sounds such as wind and wildlife. Generally, noise levels in these types of areas range from 45 to 55 dBA (USDOT 2015); although noise levels near the existing Coal Preparation Plant and refuse disposal areas would be considerably higher than surrounding areas. Based on aerial imagery, four residences are located along Clark Road within 1,000 feet of the East Refuse Disposal Area. Because the exact locations of the Bleeder Shaft Facilities are not known, it is not possible to quantify the current number of residences or other sensitive noise receptors within the Shadow Area that could be affected. However, land use within the Shadow Area is primarily agricultural with sparse residences and businesses.

In addition to residences, sensitive noise receivers can include schools, churches, cemeteries, public parks, and historic buildings or sites. During the mine permitting process, 10 known or potentially historic buildings were identified in the vicinity of the Project Area. Five churches and three cemeteries were also identified within the Shadow Area. No schools were identified within the Shadow Area or East Refuse Disposal Area.

Visual resources are the visual characteristics of a place and include both natural and manmade attributes. Visual resources are important as they can determine how an observer experiences a particular location. For example, an agricultural setting would elicit very different feelings in an observer than a manufacturing plant or an industrial area. Visual resources are important to people living in the area, people going through an area, and in the context of historical and culturally significant settings. The experience of a historically significant building can be altered if the surrounding visual character is changed. A viewshed is defined as the environment that can be seen from a certain vantage point, a viewpoint is the vantage point from where the visual character is seen.

The Project Area is east of the City of Benton. The regional character is mostly rural, with agricultural and pasture fields, flat terrain with rolling hills, forested areas, and generally small towns and communities. Immediately adjacent to the East Refuse Disposal Area is a rail line, agricultural fields, the Coal Preparation Plant, and sparse residences and businesses. Existing components associated with the Coal Preparation Plant include reclaim tunnels, parking lots, access roads, drainage control structures, office buildings, changing rooms, assembly rooms, warehousing facilities, storage facilities, elevator facilities, ventilation facilities, refuse disposal areas, overland conveyors, screens, a crusher, power distribution facilities, power lines, water lines, a rail loadout, stockpile areas, and other associated facilities. The viewsheds constitute a predominantly agricultural setting, with existing coal infrastructure along North Thompsonville Road. The visual character of the Shadow Area is similar to the regional character described above.

3.13.2. Environmental Consequences

3.13.2.1. No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed mining plan. Thus, no noise or visual impacts associated with the mining of additional TVA-owned coal would occur. Noise and visual impacts from the ongoing mining and processing of previously approved TVA-owned coal and privately owned coal would continue to occur as a result of the construction and operation of four associated bleeder shaft facilities, the East Refuse Disposal Area, and the continued operation of the Coal Preparation Plant and associated facilities.

Noise and visual impacts would occur in the vicinity of the Coal Preparation Plant during the life of the mining operations and in sporadic locations during the operational life of the bleeder shaft facilities associated with private/TVA-approved coal mining. The bleeder shaft facilities would likely be located in rural, agricultural areas and would cause minor noise and visual impacts to surrounding residences and businesses. During construction and blasting, noise impacts would be avoided or mitigated, in compliance with IDNR permit requirements. While the East Refuse Disposal Area would have a similar operational life as the bleeder shaft facilities, this facility would have a long-term visual effect, lessening over time as this soil-capped impoundment revegetates.

3.13.2.2. Action Alternative

Under the Action Alternative, TVA would approve Sugar Camp's mining plan. This would result in noise and visual impacts due to new surface facilities.

Surface Disturbances

Under the Action Alternative, noise would be generated by heavy equipment used to construct the Bleeder Shaft Facilities. As detailed in Section 2.1.2, blasting and drilling would be used to construct the Bleeder Shaft Facilities. Exact locations of the Bleeder Shaft Facilities are not

known; thus, it is not possible to quantify the current number of homes or businesses within the Shadow Area or distance to the noise-generating source. However, because land use within the Shadow Area is primarily agricultural with sparse residences and businesses, the Bleeder Shaft Facilities are not likely to have adverse noise or visual effects.

The Bleeder Shaft Facility locations 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. A Frontier-Kemper 350MT Blind Drilling System would be used to complete the bleeder shaft. Residences close to the Bleeder Shaft Facilities would hear an increase in noise as a result of construction activities. Construction-related noise levels would be about 110 decibels (dB), which are greater than 45 to 55 dB associated with rural areas. However, noise decreases by 6 dB with every doubling of distance from a noise-generating source, and the Bleeder Shaft Facilities are likely to be placed in agricultural areas away from residences and businesses.

Because blasting would be utilized for the construction of the Bleeder Shaft Facilities, a Blasting Plan would be developed for each location in accordance with 62 IL Adm. Code 1817.61 d) 2). 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.

During normal operation, properties directly adjacent of the Bleeder Shaft Facilities could potentially hear noise such as trucks or machinery noises. Noise would also be generated by fans installed within the bleeder ventilation shaft; some of this noise would be shielded by the vent housing, as well as by surrounding topography and vegetation. Operational noise generated by the bleeder shaft fan would be constant. However, due to the attenuation due to the IDNR-required 300-foot setback from occupied dwellings, noise levels at the nearest residences would be comparable to normal ambient noise. The operational life of each Bleeder Shaft Facility is expected to be approximately five years. After that time, the equipment would be removed, and no additional operational noise would be generated. Operational noise impacts of the Bleeder Shaft Facilities are expected to be minor.

