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March 5, 2020

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

Re: WBI Energy Transmission, Inc.
Docket Nos. CP20-52-000 and PF19-7-000
North Bakken Expansion Project
Draft Applicant-Prepared Environmental Assessment

Dear Ms. Bose:

WBI Energy Transmission, Inc. (WBI Energy) herewith submits for filing with the Federal Energy Regulatory Commission (Commission) in the above-referenced dockets, its Draft Applicant-Prepared Environmental Assessment.

Pursuant to 18 CFR § 385.2010 of the Commission's regulations, copies of the filing are being served to each person whose name appears on the official service list for this proceeding.

Should you have any questions or comments regarding this filing, please call the undersigned at (701) 530-1563.

Sincerely,

/s/ Lori Myerchin

Lori Myerchin
Director, Regulatory Affairs and
Transportation Services

Attachments

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated this 5th day of March, 2020.

By 
Lori Myerchin
Director, Regulatory Affairs and
Transportation Services
WBI Energy Transmission, Inc.
1250 West Century Avenue
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Federal Energy Regulatory Commission Office of Energy Projects

March 2020

WBI Energy Transmission, Inc.

Docket No. CP20-52-000

North Bakken Expansion Project Environmental Assessment



Washington, DC 20426

DRAFT

Cooperating Agencies:



U.S. Army
Corps of Engineers



U.S. Bureau of
Land Management



U.S. Fish and
Wildlife Service



U.S. Forest
Service

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 204266

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas Branch 1
WBI Energy Transmission, Inc.
North Bakken Expansion Project
Docket No. CP20-52-000

TO THE INTERESTED PARTY:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared an environmental assessment (EA) for the North Bakken Expansion Project (or Project) proposed by WBI Energy Transmission, Inc. (WBI Energy) in the above-referenced docket. WBI Energy requests authorization to construct, modify, operate, and maintain a new natural gas pipeline and associated facilities in McKenzie, Williams, Mountrail, and Burke Counties, North Dakota.

The EA assesses the potential environmental effects of the construction and operation of the Project in accordance with the requirements of the National Environmental Policy Act (NEPA). The FERC staff concludes that approval of the proposed project, with appropriate mitigating measures, would not constitute a major federal action significantly affecting the quality of the human environment.

[Note to FERC: Update as needed based on final list of cooperating agencies]

The U.S. Army Corps of Engineers, the U.S. Bureau of Land Management, **U.S. Fish and Wildlife Service**, and the U.S. Forest Service participated as cooperating agencies in the preparation of this EA. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by WBI Energy's proposal and participate in the NEPA analysis. The U.S. Army Corps of Engineers, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, and U.S. Forest Service will consider adopting the EA to fulfill their agency's NEPA obligations. The U.S. Army Corps of Engineers will use the EA and supporting documentation to consider the issuance of Clean Water Act Section 404, Section 408, and Rivers and Harbors Act Section 10 permits. The U.S. Bureau of Land Management will use the EA and other supporting documentation to consider the issuance of a right-of-way grant over federally administered lands. The U.S. Fish and Wildlife Service will consider using the EA and other supporting documentation for the purpose of complying with Section 7 of the Endangered Species Act. The U.S. Forest Service will use the EA and other supporting documentation to consider the issuance of a special use permit authorization for the portion of the project on National Forest System lands. Although the cooperating agencies provided input to the conclusions and recommendations presented in the EA, the

agencies will present their own conclusions and recommendations in their respective records of decision (where applicable) for the project.

The proposed Project includes the following facilities in North Dakota:

- 61.9 miles of new 24-inch-diameter natural gas pipeline from new facilities at WBI Energy's Tioga Compressor Station in Williams County to the proposed Elkhorn Creek Compressor Station in McKenzie County;
- 0.3 mile of new 24-inch-diameter natural gas pipeline between the proposed Elkhorn Creek Compressor Station and a new interconnect with Northern Border Pipeline Company (Northern Border) in McKenzie County;
- 20.4 miles of new 12-inch-diameter natural gas pipeline looping along WBI Energy's existing Line Section 25 between the Tioga Compressor Station and the proposed Norse Transfer Station in Burke County;
- 9.4 miles of new 12-inch-diameter natural gas pipeline looping along WBI Energy's Line Section 30 between the Nesson Valve Setting and the Tioga Compressor Station in Williams County;
- 0.5 mile of new 20-inch-diameter natural gas pipeline between the new Tioga Plant Receipt Station and new facilities to be constructed at the Tioga Compressor Station in Williams County;
- uprates to WBI Energy's Line Section 25 in Burke County;
- one new 3,750 horsepower compressor station (Elkhorn Creek Compressor Station) in McKenzie County and the addition of 22,500 horsepower of natural gas-fired compression and new equipment/facilities at the existing Tioga Compressor Station in Williams County;
- new and modifications to existing delivery, receipt, and transfer stations along WBI Energy's pipeline routes in Burke, McKenzie, Mountrail, and Williams Counties; and
- replacement of small segments of pipeline facilities and installation of block valves, pig¹ launcher/receiver stations, and associated appurtenances.

¹ A pipeline "pig" is a device used to clean or inspect the pipeline. A pig launcher/receiver is an aboveground facility where pigs are inserted or retrieved from the pipeline.

- The Commission mailed a copy of the Notice of Availability to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested parties; and local libraries and newspapers. The EA is only available in electronic format. It may be viewed and downloaded from FERC's website (www.ferc.gov) on the Environmental Documents page (<https://www.ferc.gov/industries/gas/enviro/eis.asp>). In addition, the EA may be accessed by using the eLibrary link on FERC's website. Click on the eLibrary link (<https://www.ferc.gov/docs-filing/elibrary.asp>), click on General Search, and enter the docket number in the "Docket Number" field, excluding the last three digits (i.e., CP20-52). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FercOnlineSupport@ferc.gov or toll free at (866) 208-3676, or for TTY, contact (202) 502-8659.

Any person wishing to comment on the EA may do so. Your comments should focus on the EA's disclosure and discussion of potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that the Commission has the opportunity to consider your comments prior to making its decision on this project, it is important that we receive your comments in Washington, DC on or before 5:00 p.m. Eastern Time on **[INSERT DATE]**, 2020.

For your convenience, there are three methods you can use to file your comments to the Commission. The Commission encourages electronic filing of comments and has staff available to assist you at (866) 208-3676 or FercOnlineSupport@ferc.gov. Please carefully follow these instructions so that your comments are properly recorded.

- (1) You can file your comments electronically using the eComment feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. This is an easy method for submitting text-only comments on a project;
- (2) You can also file your comments electronically by using the eFiling feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." You will be asked to select the type of filing you are making. A comment on a particular project is considered a "Comment on a Filing"; or

- (3) You can file a paper copy of your comments by mailing them to the following address. Be sure to reference the project docket number (CP20-52-000) with your submission:

Kimberly D. Bose
Secretary, Federal Energy Regulatory Commission
888 First Street N.E.,
Room 1A, Washington, DC 20426.

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (Title 18 Code of Federal Regulations [CFR] Part 385.214). Motions to intervene are more fully described at <http://www.ferc.gov/resources/guides/how-to/intervene.asp>. Only intervenors have the right to seek rehearing or judicial review of the Commission's decision. The Commission may grant affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

Additional information about the project is available from the Commission's Office of External Affairs, at **(866) 208-FERC**, or on the FERC website (www.ferc.gov) using the [eLibrary](#) link. The eLibrary link also provides access to the texts of all formal documents issued by the Commission, such as orders, notices, and rulemakings.

In addition, the Commission offers a free service called eSubscription which allows you to keep track of all formal issuances and submittals in specific dockets. This can reduce the amount of time you spend researching proceedings by automatically providing you with notification of these filings, document summaries, and direct links to the documents. Go to www.ferc.gov/docs-filing/esubscription.asp.

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TECHNICAL ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
ACEP	Agricultural Conservation Easement Program
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing materials
APE	area of potential effects
AQCR	Air Quality Control Regions
ATWS	additional temporary workspace
BA	Biological Assessment
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BLM	U.S. Bureau of Land Management
CAA	Clean Air Act of 1970
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent emissions
Commission	Federal Energy Regulatory Commission
CRP	Conservation Reserve Program
DASK	Dakota skipper
dBA	decibels on the A-weighted scale
EA	environmental assessment
EI	environmental inspector
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FR	<i>Federal Register</i>
FWS	U.S. Fish and Wildlife Service
g	gravity
GHG	greenhouse gas
GIS	geographic information system
GWP	global warming potential
HAP	hazardous air pollutant
HCA	high consequence area
HDD	horizontal directional drill
HDD Plan	Horizontal Directional Drill/Guided Bore Drilling Fluid Monitoring and Operations Plan
hp	horsepower
HUC	Hydrologic Unit Code
km	kilometer
L _{dn}	average day-night ambient sound level
L _{eq}	24-hour equivalent sound level
LMNG	Little Missouri National Grassland
MAOP	maximum allowable operating pressure
MCA	moderate consequence area
MMBtu/hr	million British thermal units per hour

MMcf/d	million cubic feet per day
MOU	Memorandum of Understanding
MP	milepost
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NDAC	North Dakota Administrative Code
NDDMR	North Dakota Department of Mineral Resources
NDDOT	North Dakota Department of Transportation
NDDEQ	North Dakota Department of Environmental Quality
NDGFD	North Dakota Game and Fish Department
NDGS	North Dakota Geological Survey
NDPSC	North Dakota Public Service Commission
NDSWC	North Dakota State Water Commission
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGA	Natural Gas Act
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NLEB	northern long-eared bat
NOI	Notice of Intent to Prepare an Environmental Assessment for the Planned North Bakken Expansion Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Session
Northern Border	Northern Border Pipeline Company
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise sensitive area
NSPS	New Source Performance Standards
NSR	New Source Review
NWI	National Wetlands Inventory
OEP	Office of Energy Projects
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	Upland Erosion Control, Revegetation, and Maintenance Plan
PLOTS	Private Land Open to Sportsmen
PM _{2.5}	particulate matter sized 2.5 microns and smaller
PM ₁₀	particulate matter sized 10 microns and smaller
PMR	passive magnetic ranging
Procedures	Wetland and Waterbody Construction and Mitigation Procedures
Project	North Bakken Expansion Project
PSD	Prevention of Significant Deterioration
psig	pounds per square inch gauge
Secretary	Secretary of the Commission
SHSND	State Historical Society of North Dakota
SIP	State Implementation Plan
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SO ₂	sulfur dioxide
SSURGO	Soil Survey Geographic Database
tpy	tons per year
USACE	U.S. Army Corps of Engineers
USC	United States Code

USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VOC	volatile organic compound
WAWSP	Western Area Water Supply Project
WBI Energy	WBI Energy Transmission Inc.
WPA	Waterfowl Production Area

A. PROPOSED ACTION

1. Introduction

On February 14, 2020, WBI Energy Transmission Inc. (WBI Energy) filed an application with the Federal Energy Regulatory Commission (FERC or Commission) in Docket No. CP20-52-000 for a Certificate of Public Convenience and Necessity (Certificate) under section 7(c) of the Natural Gas Act (NGA) to construct, modify, operate, and maintain a natural gas transmission pipeline and related facilities in McKenzie, Williams, Mountrail, and Burke Counties, North Dakota.

WBI Energy's proposed facilities, referred to as the North Bakken Expansion Project (or Project), would include 92.5 miles of new 24-, 20-, and 12-inch-diameter pipeline, pipeline looping, and 0.5 mile of pipeline replacement; uprates to WBI Energy's existing Line Section 25; construction of one new compressor station and modifications to one existing compressor station; installation of new and modifications to existing delivery, receipt and transfer stations; and installation of block valves, pig launcher/receiver stations, and other associated appurtenances. More information regarding WBI Energy's proposed Project facilities is provided in section A.4.