Moderate noise impacts are also expected during construction and operation of the East Refuse Disposal Area. Residences on Clark Road north of the East Refuse Disposal Area would hear an increase in noise as a result of construction activities. As described above, construction-related noise levels would be about 110 dB, which is much greater than 45 to 55 dB associated with rural areas. Operation of the East Refuse Disposal Area would also result in noise impacts to surrounding residences and drivers as a result of additional trucks or machinery noises. Noise impacts would end after the East Refuse Disposal Area is capped and reclaimed.

Visual impacts would occur during construction and operation of the Bleeder Shaft Facilities and the East Refuse Disposal Area; the extent of visual impacts would depend on the siting of the Bleeder Shaft Facilities. Agricultural land within the East Refuse Disposal Area would be converted to a heavy industrial use. Visually speaking, the Bleeder Shaft Facilities and East Refuse Disposal Area would not be dramatically different from the current scenery in the Project Area. While the viewshed in the immediate vicinity would change from a mostly rural setting to an industrial one with the addition of these Project components, the broader viewsheds in the Project Area constitute a predominantly agricultural setting with localized existing coal infrastructure.

The construction of the Bleeder Shaft Facilities and East Refuse Disposal Area would change the visible environment of the Project Area. During construction, heavy machinery would be present, though this would not be out of place in comparison to the equipment used at the nearby Coal Preparation Plant and cultivation of the agricultural fields. Additionally, some tall vegetation would be removed, and part of the site would be graded, changing the contouring, coloring and texture of the scenery attributes. During construction, the Project Area would appear as a mixture of browns and grays due to earthmoving, road construction, and other construction activities.

The properties with views most affected by the Project are the residences on Clark Road north of the East Refuse Disposal Area location. The Project would change views at these residences from agricultural fields and forested areas to a 389-acre refuse disposal area with a coarse coal refuse embankment. The disposal area would resemble the appearance of the north refuse disposal area on Thompsonville Road and would increase in height over time to a maximum of 90 feet. Road travelers would see the East Refuse Disposal Area while on the adjacent public roads. These visual impacts would be most noticed from Clark Road and North Bobtail Road. The topography of the area is generally flat with some rolling hills, but the relatively stable elevations and tree-lined drainages and site boundaries block views of the site from most other vantage points.

While the locations of the Bleeder Shaft Facilities and East Refuse Disposal Area would be reclaimed or capped with soil, respectively, at the end of their operational life; overall the adverse visual impacts are expected to occur in various portions of the Project Area over approximately 20 years. The East Refuse Disposal Area would be reclaimed or capped with soil, as described in Section 2.1.2. Reclamation of the Bleeder Shaft Facility and East Refuse Disposal Area locations would revert the industrial coal production views to a grassed area with comparable visual characteristics as the affected environment.

Due to the changing visual character of the Project Area and surrounding area, and the proposed reclamation plan, the change in viewshed from agricultural land and forested areas to industrial coal facilities is not expected to result in permanent adverse impacts.

Coal Extraction-Related Effects

Underground mining operations would generally not be heard above ground within the Shadow Area. Planned subsidence is not expected to result in noise impacts. Most of the subsidence would not be noticeable visually due to the general relief of the terrain in the Shadow Area. This terrain is hilly with forested areas and agricultural fields. Negligible visual impacts may occur as land subsides in a controlled manner but is not expected to be noticeable or change the visual character of the Project vicinity.

Cumulative Effects

Overall, cumulative impacts have altered soundscape and scenery in the vicinity of Sugar Camp Mine No. 1 and other area mines, but due to implementation of the IDNR-OMM-required reclamation plan, the localized noise and visual impacts are not expected to result in permanent cumulative adverse impacts. Noise impacts will continue to be avoided or mitigated, per permit requirements. Changes to the visual character of the vicinity of existing surface effects areas are temporary due to implementation of the reclamation plan.

3.14. Cumulative Impacts

The 1978 CEQ regulations (40 CFR §§ 1500-1508) implementing the procedural provisions of the NEPA of 1969, as amended (42 USC § 321 et seq.) define cumulative impact[1] as: "…the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions [RFFAs] regardless of what agency (federal or nonfederal) or person undertakes such other actions." (40 CFR §1508.7).

A cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of a project when added to other past, present and RFFAs (40 CFR § 1508.7). Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in preceding sections are based on baseline conditions and, therefore, incorporate the cumulative impacts of past and present actions.