FERC staff prepared this environmental assessment (EA) in compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations for implementing NEPA (Title 40 of the Code of Federal Regulations Parts 1500-1508 [40 CFR 1500-1508]), and the Commission's implementing regulations under 18 CFR 380.

The EA is an integral part of the Commission's decision-making process on whether to issue WBI Energy a Certificate to construct, modify, operate, and maintain the proposed facilities. Our¹ principal purposes in preparing this EA are to:

- identify and assess potential impacts on the natural and human environment that would result from the implementation of the proposed action;
- identify and recommend reasonable alternatives to the proposed action and specific mitigation measures, as necessary, to avoid or minimize Project-related environmental impacts; and
- encourage and facilitate involvement by the public and interested agencies in the environmental review process.

Under section 7(c) of the NGA, the Commission determines whether interstate natural gas transportation facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The assessment of environmental impacts is an integral part of FERC's decision on whether to issue WBI Energy a Certificate to construct, modify, operate, and maintain the proposed facilities. The Commission also bases its decision on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project. Approval would be granted if, after consideration of both environmental and non-environmental issues, the Commission finds that the Project is in the public interest.

FERC is the lead federal agency for the preparation of this EA. The U.S. Army Corps of Engineers (USACE), the U.S. Bureau of Land Management (BLM), **the U.S. Fish and Wildlife Service (FWS)**, and the U.S. Forest Service (USFS) participated as cooperating agencies in the preparation of this EA because they have jurisdiction by law or special expertise with respect to environmental impacts associated with this proposal. The federal cooperating agencies may adopt this EA per 40 CFR 1501.3 if, after an

¹ "We," "us," and "our" refer to the environmental staff of the Office of Energy Projects.

independent review of the document, they conclude that their requirements and/or regulatory responsibilities have been satisfied. However, these agencies would present their own conclusions and recommendations in their respective and applicable records of decision or determinations. Otherwise, they may elect to conduct their own supplemental environmental analyses.

1.1 Federal Energy Regulatory Commission

FERC is an independent federal agency responsible for evaluating applications for authorization to construct and operate interstate natural gas pipeline facilities. If the Commission determines a project is required by the public convenience and necessity, a Certificate is issued under section 7(c) of the NGA and Part 157 of the Commission's regulations. As such, FERC is the lead federal agency for the preparation of the EA in compliance with the requirements of NEPA, the CEQ regulations for implementing the procedural provisions of NEPA (40 CFR 1500-1508), and FERC's regulations implementing NEPA (18 CFR 380).

This EA presents our review of potential environmental impacts and reasonable recommendations to avoid or mitigate impacts. This EA will be used as an element in the Commission's review of the Project to determine whether a Certificate would be issued. FERC will also consider non-environmental issues in its review of WBI Energy's application. A Certificate will be granted if the Commission finds the evidence produced on financing, rates, market demand, gas supply, existing facilities and service, environmental impacts, long-term feasibility, and other issues demonstrates the Project is required by the public convenience and necessity.

1.2 U.S. Army Corps of Engineers

The USACE is a federal agency within the U.S. Department of Defense with jurisdictional authority pursuant to section 404 of the Clean Water Act (Title 33 of the United States Code [USC], section 1344), which governs the discharge of dredged or fill material into waters of the United States and section 10 of the Rivers and Harbors Act (33 USC 403), which regulates any work or structures that potentially affect the navigable capacity of a waterbody. Section 401 of the Clean Water Act requires that proposed dredge or fill activities permitted under section 404 be reviewed and certified by the designated state agency (in this case, the North Dakota Department of Environmental Quality [NDDEQ], Division of Water Quality) to ensure the Project meets state water quality standards. The proposed Project is within the Omaha District of the USACE. The Project would require a section 404 permit for discharge of dredged or fill material into waters of the United States (including jurisdictional wetlands) and a section 10 permit for work in or affecting navigable waters of the United States.

Additionally, the Project involves a proposed horizontal directional drill (HDD) crossing of Lake Sakakawea and associated USACE-managed real estate. Lake Sakakawea is a reservoir created by the Garrison Dam/Lake Sakakawea Project as part of the Missouri River Mainstem Reservoir System authorized under the Flood Control Act of 1944 (Public Law 78-534) and managed by the USACE. **The Garrison Dam/Lake Sakakawea Project provides for the following congressionally authorized purposes: flood control; navigation; irrigation; hydropower; water quality; municipal and industrial water supply; fish and wildlife; and recreation (USACE, 2018a). [Note to FERC: This sentence regarding the congressionally authorized purposes of the Garrison Dam/Lake Sakakawea Project was deleted during FERC review; however, it is referenced multiple times in various subsections of section B, which were not deleted. Note during your finalization of the EA and coordination with USACE if this text is removed, it will also need to be removed throughout section B.]**

Because the Project would cross Lake Sakakawea and the associated USACE-managed real estate, a section 408 permit and a USACE real estate easement would be required. Section 408, which is authorized in section 14 of the Rivers and Harbors Act (33 USC 408), allows the USACE to "grant permission for the

alteration of a public work so long as that alteration is not injurious to the public interest and will not impair the usefulness of the work” (USACE, 2016).

Furthermore, as the USACE would need to evaluate and approve several aspects of the Project and must comply with the requirements of NEPA before issuing permits under the above statutes, it has elected to participate as a cooperating agency in the preparation of this EA. As an element of its review, the USACE must consider whether a proposed project avoids, minimizes, and compensates for impacts on existing aquatic resources, including wetlands, to strive to achieve a goal of no overall net loss of aquatic resource values and functions. The USACE would adopt the EA in compliance with 40 CFR 1506.3 if, after an independent review of the document, it concludes that the EA satisfies the USACE’s comments and suggestions.

If the Project is authorized by the Commission, WBI Energy would not be allowed to commence construction until it receives all necessary federal authorizations including all authorizations under the jurisdiction of the USACE. Based on its participation as a cooperating agency and its consideration of the EA, the USACE would issue a Record of Decision to formally document its decision on the proposed action, including required environmental mitigation commitments.

1.3 U.S. Bureau of Land Management

The BLM is the federal agency responsible for certain land-use authorizations on BLM-managed lands. The authority for management of the land and resource development options comes from several statutes, including the Federal Land Policy and Management Act of 1976, the Mineral Leasing Act of 1920, and the National Trails Systems Act of 1968 (916 USC 1241–1251).

Under the Federal Land Policy and Management Act, the BLM has authority to regulate the use, occupancy, and development of federal public lands and take whatever action is required to prevent unnecessary or undue degradation of these lands (43 USC 1732). Under section 28 of the Mineral Leasing Act of 1920 (30 USC 185) and 43 CFR 2881.11, the BLM has the authority to issue grants to oil or gas pipelines or related facilities to cross federal lands under BLM jurisdiction or the jurisdiction of two or more federal agencies, except land in the National Park System, land held in trust for Indians, or land within the Outer Continental Shelf. In accordance with the Mineral Leasing Act of 1920, the BLM must respond to a right-of-way application submitted by WBI Energy to cross federally managed lands. The BLM will consider adopting this EA for agency decisions pursuant to 40 CFR 1506.3(c) if, after an independent review of the document, the BLM concurs that the analysis provides sufficient evidence to support agency decisions and is satisfied that agency comments and suggestions have been addressed. The BLM will decide whether to approve, approve with modification, or deny issuance of a right-of-way grant for the Project, and, if so, under what terms and conditions. The BLM will use this EA to identify the required mitigation measures that would apply to the right-of-way grant, mineral material sales, and other authorizations incidental to the Project.

Based on its participation as a cooperating agency and its consideration of the EA, the BLM would issue a Decision Record to formally document its decision on whether to issue a right-of-way grant over federal lands administered by the USACE and USFS for the Project.

1.4 U.S. Fish and Wildlife Service [verify participating as a cooperating agency]

The FWS is responsible for ensuring compliance with the Endangered Species Act of 1973 (ESA). Section 7 of the ESA, as amended, states that any project authorized, funded, or conducted by any federal agencies should not “...jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined...to be critical...” (16 USC 1536(a)(2)). The FWS also reviews project plans and provides comments regarding protection of fish and wildlife resources under the provisions of the Fish and Wildlife Coordination Act

(16 USC 661 et seq.) and is responsible for the implementation of the provisions of the Migratory Bird Treaty Act (16 USC 703) and the Bald and Golden Eagle Protection Act (16 USC 688).

As the lead federal agency for the Project, FERC consulted with the FWS, a cooperating agency, pursuant to section 7 of the ESA to determine whether federally listed endangered or threatened species or designated critical habitat under FWS jurisdiction are found in the vicinity of the Project, and to evaluate the proposed action's potential effects on those species or critical habitats. For the purposes of compliance with section 7 of the ESA, this EA serves as our Biological Assessment (BA) for the Project. Furthermore, we are requesting concurrence from the FWS with our determinations of effect for the federally listed species presented in this EA and further discussed in section B.4.1.

1.5 U.S. Forest Service

The USFS is a civilian federal agency within the U.S. Department of Agriculture (USDA) that administers the nation's national forests and national grasslands. The mission of the USFS is to sustain the health, diversity, and productivity of the national forests and grasslands to meet the needs of present and future generations. It is the responsibility of the USFS to manage the national forests for multiple uses of resources such as water, forage, wildlife, wood, recreation, minerals, and wilderness; and to provide products and benefits to the American people while ensuring the productivity of the land and protecting the quality of the environment.

Executive Order (EO) 13212, May 18, 2001, directed federal agencies to take appropriate actions, consistent with applicable law, to expedite reviews of authorizations for energy-related projects and to take other action necessary to accelerate the completion of such projects while maintaining safety, public health, and environmental protections. To facilitate EO 13212, the Secretaries of Agriculture, Interior, and Energy, and other federal agencies have agreed, through a formal Memorandum of Understanding (MOU), to coordinate their efforts and cooperate in the expeditious processing of authorizations for construction of natural gas pipelines.

The USFS will consider adopting this EA for agency decisions pursuant to 40 CFR 1506.3(c) if, after an independent review of the document, the USFS concurs that the analysis provides sufficient evidence to support agency decisions and is satisfied that agency comments and suggestions have been addressed. Pursuant to the Mineral Leasing Act of 1920 and in accordance with federal regulations in 43 CFR 2880, WBI Energy must secure a special use permit from the USFS to cross USFS lands. Issuance of a special use permit must be in accordance with 36 CFR 251 Subpart B, the Mineral Leasing Act of 1920 (as amended), relevant USFS manual and handbook direction, and other applicable laws and regulations.

Based on its participation as a cooperating agency and its consideration of the EA, the USFS would issue a Record of Decision to formally document its decision on whether to issue a special use permit for the Project.

2. Purpose and Need

WBI Energy states that the Project would provide 350 million cubic feet per day (MMcf/d) of incremental firm natural gas transportation capacity from natural gas processing plants in northwestern North Dakota to a proposed interconnect with Northern Border Pipeline Company's (Northern Border²) existing mainline for transit to Midwestern markets of the United States. WBI Energy notes that construction and operation of the Project would: 1) respond to market demand for additional firm take-away capacity for the increasing levels of associated natural gas production from the Bakken and Three Forks Formations in the Williston Basin, as evidenced by the significant long-term contractual commitments of the Project shippers; 2) connect associated natural gas production from the Bakken and

² Northern Border pipeline is a major natural gas pipeline system that links market demand in the Midwestern United States with natural gas production in the Western Canadian Sedimentary Basin, the Williston Basin, and the Power River Basin in the United States.

Three Forks Formations to Midwestern markets via a new interconnect with Northern Border; 3) assist in the reduction of flaring of natural gas in the region in order to meet established state-mandated natural gas capture targets; and 4) create an additional outlet for the increasing volume of natural gas production in northwestern North Dakota which has resulted in increased transportation constraints on WBI Energy's existing Line Sections 7, 25, and 30 over the past few years. WBI Energy proposes to place the proposed facilities into service by November 1, 2021 (pending regulatory approvals) in accordance with its contractual commitments for the Project.