3.14.1. Identification of Other Actions

Depending on the geographic area of analysis for each resource area, past, present and RFFAs that are considered in this cumulative analysis include coal mining activities and other identified federal and private actions within 20 miles of the Project Area. According to USEIA, these include three active mine operations, consisting of Sugar Camp Mine No. 1, Williamson Energy Pond Creek 1 Mine, and Hamilton County Coal Mine No. 1. Together, production rates at these three mines account for nearly 56 percent of overall mine production in Illinois (USEIA 2019). Four additional mines occur within the 20-mile radius that are either not currently active or not operating at production rates requiring reporting to USEIA; however, their activities are factored in, as relevant, due to being known past activities in the vicinity of the Project. Mining activities considered within the 20-mile radius are as follows:

- Approved or completed activities associated with Sugar Camp Mine No. 1, including:
    - Extraction of private/TVA-approved coal beneath approximately 38,384 acres and planned subsidence of approximately 33,024 acres within the extraction area;
    - Surface disturbance of about 53 acres within the longwall-mined coal extraction area for construction of Bleeder Shaft Facilities in approximately 10 additional locations; and
    - Approximately 2,420 acres developed with surface facilities, including three refuse disposal areas occupying approximately 1,200 acres, altogether, that would not be fully reclaimed but rather capped with soil and partially restored, per IDNR-OMM requirements.
- Other completed or IDNR-OMM-approved coal mining activities, as shown on the Illinois Coal Mine Permit Viewer (IDNR 2020); these activities involve or have involved:
    - Extraction of coal beneath approximately 214,682 acres and planned subsidence of up to approximately 157,908 acres within the extraction area;
    - Surface disturbance of about 223 acres within the longwall-mined coal extraction area for construction of Bleeder Shaft Facilities in approximately 42 additional locations; and
    - Approximately 10,554 acres developed with surface facilities, including approximately 13 refuse disposal areas occupying approximately 5,200 acres,

[1] The CEQ regulations implementing the procedural provisions of NEPA were revised in July 2020 (*Federal Register* 85:43304-43376) and the revisions take effect on September 14, 2020. The revisions include a new definition of impacts which eliminate the previous distinction between direct, indirect, and cumulative impacts. Because this EIS was begun before the issuance of the revised CEQ regulations, TVA chose to follow the previous 1978 CEQ regulations, as presented in Section 1.5.

altogether, that would not be fully reclaimed but rather capped with soil and partially restored, per IDNR-OMM requirements.

Table 3-15 presents the affected acreage associated with substantial mining activities separately for the Proposed Action, the other actions (including other Sugar Camp Mine actions) described above, and the cumulative total, including both the Proposed Action and the other actions.

Table 3-15. Affected Acreages Associated with Mining Activities in 20-Mile Radius

Mining Component/ Activity	Proposed Action	Other Mining Actions	Cumulative Total
Coal extraction area	12,125	253,066	265,191
Herrin 6 coal seam	12,125	140,551	152,676
(% also given)	(4.5%)	(52.1%)	(56.6%)
Subsidence	10,549	190,932	201,481
Surface effects area	2,420	12,974	12,974
Bleeder shaft facilities	27	276	303
Refuse disposal areas	400	6,000	6,400

Source: IDNR 2020

The cumulative analysis for water resources considered mining activities within the watershed that includes the Project, the Middle Fork Big Muddy River Watershed. Other coal mine-related activities identified as having relevance to the cumulative analysis consisted of activities associated with Sugar Camp Mine No. 1 and Williamson Energy Pond Creek 1 Mine, also noted above, and the Russell Minerals W. Frankfort, c/o CEMEX, Mine No. 1 and S.I. Energy 25&JRPP Mine. The latter two operations recover carbon (i.e., coal fines) from coal mine refuse disposal areas. Together, the activities evaluated for cumulative effects to water resources encompass coal extraction areas totaling 64,099 acres and surface effects areas, including refuse disposal areas, totaling 3,816 acres.

Other federal or private actions that could have similar effects to the Project were reviewed and considered for inclusion in the cumulative analysis for the Project. These consist of the following:

- Interstate 57 (I-57) widening project, which would add an additional lane to I-57 between Interstate 64 near Mount Vernon and Interstate 24 south of Marion. At its nearest, the I-57 widening project location would be approximately 3.75 miles west of the Project. Other portions of the widening project location are up to approximately 27 miles from the Project. Following an alternatives analysis (Oates Associates, Inc. 2007), the preferred alternative was categorically excluded under NEPA and approved by the Federal Highway Administration (IDOT 2017).
- Illinois State Highway (IL) 14/I-57 interchange modification in Benton, located west of the Project, to a split-diamond configuration. While specific impacts will be considered as the NEPA process advances, a preliminary assessment of environmental impacts indicated that the project could potentially affect prime farmland, surface water resources, noise receptors, cultural resources, threatened and endangered species, and waste resources (HMG Engineers 2015).

3.14.2. Geographic Area of Analysis

The appropriate geographic area over which past, present, and RFFAs could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated. To evaluate the cumulative impacts to air quality and greenhouse gas emissions, the geographic area of analysis includes the active mining activities within a 20-mile radius, as well as the rest of Illinois and the United States. To assess impacts to surface waters, the geographic area of analysis includes mining activities and other federal, state, or private actions within the Middle Fork Big Muddy River watershed, which extends beyond the 20-mile radius. For other resource areas, the geographic area of analysis includes all or portions of the past, present, and RFFAs within the 20-mile radius, as relevant to the particular resource.

To address cumulative impacts, the existing affected environment surrounding the Project Area was considered in conjunction with the environmental impacts described in Chapter 3. These combined impacts are defined by CEQ as “cumulative” in 40 CFR Section 1508.7 and may include individually minor, but collectively significant actions taking place over a period of time. The potential for cumulative effects to the identified environmental resources of concern are analyzed below for the Proposed Action.

3.14.3. Cumulative Impacts by Resource

3.14.3.1. Geology and Soils

Past, present, and RFFAs will permanently affect geology in the 20-mile geographic area of analysis, given the extraction of approximately 52 percent of the available Herrin No. 6 coal seam. Permanent impacts to other geological resources and soils will continue to be avoided, minimized, or mitigated by mine operators, per IDNR-OMM permit requirements. Within the geographic area of analysis, temporary impacts to soils and prime farmland due to mining-related surface disturbances of approximately 12,974 acres and planned subsidence of an overall 190,932 acres will occur, and permanent impacts to prime farmland will occur in the locations of existing and proposed refuse disposal areas occupying a total of approximately 6,000 acres, due to these locations primarily supporting only pasture land following their partial restoration. Permanent impacts to prime farmland and soils may also occur in limited areas along existing road rights-of-way due to the proposed IL 14/I-57 interchange modification.

Cumulatively, the Proposed Action and the other actions would result in permanent removal of approximately 57 percent of the Herrin No. 6 coal seam. Permanent, cumulative effects to prime farmland due to existing and proposed refuse disposal areas within the surface effects area would impact approximately 6,400 acres in Franklin County. These permanent changes to farmland would affect approximately 0.02 percent of farmland across the state (USDA 2017).

3.14.3.2. Water Resources

All of the past, present, and RFFAs considered within the geographic area of analysis for cumulative effects to water resources are subject to federal and state agency approvals described in Section 1.3. Cumulative impacts to Rend Lake as a result of water withdrawal for supplemental makeup water for the Coal Preparation Plant, combined with Rend Lake withdrawal from other mine operations, if any, are anticipated to be minimal over the life of the Project and would not significantly change daily or annually. Surface disturbances associated with the considered actions likely have not or will not impact groundwater quantity as no consumptive uses of groundwater are associated with these facilities. Bleeder shaft facilities associated with longwall mining are encased to isolate the shafts from intersecting with groundwater; therefore, their construction and operation have not or will not adversely affect groundwater. Refuse disposal areas associated with these facilities have been or are subject to

NPDES permits and associated monitoring requirements, including that of groundwater wells. Any violation of effluent exceedances would result in noncompliance with the NPDES permit and, if not resolved, would be subject to formal enforcement action. Temporary, moderate impacts have occurred or will occur to groundwater supply as a result of subsidence of portions of the coal extraction areas, together totaling 64,099 acres. Short-term, moderate groundwater quantity impacts from subsidence have occurred or could potentially occur resulting from the formation of subsidence fractures. Nearby well water levels may have been or have the potential to be temporarily impacted by subsidence; however, the potential for this type of impact is low due to 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). These temporary impacts to groundwater supply and quantity have been or will be mitigated as required by IEPA and IDNR-OMM.

During siting of surface facilities, permanent impacts to streams and wetlands associated with considered actions have been or would be avoided to the maximum extent practicable. Unavoidable direct impacts have been or will be subject to CWA Section 404 and 401 permits and mitigation, if required. Construction of refuse disposal areas have resulted or have the potential to result in permanent impacts to streams and wetlands. While the extent of previously impacted streams and wetlands cannot be accurately assessed, the impacts would have been subject to applicable CWA permits and mitigated, as necessary. Reasonably foreseeable future unavoidable permanent impacts to streams and wetlands as a result of the construction of new refuse disposal areas includes approximately 29,323 linear feet of streams, 34 acres of wetlands, and one 0.2-acre pond (Alliance Consulting 2019a; USACE 2014). To offset permanent impacts associated with Pond Creek No. 1, Williamson Energy proposed operator-responsible mitigation by creating wetlands and restoring streams. These mitigation plans were approved by USACE.

Moderate, temporary impacts to surface waters and wetlands have occurred or would occur in subsided areas. However, IDNR-OMM requires adherence to a subsidence mitigation plan, which includes the requirement to repair of any drainage changes, and like other mining-related surface effects, subsidence-related impacts to Waters of the U.S. would be subject to CWA Section 404 and 401 permits and would be mitigated as required by these permits.

During the siting of Bleeder Shaft Facilities, per EO 11988, mine permit applicants evaluate the potential effects of proposed activities within the 100-year floodplain. The existing and future refuse disposal areas at Pond Creek No. 1 are not located within floodplains. One of the three existing or proposed refuse disposal areas at Sugar Camp Mine No. 1 is located within a floodplain associated with Middle Fork Big Muddy River without a known base flood elevation, thus resulting in permanent impacts to floodplains. Subsidence-induced flooding and drainage changes in floodplains require correction by IDNR-OMM. Thus, significant long-term impacts to floodplains would not occur due to the application of corrective measures requirements.

Construction and operation of existing Bleeder Shaft Facilities and refuse disposal areas may have affected surface water quality due to temporary effects from stormwater runoff. BMPs to control erosion and sediment would have been required by an NPDES permit and, thus, resulted in insignificant impacts to water quality. The design of existing refuse disposal areas, including low permeability liner specifications, would have been reviewed and approved by IDNR-OMM during the permitting process. Both the Proposed Action and other actions are required to monitor NPDES-permitted discharge locations and groundwater wells, if any. Thus, water quality impacts associated with the Proposed Action and other actions would be or have been temporary.