The Williston Basin, which spans parts of North Dakota, South Dakota, and Montana as well as Manitoba and Saskatchewan in Canada, is one of the most prolific oil and associated natural gas production areas within the United States due to the presence of the Bakken and Three Forks Formations (Energy of North Dakota, 2020a). Conventional hydrocarbon production began in the Bakken Formation when oil was first produced there in 1955. Recent advances in horizontal drilling technologies, however, have led to a resurgence of drilling activity in the area resulting in exponential growth over the last 20 years. Although the Bakken and Three Forks Formations are primarily oil plays, there is associated rich natural gas that is produced along with the oil (U.S. Energy Information Administration, 2017). Rich natural gas generally requires investments in gas processing infrastructure before it can be delivered to market (Energy of North Dakota, 2020b). As a result, some of the gas currently produced is flared because the producer focus has been on the higher value oil, and the economics have not historically supported gas-processing infrastructure. According to the North Dakota Department of Mineral Resources (NDDMR), flaring of natural gas in the state is at about 17 percent as of November 2019. The historical high of gas flared (36 percent) occurred in September 2011 (NDDMR, 2020).

The North Dakota Pipeline Authority has forecasted natural gas production to reach between 3.1 and 3.7 billion cubic feet per day in North Dakota by 2022, and natural gas processing capacity to increase to nearly 4.0 billion cubic feet per day by the end of 2021 (Kringstad, 2019). The six processing plants associated with this Project represent approximately 17 percent of the total natural gas processing capacity available in North Dakota today. Although the capacity requested under the Project Precedent Agreements is targeting incremental natural gas volumes, the availability of this capacity may help mitigate natural gas flaring over time.

The Commission does not direct the development of the natural gas industry's infrastructure regionally or on a project-by-project basis, or redefine an applicant's stated purpose.

3. Scope of this Environmental Assessment

The resources and topics addressed in this EA include geology and soils; water resources and wetlands; vegetation, fisheries, and wildlife; threatened, endangered, and special status species; land use, recreation, and visual resources; socioeconomics; cultural resources; air quality and noise; reliability and safety; cumulative impacts; and alternatives. This EA describes the affected environment as it currently exists and the anticipated environmental consequences of the Project and compares the Project's potential impact with that of various alternatives. This EA also presents our recommended mitigation measures.

As the lead federal agency for the Project, FERC is required to comply with section 7 of the ESA and section 106 of the National Historic Preservation Act (NHPA). These statutes have been considered in the preparation of this EA. In addition to FERC, other federal, state, and local agencies may use this EA in approving or issuing any permits necessary for all or part of the proposed Project. Permits, approvals, and consultations for the Project are discussed in section A.10, below.

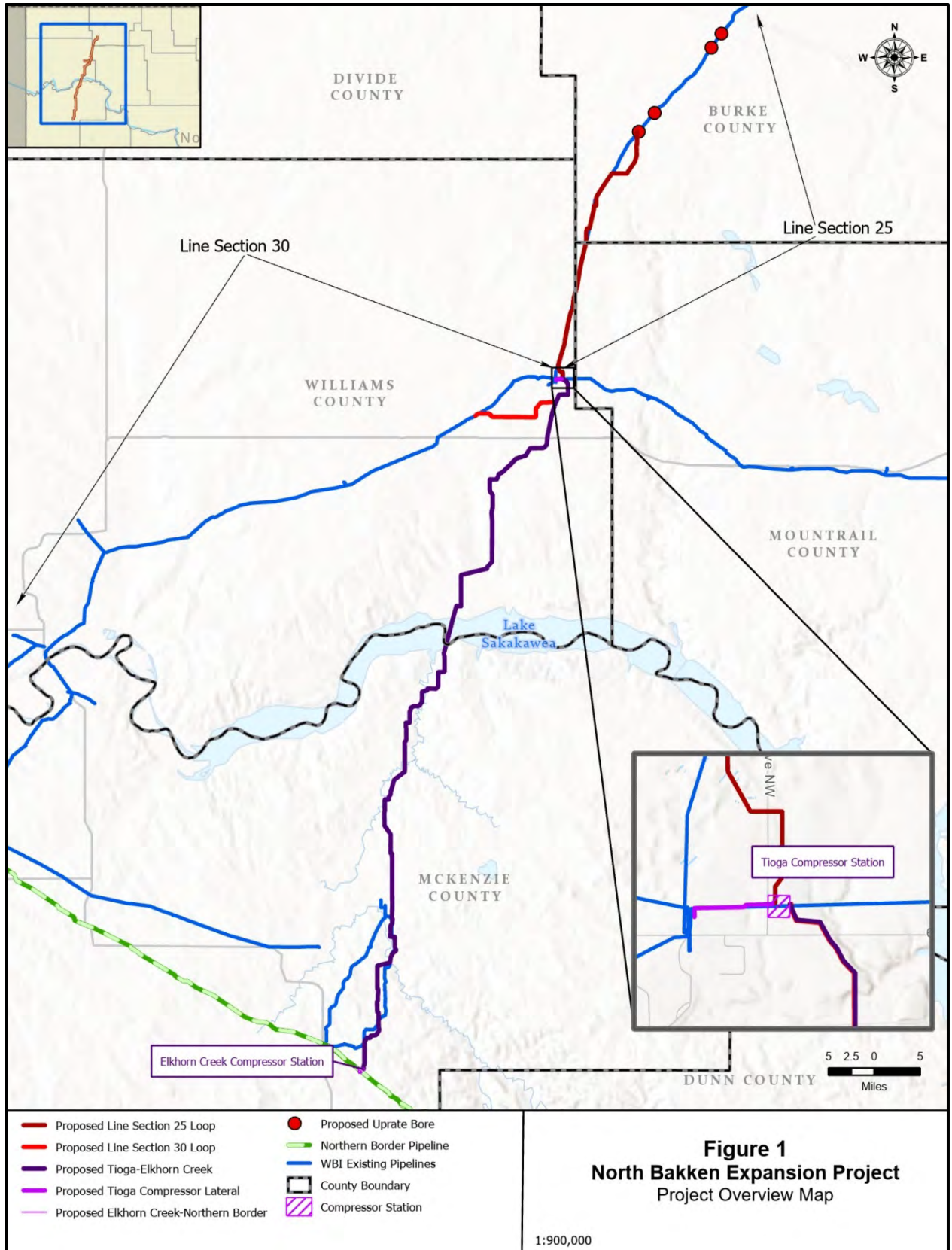
4. Proposed Facilities

The locations of the proposed Project facilities are illustrated on figure 1 and the topographic maps provided as appendix A. The alignment sheets for the Project are available on the FERC website at: http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20200214-5292.

4.1 Pipeline Facilities

WBI Energy proposes to construct approximately 92.5 miles of new pipeline, pipeline looping, and pipeline replacement, as well as replacement of an additional 0.5 mile of pipeline along a 28.3-mile segment of WBI Energy’s existing Line Section 25 pipeline to increase the maximum allowable operating pressure (MAOP) of the pipeline segment. The proposed pipeline facilities are summarized in table A-1 and described in more detail below.

TABLE A-1				
Proposed Pipeline Facilities				
Pipeline Facilities	County	Approximate Mileposts		Length (miles) ^a
		Begin	End	
NEW PIPELINE				
Tioga-Elkhorn Creek	Williams	0.0	25.2	25.2
	McKenzie	25.2	61.9	36.7
	Subtotal			61.9
Elkhorn Creek-Northern Border	McKenzie	0.0	0.3	0.3
	Subtotal			0.3
Line Section 25 Loop ^b	Williams	0.0	6.7	6.7
	Mountrail	6.7	10.4	3.7
	Burke	10.4	20.4	10.0
	Subtotal			20.4
Line Section 30 Loop	Williams	0.0	9.4	9.4
	Subtotal			9.4
Tioga Compressor Lateral	Williams	0.0	0.5	0.5
	Subtotal			0.5
	New Pipeline Subtotal			92.5
MODIFICATIONS/UPDATES TO EXISTING PIPELINE				
Uprate Line Section 25 ^c	Burke	NA	NA	0.5
	Modifications/Updates Subtotal			0.5
	TOTAL PIPELINE LENGTH			93.0
^a	The numbers in this table have been rounded for presentation purposes; as a result, the totals may not reflect the sum of the addends.			
^b	Includes 20.4 miles of new Line Section 25 Loop pipeline in Williams, Mountrail, and Burke Counties and the replacement of 676 feet of 6-inch-diameter lateral pipeline with 665 feet of 8-inch-diameter pipeline in Burke County.			
^c	Includes the replacement of about 0.4 mile of existing pipeline via the guided bore method at four county road crossings and one state highway crossing (92nd Street NW; 93rd Street NW/89th Avenue NW [both crossed by the same bore]; 86th Street NW, and Highway 40) and replacing and rerouting about 0.1 mile of existing 8-inch-diameter pipeline from the 86th Street NW bore to the proposed Norse Transfer Station.			



The Tioga-Elkhorn Creek pipeline would include about 61.9 miles of new 24-inch-diameter natural gas pipeline from new facilities at WBI Energy's Tioga Compressor Station near Tioga, North Dakota in Williams County to the proposed Elkhorn Creek Compressor Station southeast of Watford City, North Dakota in McKenzie County. The new pipeline would have bi-directional flow capabilities and an MAOP of 1,480 pounds per square inch gauge (psig). This pipeline route is bisected by Lake Sakakawea at approximately the border of Williams and McKenzie Counties.

The Elkhorn Creek-Northern Border pipeline would include about 0.3 mile of new 24-inch-diameter natural gas pipeline between the proposed Elkhorn Creek Compressor Station and the new interconnect with Northern Border in McKenzie County. The pipeline would have an MAOP of 1,480 psig.

The Line Section 25 Loop would include approximately 20.4 miles of new 12-inch-diameter natural gas pipeline looping on WBI Energy's existing Line Section 25 between the Tioga Compressor Station and the proposed Norse Transfer Station in Burke County. The pipeline would have bi-directional flow capabilities and an MAOP of 1,098 psig. The new pipeline would serve to loop the existing 8-inch-diameter pipeline, which has an existing MAOP of 700 psig. In conjunction with the Line Section 25 Loop, WBI Energy would remove about 0.1 mile (676 feet) of the existing 6-inch-diameter Stoneview-Conoco Lateral that originates at WBI Energy's existing 8-inch-diameter Line Section 25 and traverses north to the existing Norse Plant Receipt Station in Burke County, and construct about 0.1 mile (665 feet) of new 8-inch-diameter mainline to parallel the proposed Line Section 25 Loop starting at about milepost (MP) 20.2 and terminating at the proposed Norse Transfer Station.

The Line Section 30 Loop would include approximately 9.4 miles of new 12-inch-diameter natural gas pipeline looping on WBI Energy's existing Line Section 30 between the existing Nesson Valve Setting in Williams County and the Tioga Compressor Station in Williams County. The pipeline would have bi-directional flow capabilities and an MAOP of 700 psig. The loop would diverge from the existing 12-inch-diameter pipeline at the valve setting, taking a route south of the town of Tioga to meet with the proposed Tioga-Elkhorn Creek pipeline. The Line Section 30 Loop would then parallel the proposed Tioga-Elkhorn Creek pipeline north into the Tioga Compressor Station.

The Tioga Compressor Lateral would include approximately 0.5 mile of new 20-inch-diameter natural gas pipeline between the Tioga Plant Receipt Station and the new facilities at the Tioga Compressor Station in Williams County. The pipeline would have an MAOP of 1,480 psig.