In summary, significant cumulative impacts to water resources associated with the Proposed Action and other actions would not occur due to IDNR-OMM and NPDES permit requirements including groundwater monitoring programs, water quality sampling and treatment activities, and reclamation plans. Unavoidable and permanent impacts to streams and wetlands are subject to CWA Section 404 and 401 permits and would be mitigated, as required. BMPs would continue to be employed to minimize the potential for cumulative impacts to the Middle Fork Big Muddy River watershed. Overall, permanent impacts to water resources associated with the mining of coal for the Proposed Action and other actions would continue to be avoided or mitigated, per IDNR-OMM permit requirements. In addition, beneficial effects from stream and wetland mitigation would offset some of the adverse cumulative effects to water resources in the analysis area.

3.14.3.3. Air Quality and Greenhouse Gases

Comparing the cumulative direct and indirect emissions of the non-GHG pollutants from the Action Alternative with other connected activities to the corresponding emissions of the same pollutants at the national level provides a reasonable proxy for assessing potential downstream air quality impacts at a regional or larger scale. The cumulative emissions were calculated by applying the same calculation methodology as was used to calculate emissions for the Action Alternative to the cumulative 14 million tons per year of processed coal produced. The cumulative direct and indirect emissions of each criteria pollutant and select HAPs as a result of continued coal mining and the downstream combustion of the extracted coal associated with the active mining operations within 20 miles of the Project is estimated to be between 0.006 percent and 1.8 percent of the total US emissions of those pollutants in 2014 projected for the life span of the Action Alternative. The reasonably foreseeable cumulative emissions of GHGs associated with the active mining operations in the 20-mile radius would total about 877 million metric tons of CO_2e.

3.14.3.4. Biological Environment

Surface and water resource disturbances associated with the mining and IDOT actions considered in the 20-mile geographic area of analysis have been or will be investigated for biological resources prior to construction. Permanent impacts to biological resources associated with the mining activities will continue to be avoided or mitigated per IDNR-OMM permit requirements. Wildlife have been or would be temporarily disturbed by surface disturbances, but displaced species likely have returned or would return with completion of reclamation activities. Temporary impacts to state-listed threatened and endangered species may occur. Coordination with USFWS on the effects of considered mine operations and the proposed IL 14/I-57 interchange modification have occurred or would occur. Effects to wildlife, including listed species, resulting from mining operations are subject to mitigation under integrated fish and wildlife habitat reclamation plans, per IDNR permit requirements. Effects to wildlife, including listed species, resulting from the proposed interchange modification are subject to review and approval by applicable agencies.

No significant cumulative effects to biological resources would occur as a result of the Proposed Action and other actions due to avoidance, minimization, and mitigation, per IDNR-OMM permit requirements, other agency requirements, and compliance with the Endangered Species Act, as applicable.

3.14.3.5. Natural Areas

Moderate, cumulative, temporary indirect impacts to natural areas in the vicinity could occur as a result of planned subsidence of approximately 265,191 acres associated with the overall coal extraction area and proposed actions on the approximately 12,974 acres associated with

surface effects areas of the Proposed Action combined with the other mining operations. Temporary effects to hydrologic patterns have occurred and would occur; however, no long-term adverse impacts to natural areas are anticipated due to no direct impacts being anticipated and indirect impacts being subject to post-subsidence reclamation activities.

3.14.3.6. Land Use

Permanent impacts to land use will continue to occur within the 20-mile geographic area of analysis as a result of the other mining operations. Due to the rural nature of the area, mine operations will likely continue to convert agricultural and forested lands to reclaimed, IDNR-approved post-mining land uses. Reclamation activities associated with mining activities have occurred or will occur per approved reclamation plans and any mine permit conditions developed in accordance with Chapter I IAC 1817.62.

Moderate, permanent impacts have occurred to land use as a result of past and ongoing coal extraction and preparation activities. The construction of existing and proposed refuse disposal areas will continue to permanently affect agricultural and other potential uses of these areas. At the end of their operational lives, the refuse disposal areas will be capped, and these areas will likely not be suitable for cultivated crops. However, these areas associated with the other mining operations, totaling approximately 6,000 acres, could likely be used as pasture following partial restoration.

Temporary, moderate impacts to land use will continue to occur as a result of subsidence within approximately 253,066 acres associated with the overall coal extraction areas of the other mining operations and proposed disturbances within the approximately 12,974 acres associated with surface effects areas. IDNR-OMM requires coal companies to reestablish drainage patterns and stream profiles affected by mining activities. IDNR-OMM requires mitigation measures to ensure the land is returned to a condition capable of maintaining the value and reasonably foreseeable uses that the land was capable of supporting prior to subsidence.

Cumulatively, effects due to the planned subsidence of an overall total of approximately 265,191 acres associated with the Proposed Action and the other mining operations and proposed surface disturbances within a total of 12,974-acres associated with surface effects areas would be moderate but short-term due to preventive planning and required reclamation plan implementation. Land use changes within the approximate 6,400 acres that would be permanent modified with the construction of refuse disposal areas would have minor effects overall, as cultivated crops are prevalent in Franklin County and throughout the state. No cumulative, long-term impacts to land use are expected as a result of the extraction of coal or associated with planned subsidence within the geographic area of analysis.