WBI Energy would uprate about 28.3 miles of its existing 8-inch-diameter Line Section 25 from an MAOP of 700 psig to an MAOP of 1,098 psig between the proposed Norse Transfer Station and WBI Energy's MIPL-Portal interconnect in Burke County. This would be accomplished by replacing about 0.4 mile of existing pipeline via the guided bore method at four county road crossings and one state highway crossing (92nd Street NW, 93rd Street NW/89th Avenue NW [both crossed by the same bore], 86th Street NW, and Highway 40) and replacing and rerouting about 0.1 mile (about 700 feet) of existing 8-inch diameter pipeline with new 8-inch-diameter pipeline from the 86th Street NW bore to the proposed Norse Transfer Station to provide required overpressure protection. An approximately 9.6-mile segment of pipeline would require an uprate hydrotest as part of the Project.

Four landowners, Justin and Angie Hartel and LeMoine and Clarice Hartel (collectively referred to as “the Hartels”), provided comments about the routing of the Project specific to collocation with other existing pipelines. To minimize the Project footprint, WBI Energy collocated new pipeline facilities with existing pipeline, utility, and road corridors to the extent practicable. As shown in the table provided in appendix B, the new pipelines would be collocated along 42.6 miles (or 46 percent) of the pipeline routes, including:

- 20.1 miles (32 percent) of the Tioga-Elkhorn Creek pipeline;
- 15.4 miles (75 percent) of the Line Section 25 Loop;
- 6.6 miles (70 percent) of the Line Section 30 Loop; and
- 0.5 mile (100 percent) of the Tioga Compressor Lateral.

The proposed pipelines would cross approximately 1.0 mile (1 percent) of state lands, all of which are Surface Trust Lands administered by the North Dakota Department of Trust Lands (see section B.5.6 for more information). The proposed pipelines would cross 4.8 miles (5 percent) of federal lands including 2.7 miles of USACE lands and 2.1 miles of USFS lands. The proposed pipelines additionally would cross about 3.7 miles (4 percent) of private lands subject to conservation easements held by the FWS. The remaining 83.6 miles (89 percent) of the proposed pipeline routes (including the uprate to Line Section 25) would cross private lands.

4.2 Aboveground and Appurtenant Facilities

In addition to the new pipeline facilities, the Project would require construction of one new compressor station (Elkhorn Creek Compressor Station); modifications to the Tioga Compressor Station; construction of and modifications to existing delivery, receipt, and transfer stations, and installation of block valves, pig launcher and receiver facilities, and associated appurtenances. The new and modified aboveground facilities are summarized in table A-2 and described in more detail below.

Compressor Stations

Modifications to Tioga Compressor Station

WBI Energy would install 22,500 horsepower (hp) of additional compression and new equipment/facilities to meet Project design specifications at the Tioga Compressor Station located about 0.5 mile east of Tioga, North Dakota in Williams County. WBI Energy would install a new transfer grid to tie-in WBI Energy’s existing Line Sections 7, 25, and 30 as well as the new Tioga-Elkhorn Creek pipeline, the Line Section 25 and 30 Loops, and the Tioga Compressor Lateral. WBI Energy would extend the existing station fencing to accommodate the station expansion and construct a new access road in the northwest corner of the site. All facility additions would be within the existing property boundaries.

TABLE A-2

Proposed New and Modified Aboveground Facilities

Facility	Approximate Location	County	Description
Compressor Stations			
Tioga Compressor Station (modifications to existing compressor station)	MP 0.0 of the Tioga-Elkhorn Creek pipeline	Williams	Installation of additional 22,500 hp of compression and new equipment/facilities at the existing compressor station
Elkhorn Creek Compressor Station (new compressor station)	MP 61.9 of the Tioga-Elkhorn Creek pipeline	McKenzie	Construction of a 3,750 hp greenfield compressor station
Delivery, Receipt, and Transfer Stations			
Lignite Plant Receipt Station and Lignite Town Border Station (replace)	Offline (along Line Section 25)	Burke	Replacement of existing Lignite Plant Receipt Station and Lignite Town Border Station at the same location to accommodate incremental volumes
Norse Plant Receipt Station (upgrade)	MP 20.4 of the Line Section 25 Loop	Burke	Upgrade meter, station piping, and associated facilities to accommodate incremental volumes
Norse Transfer Station (new)	MP 20.4 of the Line Section 25 Loop	Burke	Construction of new transfer station to protect facilities operated at a MAOP of 700 psig from the 1,098 psig MAOP of the Line Section 25 Loop
Northern Border Interconnect (new)	Offline (west of the Elkhorn Creek Compressor Station)	McKenzie	Construction of new interconnect facilities with Northern Border west of the Elkhorn Creek Compressor Station to accommodate incremental volumes
Robinson Lake Plant Receipt Station (upgrade)	Offline (on Line Section 7)	Mountrail	Upgrade meter, station piping, and associated facilities to accommodate incremental volumes
Springbrook Plant Receipt Station (upgrade)	Offline (along Line Section 30 pipeline)	Williams	Upgrade meter, station piping, and associated facilities to accommodate incremental volumes
Tioga Plant Receipt Station (replace)	MP 0.0 of the Tioga Compressor Lateral	Williams	Replacement of existing station to a new location to accommodate incremental volumes
Block Valves ^a			
56th Avenue NW Block Valve ^b	MP 16.1 of the Tioga-Elkhorn Creek pipeline	Williams	New block valve along Tioga-Elkhorn Creek pipeline.
South Lake Block Valve ^c	MP 26.1 of the Tioga-Elkhorn Creek pipeline	McKenzie	New block valve along Tioga-Elkhorn Creek pipeline
Highway 10 Block Valve ^c	MP 36.8 of the Tioga-Elkhorn Creek pipeline	McKenzie	New block valve along Tioga-Elkhorn Creek pipeline
Cherry Creek Block Valve ^c	MP 51.2 of the Tioga-Elkhorn Creek pipeline	McKenzie	New block valve along Tioga-Elkhorn Creek pipeline
Valve No. 6.8 ^c	MP 6.9 of the Line Section 25 Loop	Mountrail	New valve site east of 102nd Road along Line Section 25 Loop pipeline
Valve No. 13.6 ^c	MP 13.7 of the Line Section 25 Loop	Burke	New valve site south of 81st Street along Line Section 25 Loop pipeline

TABLE A-2 (cont'd)

Proposed New and Modified Aboveground Facilities

Facility	Approximate Location	County	Description
Pig Launchers/Receivers^a			
Pig launcher/receiver 1	MP 0.0 of the Tioga-Elkhorn Creek pipeline	Williams	Install within the Tioga Compressor Station
Pig launcher/receiver 2 ^c	MP 6.1 of the Tioga-Elkhorn Creek pipeline	Williams	Install at 104th Avenue NW
Pig launcher/receiver 3	MP 61.9 of the Tioga-Elkhorn Creek pipeline	McKenzie	Install within the new Elkhorn Creek Compressor Station
Pig launcher/receiver 4	MP 0.0 of the Line Section 25 Loop	Williams	Install within the Tioga Compressor Station
Pig launcher/receiver 5 and 6	MP 20.4 of the Line Section 25 Loop	Burke	Install at the new Norse Transfer Station (one for the Line Section 25 Loop and one for the 665 feet of 8-inch-diameter pipeline replacement)
Pig launcher/receiver 7	MP 0.0 of the Line Section 30 Loop	Williams	Install at the Nesson Valve Setting
Pig launcher/receiver 8	MP 9.4 of the Line Section 30 Loop	Williams	Install within the Tioga Compressor Station
Pig launcher/receiver 9	MP 0.0 of the Tioga Compressor Lateral	Williams	Install within the Tioga Plant Receipt Station
Pig launcher/receiver 10	MP 0.5 of the Tioga Compressor Lateral	Williams	Install within the Tioga Compressor Station
Pig launcher/receiver 11	N/A	Burke	Install at the new Norse Transfer Station
Pig launcher/receiver 12	N/A	Burke	Install at the Lignite Border Station
^a	No new block valves or pig launcher/receivers would be installed along the Elkhorn Creek-Northern Border pipeline.		
^b	56th Street NW would be used to access this facility during operation.		
^c	New permanent access roads would be constructed to provide access to these facilities during operation as shown in the maps in appendix A and the access road table in appendix C.		

The new equipment and facilities at the Tioga Compressor Station would include:

- six new compressor units, each consisting of a skid-mounted 3,750 hp natural gas-fired Caterpillar G3612 engine coupled to a KBZ-4 compressor unit;
- three new compressor buildings housing two units each;
- one gas cooler and one auxiliary cooler for each compressor unit (six total);
- a 980-kilowatt backup power generator driven by a natural gas-fired 1,380 hp Waukesha L5794GSI engine;
- two 2.47 million British thermal units per hour (MMBtu/hr) gas boilers for building heating and one 0.25 MMBtu/hr building unit heater;
- one underground 3,000-gallon pipeline liquids storage tank;

- one underground 3,000-gallon waste oil storage tank;
- one underground 3,000-gallon floor drain tank to collect wastewater;
- relocation of an existing stormwater detention pond;
- one transfer building, one auxiliary building, and one scrubber building to house the new equipment; and
- four pig launcher/receivers (one 24 inches in diameter for the Tioga-Elkhorn Creek pipeline, one 20 inches in diameter for the Tioga Compressor Lateral, and two 12 inches in diameter for the Line Sections 25 and 30 Loop pipelines).

Elkhorn Creek Compressor Station

WBI Energy would construct one new 3,750 hp greenfield compressor station with associated equipment and facilities on a 10.9-acre site about 8 miles southeast of Watford City, North Dakota in McKenzie County. The new compressor station would be tied into the Tioga-Elkhorn Creek pipeline at about MP 61.9 and the Elkhorn Creek-Northern Border pipeline. WBI Energy would install a new access road to the facility from County Road 34/18th Street NW. WBI Energy has signed a purchase agreement to acquire the compressor station property in fee.

The new compressor station facilities would include:

- one skid-mounted 3,750 hp Caterpillar G3612 natural gas-fired engine coupled to a KBZ-4 compressor unit within a new compressor building;
- one gas cooler and one auxiliary cooler;
- one 1.69 MMBtu/hr gas boiler for building heating, one 2.08 MMBtu/hr water heater, and one 0.25 MMBtu/hr building unit heater;
- one underground 2,000-gallon pipeline liquids storage tank;
- one underground 2,000-gallon waste oil storage tank;
- one underground 2,000-gallon floor drain tank to collect wastewater;
- one transfer building to house the transfer grid piping, gas cleaning equipment, and gas measurement and regulation equipment;
- one auxiliary building to house the motor control center (including an emergency generator electrical transfer switch), the station and fire/gas programmable logic controller and human-machine interface, and an office/shop area; and
- a 24-inch-diameter pig launcher/receiver, associated piping and valves, and a septic system.

Delivery, Receipt, and Transfer Stations

Lignite Plant Receipt Station and Lignite Town Border Station

WBI Energy would rebuild the existing Lignite Plant Receipt Station along Line Section 25 to accommodate incremental volumes associated with the Project. The new station would include a new building with telemetry and gas quality instruments; a second building with high-pressure metering, an odorant system, and station piping with overpressure protection equipment; and an 8-inch-diameter pig launcher/receiver for Line Section 25. WBI Energy would also rebuild the existing Lignite Town Border Station to meet the updated Line Section 25 MAOP design of 1,098 psig. The new Lignite Town Border Station would include a new building with regulation, overpressure protection, and measurement equipment; filtration equipment; new valves; aboveground piping; and fittings. WBI Energy previously obtained an easement for the existing stations and plans to purchase an adjoining easement.

Norse Plant Receipt Station

WBI Energy would upgrade the meter, station piping, and associated facilities at the existing Norse Plant Receipt Station at MP 20.4 of the proposed Line Section 25 Loop. The modifications would be necessary to accommodate incremental volumes associated with the Project. Access to the Norse Plant Receipt Station would be via the existing entrance off of 86th Street NW. WBI Energy previously obtained an easement for the existing station; no additional land would be required.