3.14.3.7. Transportation

Moderate, temporary cumulative impacts to transportation will continue to occur as a result of the past, present, and RFFAs within the 20-mile geographic area of analysis. Rail lines constructed to transport coal from the various mine operations would reduce coal-hauling truck traffic on existing roads in the vicinity but may result in the construction of additional grade crossings. Some local roadways may be temporarily or permanently closed as a result of the construction and operations of proposed mine components or due to construction of the proposed IDOT projects. Any temporary damage to roads or bridges as a result of the subsidence of up to approximately 190,932 acres associated with the other mining operations would be repaired as required by IDNR-OMM.

Cumulatively, if mine components are constructed in the 20-mile area of geographic analysis at the same time as those constructed for the Proposed Action or if subsidence of different portions of the overall 201,481-acre subsidence area occur simultaneously, moderate, temporary cumulative effects could occur to existing roadways. Some local road closures could also occur due to mining activities in the geographic area of analysis, resulting in moderate, temporary or permanent cumulative effects. As required by the IDNR-OMM permitting process, Sugar Camp and other mine operators would take measures to minimize inconvenience to the users of public roadways and obtain the necessary waivers from the authorities governing the use of those roads. Beneficial effects to transportation from the proposed IDOT projects would offset some of the adverse cumulative effects from mining activities.

3.14.3.8. Utilities

Permanent impacts to utilities associated with the mining activities in the 20-mile geographic area of analysis will continue to be avoided or mitigated, per IDNR-OMM permit requirements. Sugar Camp and other mine operators will use existing agreements or would pursue agreements with governmental bodies and utility companies responsible for all utility services expected to be affected within the approximate 190,932-acre subsidence area. Mine operators will continue to compensate utilities for repair of any damage caused by mining operations.

Cumulatively, effects on utilities due to the planned subsidence of approximately 265,191 acres associated with the overall coal extraction area and proposed actions on the approximately 12,974 acres associated with surface effects areas would be minor and short-term due to preventive planning with governmental bodies and utility companies and subsequent repair.

3.14.3.9. Cultural Resources

Surface disturbances associated with the mining and IDOT actions considered in the 20-mile geographic area of analysis have been or will be investigated for cultural resources impacts prior to construction. Phase I cultural resources assessments are routinely conducted, as needed, and the results of these assessments are provided to IHPA for consultation. Mine operators are required to repair or compensate owners for structural damage caused by subsidence of approximately 190,932 acres, including damage to historic properties. Impacts to historic properties that could result from subsidence would, thus, be temporary.

Cumulative effects to cultural resources in relation to the overall 265,191-acre coal extraction area and proposed actions in the approximately 12,974 acres associated with surface effects areas, such as impacts to the viewsheds of aboveground resources, structural damage to architectural resources, or effects to NRHP-eligible archaeological sites, will be avoided, minimized, or mitigated, per IDNR-OMM requirements, and in consultation with IHPA and interested tribes.

3.14.3.10. Solid and Hazardous Waste

The proposed IL 14/I-57 interchange modification and other mining activities in the 20-mile radius are subject to USEPA's oil spill prevention program which includes the SPCC and the Facility Response Plan (FRP) rules. The FRP rule requires certain facilities to submit a response plan and prepare to respond to a worst case oil discharge or threat of a discharge. Mine operators are required to comply with USEPAs SPCC and RFP rules. Existing and proposed refuse disposal areas will be capped and maintained in accordance with applicable regulations and approved by IDNR-OMM. Existing and future NPDES permits are required to discharge water from point source locations.

Cumulative impacts would be minimized by maintaining SPCC plans, as applicable. No cumulative impacts would occur in planned subsidence areas, as subsidence does not generate additional solid or hazardous waste.

3.14.3.11. Human Health and Safety

Previous portions of Sugar Camp Mine No. 1 and future actions related to the mine have been or will be designed and operated to comply with IDNR Mine Safety and Training Division requirements and MSHA and OSHA regulations. Thus, Sugar Camp's ongoing and proposed actions associated with the overall 37,972-acre SRR No. 6 mine expansion and the existing 2,420-acre surface effects area would not contribute to cumulative adverse impacts to human health and safety.

3.14.3.12. Socioeconomics and Environmental Justice

Economic benefits of mining activities and the proposed IDOT construction projects in the 20-mile radius include the purchase of materials, equipment, and services, and moderate short- to long-term increases in employment and income. These increases would be local or regional, depending on where the goods, services, and workers have been or are obtained. Environmental justice impacts will continue to be avoided by IDOT and by the mine operators due to compliance with IDNR permit requirements to avoid, minimize, or mitigate adverse effects from mining operations. In addition, the short- and long-term economic benefits of road construction and mining-related operations may have a particular benefit to low-income populations in the 20-mile geographic area of analysis.

Overall, moderate, short- to long-term, cumulative beneficial economic impacts would result from implementation of the Action Alternative in combination with the other actions considered in the 20-mile analysis area. Indirect, cumulative economic effects would also occur from the expenditure of wages earned by the workforce involved in construction activities and mining operations. No cumulative adverse impacts would occur to environmental justice populations present in the analysis area; however, moderate cumulative beneficial impacts may be realized.

3.14.3.13. Noise and Visual Resources

Noise and visual impacts have occurred in the 20-mile area of analysis as a result of past mining actions and will continue with ongoing mining operations. Due to the rural nature of the 20-mile area, mine operators will likely continue to locate the bleeder shaft facilities in rural, agricultural areas, and these facilities will cause noise and visual impacts to surrounding residences and businesses. During construction, noise impacts associated with blasting for bleeder shaft facilities would continue to be avoided or mitigated, per IDNR-OMM permit requirements. Noise and visual impacts will not occur in relation to planned subsidence of the estimated 190,932 acres.

Overall, cumulative impacts have altered the soundscape and scenery in the vicinity of area mines, but due to implementation of the IDNR-OMM-required reclamation plan, the localized noise and visual impacts in relation to the Proposed Action and other actions considered in this analysis are not expected to result in significant permanent cumulative adverse impacts.

3.15. Unavoidable Adverse Environmental Impacts

The Proposed Action could cause some unavoidable adverse environmental effects (Table 2-3). Depending upon the exact nature of the Project effects, these resources could include cultural resources, groundwater, surface water quality, wetlands, terrestrial plants and wildlife, transportation, federally and state-listed species, and prime farmland. These effects could result

from land use changes, including vegetation clearing. Some of these adverse effects could be reduced through implementing mitigation measures as described in Section 2.5.

Use of land for construction of the Bleeder Shaft Facilities could result in unavoidable impacts to prime farmland and farmland of statewide importance during operation of the mine. These temporary impacts would affect no more than 27 acres of land. The extent of the impact would depend on the acres of prime farmland in the footprint of the Bleeder Shaft Facilities and the timing of subsidence and drainage restoration activities. However, permanent impacts to prime farmland would result from the construction of the East Refuse Disposal Area. This area would no longer support cultivated crop production. In addition, the construction of the East Refuse Disposal area would also result in unavoidable adverse impacts to wetlands.

As explained in Section 3.3.2, extraction of underground coal results in the unavoidable release of methane. The transportation of the coal to the end users and the combustion of the coal by the end users would also result in the emission of substantial quantities of CO^2. The emissions of methane and CO^2, both of which are GHGs that contribute to long-term global climate changes, also constitute an unavoidable adverse effect.

Planned subsidence has the potential to cause unavoidable impacts to various resources due to changes in topography and hydrology or from direct damage to structures. Subsidence could cause changes in drainage patterns, thereby affecting wetland functions. Groundwater quantity and quality could also be impacted. However, the IDNR permit would require repair of such damages or compensation to surface landowners for these damages; therefore, these impacts would be temporary.

3.16. Relationship of Short-Term Uses and Long-Term Productivity

Short-term uses are those that generally occur on a year-to-year basis. Examples are wildlife use of forage, timber management, recreation, and human uses of water resources. Long-term productivity is the capability of the land to provide both market and nonmarket resources for future generations. In this context, long-term impacts to Project Area productivity would be those that last beyond the life of the Project.

The Proposed Action would affect short-term uses of the site of the East Refuse Disposal Area by temporarily converting land uses from agricultural and undeveloped land to industrial uses. The Proposed Action would also affect short-term uses of the 10,549-acre portion of the Shadow Area where planned subsidence would occur as well as the locations of the Bleeder Shaft Facilities. Subsidence could result in short-term losses of agricultural production in limited areas due to temporary changes in soils, topography, and drainage patterns. Following the IDNR-OMM-required reclamation and restoration activities, the productivity of the Project Area, for both humans and wildlife, would be restored with no expected long-term losses. Overall, any long-term loss of productivity would be negligible.

3.17. Irreversible and Irretrievable Commitments of Resources

An irreversible or irretrievable commitment of resources would occur when resources would be consumed, committed, or lost because of the Project. The commitment of a resource would be considered irretrievable when the Project would directly eliminate the resource, its productivity, or its utility for the life of the Project and possibly beyond. Coal extraction associated with the Project, as well as some construction and operation activities, would result in an irretrievable and irreversible commitment of natural and physical resources. The implementation of the Proposed Action would involve irreversible commitment of fuel, electric energy, and resource labor required to operate mining equipment and the Coal Preparation Plant and to construct the

East Refuse Disposal Area and Bleeder Shaft Facilities represent other irreversible commitments of resources. Because of IDNR-OMM-required reclamation and restoration activities, the Project Area would not be irreversibly altered, overall, as the Project Area would be returned to IDNR-OMM-approved post-mining conditions and, thus, used for pre-mining activities such as agriculture or other productive purposes upon cessation of the Proposed Action.