Norse Transfer Station

WBI Energy proposes to construct a new transfer station on a new tract adjacent to and south of the existing Norse Plant Receipt Station at about MP 20.4 of the proposed Line Section 25 Loop. The new station would include a new building with regulation and overpressure protection equipment to provide overpressure protection to facilities operated at an MAOP of 700 psig. The transfer station's telemetry equipment would be housed in the Norse Plant Receipt Station. Three pig launcher/receivers would be installed within the boundary of the proposed Norse Transfer Station, including a 12-inch-diameter pig launcher/receiver for the proposed Line Section 25 Loop and two 8-inch-diameter pig launcher/receivers for Line Section 25 (one northbound and one southbound). WBI Energy plans to purchase the required land.

Northern Border Interconnect

WBI Energy would construct new facilities to connect with Northern Border west of the new Elkhorn Creek Compressor Station in McKenzie County to accommodate the incremental volumes associated with the Project. The facilities would include a new building with telemetry and gas quality instruments and a second building with high-pressure metering, an odorant system, and station piping with overpressure protection equipment. Additionally, WBI Energy would reimburse Northern Border for the cost of a tap and measurement facilities it would construct, own, and operate. WBI Energy has signed a purchase agreement with the landowner of the Elkhorn Creek Compressor Station tract, which includes a permanent easement for the Northern Border interconnect facilities and access road.

Robinson Lake Plant Receipt Station

WBI Energy would upgrade the meter, station piping, and associated facilities at the existing Robinson Lake Plant Receipt Station along Line Section 7 about 1.5 miles southeast of Stanley, North Dakota. The upgrades would be required to accommodate incremental volumes associated with the Project.

Access to the station would be via the existing entrance/access road from 61st Street NW. WBI Energy previously obtained an easement for the existing station and plans to purchase an adjoining easement.

Springbrook Plant Receipt Station

WBI Energy would upgrade the meter, station piping, and associated facilities at the existing Springbrook Plant Receipt Station about 25 miles west-southwest of Tioga, North Dakota on WBI Energy's existing Line Section 30 to accommodate incremental volumes associated with the Project. Access to the facility would be via the existing entrance off 131st Avenue NW. WBI Energy plans to expand its current easement for the existing station.

Tioga Plant Receipt Station

WBI Energy would remove the existing Tioga Plant Receipt Station and construct a new station at MP 0.0 of the Tioga Compressor Lateral. This modification is required to accommodate incremental volumes associated with the Project. The new station would include a new building with telemetry and gas quality instrumentation and a second building with high-pressure metering, an odorant system, and station piping with overpressure protection equipment. A new permanent access road would be constructed to provide access to the facility. WBI Energy has acquired an easement and executed a surface agreement to construct the new station.

Block Valves and Pig Launchers/Receivers

WBI Energy would install six new mainline block valves, four along the Tioga-Elkhorn Creek pipeline and two along the Line Section 25 Loop, and 12 new pig launcher/receivers associated with the Tioga Elkhorn Creek pipeline, Line Section 25 Loop, Line Section 30 Loop, Tioga Compressor Lateral, and uprates to Line Section 25. Table A-2 provides the specific location of these facilities and a more detailed description. No new block valves or pig launcher/receivers would be installed along the Elkhorn Creek-Northern Border pipeline.

5. Land Requirements

Construction of the Project would affect about 1,405.1 acres of land, including the pipeline construction rights-of-way, additional temporary workspace (ATWS), staging areas, temporary and permanent access roads, and aboveground facilities. Following construction, about 817.3 acres, including the temporary construction right-of-way, ATWS, staging areas, temporary access roads, and temporary workspace at aboveground facility sites, would revert to preconstruction conditions and uses. The remaining 587.8 acres, including the permanent pipeline easements, permanent aboveground facility sites, and permanent access roads, would be retained for operation of the pipeline system. Table A-3 summarizes the land requirements for the Project.

TABLE A-3
Summary of Land Requirements ^a

Facility	County	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Pipeline Rights-of-Way ^b			
Tioga-Elkhorn Creek ^c	Williams, McKenzie	714.2	374.8
Elkhorn Creek-Northern Border	McKenzie	3.5	1.8
Line Section 25 Loop ^d	Williams, Mountrail, and Burke	185.1	123.5
Line Section 30 Loop ^c	Williams	85.9	57.2
Tioga Compressor Lateral	Williams	3.9	2.8
Uprate Line Section 25 ^e	Burke	3.8	3.0
	Subtotal	996.4	563.2
ATWS			
Tioga-Elkhorn Creek	Williams, McKenzie	79.1	0.0
Line Section 25 Loop	Williams, Mountrail, and Burke	29.8	0.0
Line Section 30 Loop	Williams	10.1	0.0
Tioga Compressor Lateral	Williams	0.5	0.0
Uprate Line Section 25 ^f	Burke	11.6	0.0
	Subtotal	131.1	0.0
Staging Areas			
68th Street Yard	Williams	20.4	0.0
Boehm Staging Yard	McKenzie	6.2	0.0
CRS Yard	Williams	22.8	0.0
Delta Contractors Yard	McKenzie	23.6	0.0
Enget Yard	Mountrail	39.8	0.0
Flatlands Yard 1	McKenzie	4.9	0.0
Flatlands Yard 2	McKenzie	6.1	0.0
Lobell Yard	Williams	39.5	0.0
Schmidt Yard	Williams	8.4	0.0
Weflen Staging Yard	Williams	17.7	0.0
	Subtotal	189.4	0.0
Access Roads			
Temporary access roads	Multiple	54.9	0.0
Permanent access roads	Williams	3.7	3.7
	Subtotal	58.6	3.7

TABLE A-3 (cont'd)

Summary of Land Requirements ^a

Facility	County	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Aboveground Facilities			
Elkhorn Creek Compressor Station (new)	McKenzie	12.0	10.9
Tioga Compressor Station (existing)	Williams	8.5	4.4 ^g
Lignite Town Border and Lignite Plant Receipt Station (existing)	Burke	0.6	0.6
Norse Plant Receipt Station (existing)	Burke	0.6	0.6
Norse Transfer Station (new)	Burke	1.3	0.3
Northern Border Interconnect (new)	McKenzie	2.1	1.0
Robinson Lake Plant Receipt Station (existing)	Mountrail	1.4	0.6
Springbrook Plant Receipt Station (existing)	Williams	1.0	0.4
Tioga Plant Receipt Station (existing)	Williams	1.1	1.1
Block valves (new) ^h	Burke, McKenzie, Mountrail, and Williams	0.9	0.9
Pig launchers/receivers (new) ⁱ	Burke, McKenzie, and Williams	0.2	0.2
	Subtotal	29.6	21.0
PROJECT TOTAL		1,405.1	587.8

^a The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.

^b Based on a 100-foot-wide construction right-of-way for the 24-inch-diameter pipelines, a 75-foot-wide construction right-of-way for the 20-, 12-, and 8-inch-diameter pipelines, and a 50-foot-wide permanent right-of-way for all new pipeline facilities. Includes any appurtenant facilities within the pipeline right-of-way (i.e., block valves, cathodic protection facilities).

^c The Tioga-Elkhorn Creek pipeline and Line Section 30 Loop would be collocated from the Tioga Compressor Station to approximately MP 2.6 of the Tioga-Elkhorn Creek pipeline (MPs 6.8 to 9.4 of the Line Section 30 Loop). Portions of the temporary and permanent right-of-way that overlap along the collocated portion would be used during construction and/or operation of both pipelines.

^d Also includes the replacement of 676 feet of 6-inch-diameter lateral pipeline with 665 feet of 8-inch-diameter pipeline.

^e Includes the road crossing replacements via guided bore and replacing and rerouting about 0.1 mile of existing 8-inch-diameter pipeline from the 86th Street NW bore to the proposed Norse Transfer Station.

^f Also includes temporary workspace required for removal of the existing 0.1 mile of 8-inch-diameter pipeline to be rerouted.

^g All 4.4 acres are within WBI Energy's Tioga Compressor Station owned property boundaries; however, 2.2 acres are outside of the existing chain-linked fenced facility. The fence would be extended to encompass the compressor station expansion.

^h Four of the six proposed block valves (Valve No. 13.6, the 56th Avenue NW Block Valve, the Highway 10 Block Valve, and the South Lake Block Valve) would be constructed entirely within the permanent pipeline rights-of-way and no additional land would be required for their construction or operation. However, the Cherry Creek Block Valve and Valve No. 6.8 would require an additional 0.9 and less than 0.1 acre of land, respectively, outside the existing permanent right-of-way for construction and operation.

ⁱ All but one of the pig launcher/receiver sites would be constructed and operated within compressor, receipt, and /or transfer station or valve setting sites; no additional land would be required for construction and operation of these facilities. The remaining pig launcher/receiver would affect 0.2 acre outside the existing permanent pipeline right-of-way during construction and operation.

5.1 Pipeline Facilities

Construction of the proposed 12-inch-diameter Line Section 25 and Line Section 30 Loops and the 20-inch-diameter Tioga Compressor Lateral would require a standard 75-foot-wide construction right-of-way. Except through wetlands and across USFS land,³ construction of the proposed 24-inch-diameter Tioga-Elkhorn Creek and Elkhorn Creek-Northern Border pipelines would require a 100-foot-wide construction right-of-way to accommodate increased amounts of topsoil and subsoil storage while allowing safe passage of construction equipment and material along the working side of the right-of-way during construction (see section A.7 for more information).

The construction right-of-way would typically consist of a 50-foot-wide working side and a 25-foot-wide spoil side for the standard 75-foot-wide construction right-of-way and a 70-foot-wide working side and a 30-foot-wide spoil side for the 100-foot-wide construction right-of-way (see the typical construction right-of-way diagrams in appendix D). Following construction, a 50-foot wide permanent easement would be retained for pipeline operations; the remainder of the construction right-of-way would be restored to pre-existing conditions and revert back to its previous uses. In total, the pipeline construction-right-of-way would require approximately 996.4 acres, of which 563.2 acres would be retained as permanent easement.

ATWS outside of the 75- and 100-foot-wide construction right-of-way would be required at certain waterbody and wetland crossings, road and railroad crossings, points of inflection along the route, areas where special construction methods would be implemented (e.g., the HDD and guided bore methods), and areas where additional space is needed for storage of stripped topsoil. In total, use of ATWS during construction would affect about 131.1 acres, all of which would be restored to preconstruction conditions and allowed to revert back to previous uses following construction. A table of ATWS areas is provided in appendix E.

Although WBI Energy has identified areas where extra workspace would be required, additional or alternative areas could be identified in the future due to changes in site-specific construction requirements. WBI Energy would file information on each of those areas for review and approval, as necessary, prior to use.

5.2 Aboveground Facilities

Construction and operation of the proposed modifications to the Tioga Compressor Station at MP 0.0 of the Tioga-Elkhorn Creek pipeline would affect about 8.5 acres. About 4.4 acres would be retained for operation of the facility.⁴ The remaining 4.1 acres consist of temporary workspace that would be restored to preconstruction condition following construction.

Construction and operation of the Elkhorn Creek Compressor Station at MP 61.9 of the Tioga-Elkhorn Creek pipeline would affect about 12.0 acres, including 10.9 acres that would be fenced and maintained for operation of the compressor station. The remaining 1.1 acres consist of temporary workspace that would be restored to preconstruction condition following construction.

Construction of the new and modifications to the existing delivery, receipt, and transfer stations would affect about 8.1 acres of land, including 4.6 acres that would be retained for operation of the facilities. The remaining 3.5 acres consist of temporary workspace that would be restored to preconstruction condition following construction.

³ The construction right-of-way width across USFS land will be reduced to 50 feet (with an additional 25 feet of ATWS).

⁴ This would include 4.4 acres within the Tioga Compressor Station site property boundaries; 2.2 acres of which are outside the existing chain-linked fenced facility but within the existing property boundaries.

WBI Energy would construct six block valves, four of which would be entirely within the permanent pipeline rights-of-way. The remaining two block valves (the Cherry Creek Block Valve and Valve No. 6.8) would affect 0.9 acre outside the permanent right-of-way, all of which would be retained during operations. WBI Energy would construct 12 pig launcher/receivers, 11 of which would be constructed and operated within the boundaries of a compressor, receipt, and transfer station or valve setting sites. The remaining pig launcher/receiver site (104th Avenue NW pig launcher/receiver near MP 6.1 of the Tioga-Elkhorn Creek pipeline) would affect 0.2 acre outside the permanent pipeline right-of-way, which would be retained during operations.

5.3 Staging Areas

WBI Energy has identified 10 staging areas to serve as the bases of operation during construction. These staging areas are depicted on the Project route maps in appendix A. Activities in these areas would include site preparation (e.g., topsoil segregation and minor grading), pipe and equipment storage, vehicle/equipment maintenance, and regular vehicle and equipment traffic and parking. Additionally, Project construction trailers would be placed on the sites as offices. Use of the staging areas collectively would affect about 189.4 acres during construction. Following construction, these areas would be restored and allowed to revert back to preconstruction uses.

5.4 Access Roads

WBI Energy would use existing public and private roads to provide temporary access to the construction right-of-way and aboveground facility sites during construction. Standard-maintenance public roads would be used for access without modification or improvement. Some minimum-maintenance public roads and private roads would require improvement (such as grading; placement of gravel, crushed rock, or scoria for stability and surface improvement; replacing or installing culverts; and clearing of overhead vegetation, if present) to safely accommodate Project equipment and vehicles. A table listing the Project access roads is provided as appendix C.

Use of the existing temporary access roads would affect approximately 54.9 acres. If any of the temporary access roads are damaged by the Project, WBI Energy would restore the roads to pre-existing condition or better. As a result, the Project would have no permanent impact on these roads.

WBI Energy would construct 10 new permanent access roads to provide access to the proposed aboveground facilities. Construction and use of the permanent access roads would permanently affect about 3.7 acres.

The Hartels provided comments about access road use. WBI Energy would only use those access roads outlined in this EA. If WBI Energy identifies any additional access roads required for construction or operation of the Project at a later date, it would need to submit a variance request to FERC for approval to use those roads and complete all appropriate federal, state, and local permitting associated with the Project change.

6. Construction Schedule and Workforce

WBI Energy anticipates that construction of the Project would commence in March 2021 for aboveground facilities and May 2021 for the pipeline facilities, subject to receipt of necessary permits and regulatory approvals. WBI Energy anticipates that construction of the Project facilities would be completed in October 2021 and that all facilities would be placed in service by November 1, 2021. Based on the current construction schedule, WBI Energy anticipates that construction during winter conditions would not be necessary. Construction activities would generally occur Monday through Saturday from 7:00 a.m. to 7:00 p.m.; however, certain activities would occur up to 24 hours per day, including Sundays and potentially federal holidays. WBI Energy anticipates that these activities would include HDD and guided

bore crossings, hydrostatic testing and associated activities, critical tie-ins, operation of pumps associated with a dam-and-pump crossing (if necessary), aboveground facility building construction, installation of compressor units, aboveground facility commissioning, etc. Additionally, certain unforeseen circumstances may require unplanned construction activities outside the typical work hours, which may include, but are not limited to, completing in-progress construction activities and wetland/waterbody crossings delayed by an unanticipated event (e.g., severe weather, constructability issues), incident response procedures/measures, and emergency equipment repairs/maintenance. WBI Energy has committed to notifying affected landowners in the event of unforeseen activities requiring work outside of the typical 7:00 a.m. to 7:00 p.m. construction hours. WBI Energy anticipates that construction of the proposed Project would be accomplished using a peak construction workforce of about 450 people and an average workforce of about 350 people, including inspection crews. Construction of the pipeline facilities would occur using three construction spreads with an average temporary workforce of 250 people, including inspection crews. Construction of the aboveground facilities would require an average of about 100 additional people, including 80 for the compressor stations and 20 for the delivery, receipt, and transfer stations. Once construction of the Project is complete, WBI Energy would hire four new permanent employees to assist in operation and maintenance of the new facilities.

7. Construction, Operations, and Maintenance Procedures

WBI Energy would design, construct, operate, and maintain the Project in accordance with applicable requirements defined by U.S. Department of Transportation (USDOT) regulations in 49 CFR 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*; by 18 CFR 380.15, *Siting and Maintenance Requirements*; and by other applicable federal and state safety regulations. Additionally, WBI Energy would construct, operate, and maintain the proposed pipelines and other facilities in accordance with the requirements of permits issued to the Project. WBI Energy would implement the construction techniques and mitigation measures identified in the 2013 versions of FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures) as modified by the alternative measures identified in table A-4.

WBI Energy would implement additional construction, restoration, and mitigation plans that it prepared for the Project. These include the following:

- Spill Prevention, Control, and Countermeasure Plan (SPCC Plan);
- Plan for Unanticipated Discovery of Contaminated Environmental Media;
- Noxious Weeds Management Plan;
- Blasting Plan;
- Fugitive Dust Control Plan;
- Plan for Unanticipated Discovery of Historic Properties or Human Remains during Construction;
- Plan for Unanticipated Discovery of Paleontological Resources during Construction; and
- Horizontal Directional Drill/Guided Bore Drilling Fluid Monitoring and Operations Plan (HDD Plan).

We have reviewed WBI Energy's construction, restoration, and mitigation plans, and the proposed alternative measures to the FERC Plan and Procedures, and **[placeholder for FERC conclusion on Project plans]**.

TABLE A-4

Proposed Modifications to the FERC Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures

Plan or Procedures/ Section No.	Measure	Proposed Modification	Justification for Proposed Modification
Plan			
IV.A.2	The construction right-of-way width for a project shall not exceed 75 feet.	For the 24-inch-diameter Tioga-Elkhorn Creek and Elkhorn Creek-Northern Border pipelines, WBI Energy requests use of a 100-foot-wide construction right-of-way in non-wetland areas except across USFS land.	Additional workspace would be necessary for the 24-inch-diameter pipelines to provide sufficient workspace to accommodate topsoil and subsoil storage while allowing safe passage of construction equipment and material along the working side of the right-of-way during construction. WBI Energy proposes to complete topsoil segregation in all areas affected by standard pipeline construction, which would require additional workspace for topsoil and subsoil storage. The 100-foot-wide construction right-of-way would also provide sufficient space to allow proper safety precautions to be implemented during construction. The extra right-of-way width would allow work between the pipe and trench to be prohibited after trench excavation and workers to be positioned between the equipment and the pipe to monitor, inspect, and repair coating as needed or to adjust temporary pipe supports during lowering-in activities. The extra right-of-way width would allow construction equipment to be offset from the edge of the trench at a minimum distance equal to that of the depth of the trench to minimize the potential for trench collapse. Additionally, the extra right-of-way width ensures that there will be a travel lane around construction equipment for first responders in the event of an incident.
Procedures			
V.B.2	Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.	Locate workspace at MP 12.1 of the Tioga-Elkhorn Creek pipeline within 50 feet of the water's edge.	The workspace on the south side of 60th Street NW would be necessary to cross the road by guided bore; the workspace would be about 24 feet from the waterbody.
		Locate workspace at MP 27.3 of the Tioga-Elkhorn Creek pipeline within 50 feet of the water's edge.	The workspace on the east side of the drainage would be necessary for the guided bore crossing of the waterbody; the workspace would be about 7 feet from the waterbody. Note this area has not been field surveyed and data is currently based on the National Hydrography Dataset.
		Locate workspace at MP 44.7 of the Tioga-Elkhorn Creek pipeline within a waterbody.	This workspace on the north side of 33rd Street NW would be necessary to cross this road by guided bore. Note this area has not been field surveyed and data is currently based on the National Hydrography Dataset.

TABLE A-4 (cont'd)

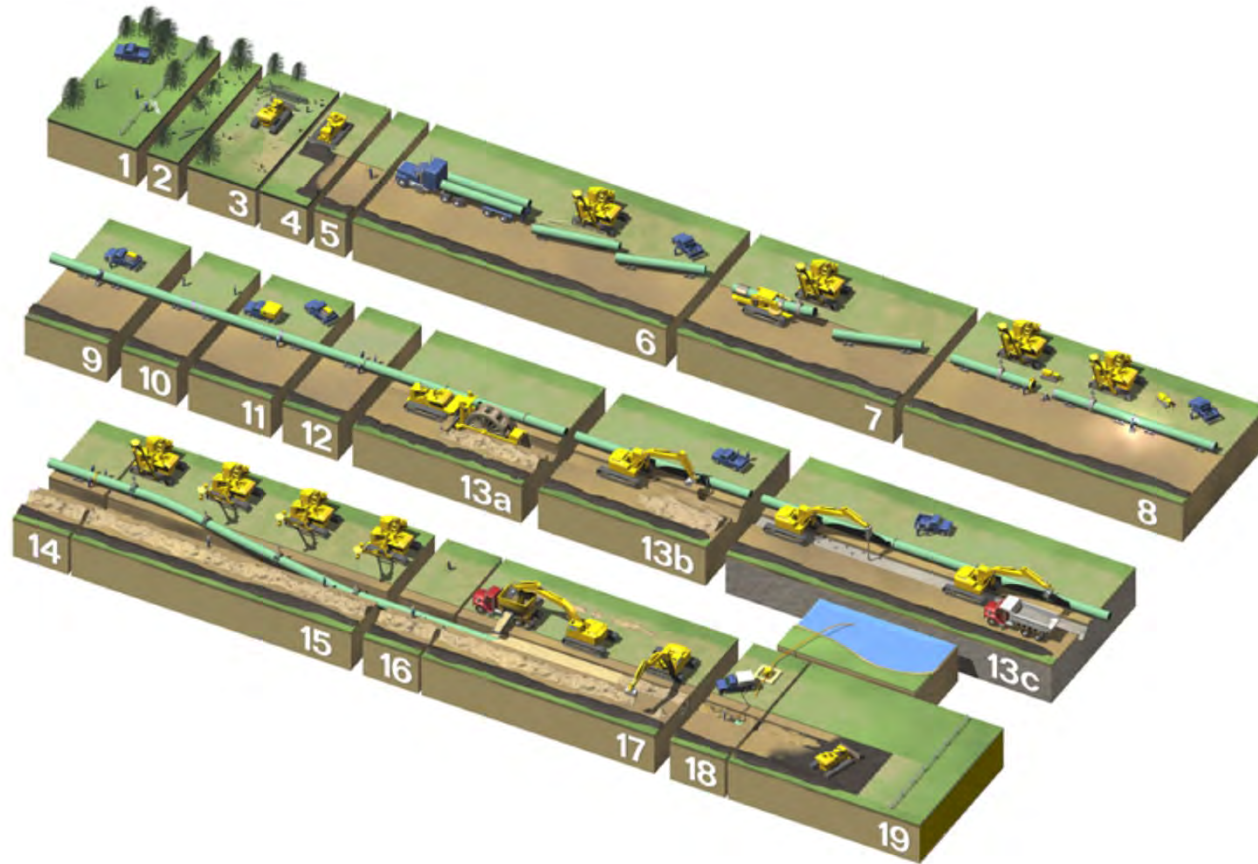
Proposed Modifications to the FERC Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedure

Plan or Procedures/ Section No.	Measure	Proposed Modification	Justification for Proposed Modification
VI.B.1	Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.	Locate workspace at MP 28.4 of the Tioga-Elkhorn Creek pipeline within 50 feet of an emergent wetland.	To meet right-of-way requirements for USFS land, a 25-foot-wide ATWS would be necessary along the 50-foot-wide permanent right-of-way through USFS land. This 25 feet would be needed for topsoil segregation, travel lanes, and equipment/personnel safety.
		Locate workspace at MP 29.2 of the Tioga-Elkhorn Creek pipeline within an emergent wetland.	To meet right-of-way requirements for USFS land, a 25-foot-wide ATWS would be necessary along the 50-foot-wide permanent right-of-way through USFS land. This 25 feet would be needed for topsoil segregation, travel lanes, and equipment/personnel safety.
		Locate workspace at MP 44.7 of the Tioga-Elkhorn Creek pipeline within a wetland	This workspace on the north side of 33rd Street NW would be necessary to cross this road by guided bore. Note this area has not been field surveyed and data is currently based on National Wetlands Inventory data.
		Locate two workspaces at MP 13.4 of the Line Section 25 Loop within 50 feet of an emergent wetland.	The workspaces on the south side of White Earth Creek would be necessary for the guided bore crossing of this waterbody and associated fringe wetland. The workspaces would be between about 18 and 20 feet from the wetland.
		Locate workspace at MP 0.4 of the Tioga Compressor Lateral within 50 feet of an emergent wetland.	The workspace on the west side of 103rd Avenue NW would be necessary to cross the road by guided bore; the workspace would be about 5 feet from a waterbody.
		Locate workspace at uprate bore site 3 within 50 feet of an emergent wetland.	The workspace on the south side of 92nd Street NW would be necessary to cross the road by guided bore; the workspace would be about 45 feet from the wetland.
		Locate workspace at uprate bore site 4 within 50 feet of an emergent wetland.	The workspace on the north side of 93rd Street NW would be necessary to cross the road by guided bore; the workspace would be about 33 feet from the wetland.