CHAPTER 4 – LIST OF PREPARERS

4.1. NEPA Project Management

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Education: B.A., Environmental Studies and Geography
Experience: 10 years in environmental policy and NEPA compliance
Involvement: Project Lead, NEPA Compliance, and Document Preparation

Matthew Higdon
Position: NEPA Specialist (TVA)
Education: M.S., Environmental Planning; B.A., History
Experience: 17 years in natural resource planning, environmental impact analysis, and NEPA compliance
Involvement: NEPA Compliance, and Document Preparation

Meghan Oh
Position: Contract NEPA Specialist (formerly with HDR)
Education: M.S. and B.S., Chemistry
Experience: 15 years in environmental science, including environmental site assessments, wetland delineations and environmental permitting, watershed planning, analysis of water resources
Involvement: NEPA Compliance and Document Preparation

Charles Nicholson
Position: Sr. Environmental Scientist/Planner (HDR)
Education: PhD, Ecology and Evolutionary Biology; M.S., Wildlife Management; B.S., Wildlife and Fisheries Science
Experience: 17 years in wildlife and endangered species research and management, 24 years in NEPA compliance
Involvement: Technical Advisor and Document QA/QC

Kelly Thames, PWS
Position: Environmental Project Manager (HDR)
Education: M.S., Plant Biology; B.A., Environmental Science
Experience: 11 years in Section 404/401 regulatory permitting, ecology, biology, stream and wetland delineations, habitat evaluation and restoration, and GIS mapping
Involvement: Project Manager and Water Resources

Harriet L. Richardson Seacat
Position: Environmental Project Manager (HDR)
Education: M.A., Anthropology (Cultural); B.A., Anthropology (Native American Studies minor)
Experience: 19 years in anthropology, archaeology, history, NHPA and NEPA documentation and project management
Involvement: Assistant Project Manager, NEPA Lead, Cultural Resources, Socioeconomics and Environmental Justice, and Cumulative Impacts

4.2. Other Contributors

Nicole Anderson
Position: Environmental Scientist (HDR)
Education: B.S., Environmental Science
Experience: Four years in environmental science, including environmental site assessments, wetland delineations and environmental permitting, Phase I ESA, and SWPPP development
Involvement: NEPA Compliance and Document Preparation

Melissa Breyer
Position: Contract NEPA Specialist (HDR)
Education: M.S., Environmental Science; B.S., Fisheries and Wildlife
Experience: Three years in environmental science, including environmental permitting, biological surveys and habitat assessments, wetland delineations, environmental assessments, and stormwater prevention plan development and inspection.
Involvement: GIS, NEPA Compliance, Document Preparation, and Natural Areas

Marion Kirk Dunbar
Position: Air Quality Section Manager (HDR)
Education: B.S., Aeronautical/Astronautical (Aerospace) Engineering
Experience: 29 years in air quality permitting, including stationary source permitting, greenhouse gas inventory preparation, and regulatory review and interpretation
Involvement: Air Quality and Greenhouse Gases

Mark Filardi, P.G.
Position: Sr. Environmental Scientist (HDR)
Education: M.S. and B.S., Geology
Experience: 19 years in hydrogeology, contaminated site assessment, and remediation
Involvement: Geology and Soils, Groundwater, and Solid and Hazardous Waste

Josh Fletcher, RPA
Position: Environmental Scientist/Planner (HDR)
Education: M.A., Anthropology (Archaeology); B.S., Architectural Design
Experience: 20 years in cultural resources management, regulatory compliance, NEPA documentation, and project management
Involvement: Transportation and Utilities

Ed Liebsch
Position: Sr. Air Quality Specialist (HDR)
Education: M.S., Meteorology; B.S., Earth Science with Chemistry Minor
Experience: 38 years in air dispersion analyses, 28 years in air quality permitting and NEPA air quality analyses
Involvement: Air Quality and Greenhouse Gases

Eric Mularski, PWS

Position:	Environmental Scientist (HDR)
Education:	B.S., Biology
Experience:	17 years in environmental science, including environmental site assessments, wetland delineations, environmental permitting, watershed planning, and analysis of water resources
Involvement:	Water Resources

Robert Mull

Position:	Environmental Geologist (HDR)
Education:	B.S., Geology
Experience:	Four years in environmental geology, including Phase I Environmental Site Assessments, contaminated site investigations, and geologic/hydrogeologic site characterization
Involvement:	Geology, Groundwater, and Solid and Hazardous Waste

Blair Goodman Wade, ENV SP

Position:	Sr. Environmental Planner (HDR)
Education:	M.E.M., Environmental Management; B.S., Integrated Sciences and Technology (Environmental Science and GIS)
Experience:	15 years in regulatory compliance, NEPA documentation, and mitigation planning
Involvement:	Land Use, Noise and Visual Resources, Health and Human Safety, Socioeconomics and Environmental Justice, and Cumulative Impacts

Erica Wadl

Position:	Environmental Project Manager (HDR)
Education:	M.S., Forestry; B.S., Biology
Experience:	13 years in environmental permitting, land management, and NEPA compliance
Involvement:	Biological Environment

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CHAPTER 5 – FINAL ENVIRONMENTAL IMPACT STATEMENT RECIPIENTS

5.1. Federal Agencies

U.S. Army Corps of Engineers – Louisville District, Newburgh Regulatory Field Office
U.S. Environmental Protection Agency – Region 5, Chicago, Illinois
U.S. Fish and Wildlife Service – Southern Illinois Sub-Office, Marion, Illinois

5.2. Federally Recognized Tribes

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

5.3. State Agencies

Illinois Department of Natural Resources
Illinois Environmental Protection Agency
Illinois Historic Preservation Agency

5.4. Individuals and Organizations

Foresight Energy LP, St. Louis, Missouri
Sugar Camp Energy, LLC, Macedonia, Illinois

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Appendix A – Notice of Intent

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Appendix B – Scoping Comments

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Appendix C – Draft EIS Comments and Responses

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Appendix D – Correspondence / Permits

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