7.1 General Pipeline Construction Procedures

Construction of the proposed pipelines would follow industry-standard practices and procedures, which involve a series of discrete activities conducted in a linear sequence. Figure 2 illustrates each of the steps in a typical construction scenario.

Prior to construction, WBI Energy’s survey contractor would stake the pipeline centerlines and the limits of the construction right-of-way and ATWS areas. Wetland boundaries and other environmentally sensitive areas also would be marked at this time. WBI Energy’s construction contractor additionally would cut and brace fences along the right-of-way, if necessary, for preconstruction survey.



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- | | | |
|-----------------------------------|------------------------------------|---|
| 1. Survey and Staking | 10. As-Built Footage | 17. Pad, Backfill, Rough Grade |
| 2. Clearing | 11. X-Ray Inspection, Weld Repair | 18. Hydrostatic Testing, Final Tie-in |
| 3. Front-End Grading | 12. Coating Field Welds | 19. Replace Topsoil, Final Clean-Up, Full Restoration |
| 4. ROW Topsoil Stripping | 13a. Trenching (wheel ditcher) | |
| 5. Restaking Centerline of Trench | 13b. Trenching (backhoe) | |
| 6. Stringing Pipe | 13c. Trenching (rock) | |
| 7. Field Bending Pipe | 14. Inspection & Repair of Coating | |
| 8. Line-Up, Initial Weld | 15. Lowering Pipe into Trench | |
| 9. Fill & Cap, Final Weld | 16. As-Built Survey | |

Figure 2
Typical Pipeline Construction Sequence
North Bakken Expansion Project
 WBI Energy Transmission, Inc.

Prior to ground-disturbing activities, WBI Energy's construction contractor would coordinate with the North Dakota One-Call system to have existing underground utilities identified and flagged, and would use locating equipment to identify other infrastructure in areas where existing lines are thought to exist but were not identified by other means. A clearing crew then would clear the work area of vegetation and other obstacles, including trees (as necessary), stumps, logs, brush, and rocks. To the extent feasible, WBI Energy would minimize tree removal during construction. Cleared vegetation and stumps would be chipped (except in wetlands), put to beneficial use such as mulch for erosion control, or hauled offsite to a commercial disposal facility. As required, snow would be plowed to the edge of the construction right-of-way and stockpiled within the corridor.

Following clearing (and snow removal as necessary), the construction right-of-way and ATWS areas would be graded where necessary to provide a level work surface. In accordance with the FERC Plan and Procedures, topsoil would be segregated in agricultural areas and in unsaturated wetlands. Additionally, WBI Energy proposes to segregate topsoil in all unsaturated areas affected by standard pipeline construction to aid in successful revegetation. If the ground is relatively flat and does not require grading, rootstock would be left in the ground to facilitate revegetation of the right-of-way. In areas disturbed by grading, and as required by the FERC Plan and Procedures, temporary erosion and sediment controls would be installed within the right-of-way to minimize erosion. These erosion and sediment controls would be inspected and maintained throughout the construction and restoration phases of the Project, as required by the FERC Plan and Procedures.

Individual joints of pipe would be trucked to the construction right-of-way and strung along the trenchline in a single, continuous line. The pipe would be bent, where necessary, to allow for a uniform fit with the contours at the bottom of the trench. Typically, a track-mounted, hydraulic pipe-bending machine would tailor the shape of the pipe to conform to the contours of the terrain. After the pipe sections are bent, they would be welded together into long sections and placed on temporary supports. Welding would be conducted in compliance with Title 49 CFR Part 192 and American Petroleum Institute Standard 1104 *Welding of Pipelines and Related Facilities*. Completed welds would be visually and non-destructively inspected, and all pipe welds would be coated in accordance with required specifications. The coating would be inspected for defects, and repaired, if necessary, prior to lowering the pipe into the trench.

Prior to crossing any marked utility lines or pipeline infrastructure, a hydrovac excavator would be used to daylight the lines and verify depth. Crossings of third-party lines or pipeline infrastructure would be conducted according to any agreements between WBI Energy and the third-party utility. Trenching would be conducted with rotary trenching machines, track-mounted backhoes, or other similar equipment. Trench spoil would be deposited adjacent to the trench within the construction right-of-way, and adjacent to the topsoil pile. The trench would be excavated to a depth that provides sufficient cover over the pipeline after backfilling. Typically, the trench would be excavated to a depth of about 6 feet to allow for a normal depth of cover of 4 feet over the pipeline, or any appurtenances, after construction. Additional cover would be provided at road crossings for a minimum depth of cover of 5 feet. The bottom width of the trench would be sufficient to accommodate the pipeline. The width at the top of the trench would vary to allow the side slopes to be adapted to local conditions at the time of construction. If trench dewatering is required within or off the construction right-of-way, it would be conducted in a manner that would not cause erosion or result in silt-laden water flowing into any waterbody or wetland.

Prior to lowering-in, the trench would be inspected to ensure it is free of rocks and other debris that could damage the pipe or its protective coating. The pipe would then be lifted from the temporary supports and lowered into the trench using side-boom tractors. As necessary, trench breakers (stacked sand bags or foam) would be installed in the trench around the pipe in steeply sloped areas to prevent movement of subsurface water along the pipeline. After lowering-in, the trench would be backfilled with previously excavated materials using bladed equipment or backhoes. If the excavated material is rocky, the pipeline

would be protected with a rock shield or covered with more suitable fill. Clean fill would be obtained by removing rock from the excavated spoil. Topsoil would not be used to pad the pipe.

After backfilling, the entire pipeline would be hydrostatically tested in sections to ensure that the system is free from leaks and would provide the required margin of safety at operating pressures. Individual sections of pipeline to be tested would be determined by terrain conditions. WBI Energy would source hydrostatic test water from a water depot. WBI Energy would transport the hydrostatic test water via truck to the right-of-way in accordance with state regulations and any required transportation permits. Although not proposed at this time, if WBI Energy determines it would be necessary to pipe water to the right-of-way in lieu of transporting it via truck, it would provide site-specific information and any associated impacts in a supplemental filing to FERC. If WBI Energy later determines that it is necessary to obtain water from surface water sources for hydrostatic testing or other Project-related purposes, it would obtain any required permits or approvals in accordance with state regulations and FERC requirements. Depending on the source of water, dichlorination tablets may be used to treat water prior to testing. Internal test pressures and durations would be in accordance with 49 CFR 192 and applicable permit conditions. If leaks are found, the defect would be repaired, and the section of pipe retested until all required specifications are met. After testing, the water would be discharged to an approved well-vegetated upland area(s) in accordance with permit conditions and the FERC Plan.

After hydrostatic testing, the final pipeline tie-in would be completed and commissioning would commence. Commissioning would involve activities to verify that equipment is properly installed and working, controls and communications systems are functional, and the pipeline is ready for service. The pipeline would be cleaned, dried, and inspected using in-line inspection tools to detect anomalies in the pipe that may have been introduced during construction, and prepared for service by purging the line of air and loading the line with natural gas.

Final cleanup would begin after backfilling and as soon as weather and site conditions permit. Efforts would be made to complete final cleanup (including final grading and installation of permanent erosion control devices) within timeframes required by permits, in accordance with landowner requests, or as required by the FERC Plan and Procedures.

During cleanup, construction debris would be collected and taken to a disposal facility. Preconstruction contours along the right-of-way would be restored to pre-existing condition as closely as possible. Segregated topsoil would be returned to the stripped area and permanent erosion controls would be installed. Revegetation measures would be implemented in accordance with the FERC Plan and Procedures.

Markers showing the location of the pipeline would be installed at fence crossings, road crossings, points of inflection, and other areas as necessary to identify WBI Energy as the owner of the pipeline and convey emergency information in accordance with applicable government regulations, including USDOT safety requirements.

7.2 Special Pipeline Construction Procedures

WBI Energy would use special construction techniques where warranted by site-specific conditions (e.g., when constructing across waterbodies, wetlands, roads and railroads, agricultural areas, and steep side slopes) as described below. The Project would not require construction in residential areas, and WBI Energy does not expect that blasting would be required during construction. As discussed in section B.1.2 of this EA, hard bedrock is not expected to be present along the proposed pipeline routes.

WBI Energy would construct across oil and gas fields and gathering pipelines using the same general pipeline construction techniques described in section A.7.1. Crossings of gathering pipelines would be completed as shown in the typical construction right-of-way cross-section diagrams for foreign pipeline crossings (see appendix D).

Waterbody Crossings

For waterbodies that are not proposed to be crossed using trenchless HDD or guided bore methods, WBI Energy proposes to use conventional upland (open-cut) techniques if no flow is present at the time of the crossing. Based on site conditions at the time of construction, WBI Energy may use the guided bore crossing method to cross waterbodies currently proposed as open-cut crossings. Although dry crossing methods, such as the flume and dam-and-pump methods, are not proposed for the Project, they may be considered if warranted by site-specific conditions at the time of construction. In each case and for each method, WBI Energy would adhere to the measures specified in the FERC Procedures and any additional requirements specified in federal or state waterbody crossing permits. See section B.2.2 for a list of waterbodies crossed by the Project and the proposed crossing methods.

Open-Cut Method

WBI Energy would cross non-flowing waterbodies using the open-cut method. In these cases, backhoe-type excavators operating from the banks of the waterbody would be used to open a trench while flow is maintained across the channel. Spoil excavated from the trench would be placed on the bank above the high water mark for use as backfill. A prefabricated segment of pipeline would then be placed into the trench using side-boom tractors. Concrete coating or set-on weights would be used, as necessary, to provide negative buoyancy for the pipeline. Once the trench is backfilled, the banks would be restored as near as practicable to preconstruction contours and stabilized. Stabilization measures would include seeding, installation of erosion control blankets, or installation of riprap materials, as appropriate. Excavated material not required for backfill would be removed and disposed of at upland disposal sites.

Throughout the construction process, WBI Energy would follow the FERC Procedures to avoid or minimize impacts on water quality. WBI Energy would schedule construction activities so that the trench is not excavated across the waterbody until immediately prior to pipe laying activities. The duration of in-stream construction activities (excluding blasting, if required) would be limited to 24 hours across minor waterbodies (those 10 feet in width or less) and 48 hours across intermediate waterbodies (those between 10 and 100 feet in width). Excavated spoil would be stockpiled at least 10 feet from the edge of the waterbody, and appropriate erosion control devices would be installed in the field.

Horizontal Directional Drill and Guided Bore Methods

The HDD and guided bore crossing methods are both trenchless methods used to install pipelines across sensitive areas such as waterbodies and wetlands, roads, and other utility crossings to avoid direct impacts on those features.

The HDD method is a trenchless crossing method that involves establishing land-based staging areas on both sides of a proposed crossing, drilling a hole below the depth of a conventional lay, and installing the pipeline underneath a sensitive area while avoiding disturbance to surface and shallow subsurface features. The HDD method is typically used for longer (i.e., greater than 1,000 feet) and deeper crossings that require use of much larger stationary equipment that is assembled on site.

WBI Energy proposes to use the HDD intersect method to construct its pipeline across Lake Sakakawea (and a natural pond). The HDD intersect method involves using two drill rigs, one on each side of the HDD, and drilling two pilot holes towards each other until they intersect at a predetermined point. Unless unforeseen events occur, such as inadvertent releases of drilling fluid, use of the HDD method typically avoids impacts on water quality by precluding disturbance of the waterbody bed and banks.

WBI Energy's HDD contractor proposes to use either the Para-Track System or the Gyroscope System to complete the HDD intersect crossing (see the HDD intersect typical construction drawing in appendix D). Both systems involve using a directional jetting bottom-hole assembly or a mud motor with a bit and bottom-hole assembly to advance a 12.25-inch-diameter drill bit from each of the HDD entry sites (one at the drill rig entry side and one at the pipe entry side). Because HDD intersect procedures do not need to occur at exactly the halfway point along the drill path, drilling can occur concurrently from both sides or start at different times. Although the HDD intersect point is predetermined, conditions encountered during drilling the pilot holes may dictate the exact location of the final intersect point. The two drill crews would maintain constant communication as the HDD pilot holes progress.

The Para-Track System would use a down-hole probe (Para-Track2 Probe) to monitor the progress of each pilot hole. The elevation, alignment, and distance from the drill bit to the drill rigs would be recorded at regular intervals. As the two pilot holes approach the HDD intersect location, the magnetic signal would increase in strength. Once the pilot holes approach within about 30 feet of overlapping, a passive magnetic ranging (PMR) survey would be conducted to determine the position offset between the two pilot holes. The PMR survey involves using the down-hole probe to collect static magnetic field readings relative to the adjacent drill stem. To perform this operation, the drill pipe positioned in the previously drilled pilot hole would be retracted in predetermined distance increments, which would be detected and recorded by the down-hole probe for the other pilot hole. The magnetic field readings would be analyzed to verify that a sufficiently accurate position offset between the two pilot holes can be determined. This PMR survey would be repeated once every 30 feet until the two pilot holes intersect.

The Gyroscope System would also involve the use of a down-hole probe (a Gyroscope) to monitor the progress of the pilot holes. The elevation, alignment, and distance from the drill bit to the drill rigs would be recorded at the end of every drill stem length (about every 30 feet). As the pilot holes approach the predetermined intersect point, the HDD contractor would place a radar behind each Gyroscope probe (one for each pilot hole). When the drill bits approach within 30 feet of overlapping, one of the drill crews would pull a joint of drill stem to the top of the drill rig and wait while drilling continues from the other side. HDD crews would monitor annular pressure (if applicable) and review survey readouts for indications of vibrations. When the drill intersects the opposite pilot hole (usually indicated by a change in drill push or rotation), the HDD crew would slowly push down on the opposite drill bit to see if the two drill bits bump into each other. If the two drill bits do not make contact, additional drill stem would be pulled back on the non-drilling side, drilling would resume, and a radar survey would be taken every one to three drill stem joints to determine how best to achieve the pilot hole intersect. Once the drill bits make contact, the HDD superintendent and surveyors would analyze the angles of intersect, push and torque on the pipe strings, distance from the intersect point to each end of the drill, and existing ground conditions. This information would be used to decide which drill bit would proceed to the other side (i.e., push out of the ground at the opposite end of the HDD) and how much distance to maintain between the advancing drill bit and the retreating drill bit.

Once the pilot hole is completed, the pilot hole would be enlarged using one or more passes of a reamer until the hole is the necessary diameter to facilitate the pull-back (installation) of the pipeline. Once the reaming process is complete, a prefabricated segment of pipe would be attached to the drill string on one side of the crossing and pulled back through the hole toward the drill rig. The pipe segment is generally hydrostatically tested prior to its installation, and once installed, connected on either side of the crossing to

adjoining sections of pipe. The pipe segment is generally hydrostatically tested a second time with the remainder of the pipeline system.

In the process of drilling and/or reaming the hole, a slurry of drilling fluid (or drilling mud) would be circulated through the drilling tools to lubricate the drill bit, remove drill cuttings, and promote drill hole stability. Drilling fluid primarily consists of water mixed with in-situ material or bentonite, which is a non-toxic, naturally occurring sedimentary clay. Although not currently proposed, drilling fluid additives may be used for HDD and guided bore activities associated with the Project in accordance with all applicable permit requirements and environmental regulations.⁵ WBI Energy is coordinating with landowners on potential locations within agricultural areas for the beneficial reuse of HDD drilling fluid. All Project drilling fluid would be disposed of in accordance with federal, state, and local regulations.

The guided bore method is very similar to that described for the HDD but is typically used for relatively short crossings (i.e., less than 1,000 feet) that are relatively shallow with a small arc bore path. Additionally, guided bores typically use self-contained mobile equipment with a smaller footprint. WBI Energy proposes to use the guided bore method to install the pipeline across Beaver Creek, Tobacco Garden Creek (two crossings), Northfork Creek, Cherry Creek, and White Earth Creek (see section B.2.2 for more information).

WBI Energy's use of the HDD and guided bore methods would avoid disturbing surface and shallow subsurface features (e.g., waterbodies, wetlands, vegetation) between the HDD and guided bore entry and/or exit workspaces. However, it may be necessary to hand-clear vegetation along the pipeline centerline between the entry and exit workspaces at some locations to facilitate laying the electric-grid guide wires often used to steer the drill heads. Additionally, a travel lane would be required between the entry and exit workspaces at several of the guided bore crossings.⁶

An unintended release of drilling fluid (referred to as an inadvertent return) could occur if drilling fluids escape the drill hole and are forced through the subsurface substrate to the ground surface. To minimize potential impacts of inadvertent releases of drilling fluids, WBI Energy would implement the measures identified in its HDD Plan. This plan describes procedures WBI Energy would implement to monitor, contain, and clean up any potential releases of drilling fluid. It also identifies contingency measures to be implemented in the event that an HDD or guided bore is unsuccessful.

Flume Method

The flume method consists of installing temporary dams upstream and downstream of a proposed crossing and temporarily directing water flows through one or more flume pipes placed over the area to be excavated. This method allows for trenching activities to occur under relatively dry conditions beneath the flume pipes, avoiding disruption to water flow. WBI Energy is not currently proposing to use the flume method at any of the waterbody crossings along the pipeline routes, but may elect to do so if warranted by site-specific conditions at the time of construction.

⁵ Drilling contractors would be limited to use of drilling fluid additives that are non-petrochemical based, non-hazardous, and currently certified to the American National Standards Institute/National Sanitation Foundation International Standard 60 at the time of construction. Any additives used would comply with permit requirements and environmental regulations applicable to the Project. Additives other than those certified to the standard would not be allowed unless approval by appropriate regulatory authorities is granted. Contractors would be required to maintain safety data sheets on location for all additives used for HDD and guided bore operations and keep records of the types and amounts of additives used.

⁶ A travel lane would be required between the entry and exit workspaces at the following guided bore crossings: Beaver Creek (s-wm-eb-002), Tobacco Garden Creek (s-mk-eb-002 and s-mk-ea-003), wetland w-mk-ea-004e, Northfork Creek (s-mk-eb-005), and Cherry Creek.

Dam-and-Pump Method

The dam-and-pump method consists of installing temporary dams upstream and downstream of a proposed crossing. The dams are typically constructed of sandbags and plastic sheeting. Following installation of the dams, pumps are used to dewater the excavation area and to transport stream flow around the construction work area. WBI Energy is not currently proposing to use the dam-and-pump method at any of the waterbody crossings along the pipeline routes, but may elect to do so if warranted by site-specific conditions at the time of construction.

Wetlands

WBI Energy would install the pipeline across wetlands in accordance with the FERC Procedures, site-specific modifications to the FERC Procedures as requested by WBI Energy and approved by FERC, and the requirements of federal or state water crossing permits. Wetland boundaries would be delineated and marked in the field prior to construction activities. Temporary erosion control devices would be installed as necessary after initial disturbance of wetlands or adjacent upland areas and maintained until revegetation is complete to prevent sediment flow into wetlands in accordance with the FERC Procedures. Trench plugs would be installed as necessary to maintain wetland hydrology. Construction equipment operating in wetland areas would be limited to that needed to clear the right-of-way, dig the trench, install the pipeline, backfill the trench, and restore the right-of-way.

The top 12 inches of topsoil would be stripped from the area directly over the trench line (except in areas of standing water or in saturated conditions) and stockpiled separately from the subsoil. The segregated topsoil would be restored to its original location following installation of the pipe and backfilling of the trench in accordance with the FERC Procedures. Materials such as timber mats placed in wetlands during construction would be removed during rough grading and final cleanup, and the preconstruction contours of the wetland would be restored. Permanent erosion control measures would be installed in accordance with the FERC Procedures, and disturbed areas within wetlands would be stabilized temporarily with a cover species such as annual ryegrass as soon as weather conditions permit. Wetland areas would then be allowed to return to preconstruction conditions using the original seed stock contained in the conserved topsoil layer.

The specific crossing procedures used to install the pipeline across wetlands would depend on the level of soil stability and saturation encountered during construction. Construction across unsaturated soils or soils that can support the weight of equipment would be conducted in a manner similar to the upland construction procedures. In areas that are proposed for conventional open trench construction, but where soil conditions may not support the weight of equipment, timber mats would be used to minimize disturbance to wetland hydrology and maintain soil structure.

WBI Energy may use the pull method of construction in inundated or saturated conditions where wetland soils and hydrology cannot support conventional pipe laying equipment, or in areas that have significant quantities of water that would allow the pipe to be floated over the open trench. With this method, construction and excavation equipment would work from temporary work surfaces and a prefabricated pipeline segment would be pulled or floated into position then sunk with buoyancy control devices and placed in the trench.

Road and Railroad Crossings

Construction across paved roads, highways, and railroads would be conducted in accordance with the FERC Plan and requirements identified in road and railroad crossing permits or approvals. Most paved roads, highways, and railroads would be crossed using the guided bore method. The guided bore method

is very similar to that described above under the HDD, using smaller self-contained equipment to install the pipeline beneath the roadbed or railroad. For long crossings, sections would be welded into a pipe string before being pulled through the borehole. Typically, there would be little or no disruption to traffic at the road, highway, or railroad crossings during boring operations. WBI Energy would also use the guided bore method at the road crossing replacements associated with the uprate to WBI Energy's existing Line Section 25: 92nd Street NW, 93rd Street NW/89th Avenue NW (crossed at the same location/intersection), 86th Street NW, and Highway 40.

WBI Energy would cross unpaved roads, two-tracks, trails, and driveways using the open-cut method and then restored to preconstruction condition. Most open-cut road crossings would be completed, and the road restored in a few days. For all road and railroad crossings, WBI Energy has designed the pipelines in accordance with the USDOT regulations at 49 CFR 192 and the American Society of Mechanical Engineers' code (B31.8) for gas transmission and distribution piping systems. Uncased crossings are preferred over cased crossings due to the increased potential for problems with installation, the cathodic protection system, and corrosion on cased crossings. Therefore, WBI Energy would utilize uncased crossings for all road and railroad crossings unless required otherwise by the appropriate regulatory authority with jurisdiction over a road or railroad crossing. A list of road and railroad crossings along the pipeline routes is included in appendix F.

Agricultural Areas

In active croplands, pastures, or hayfields, the topsoil layer would be removed and segregated from the subsoil in accordance with the FERC Plan. Typically, topsoil would be stripped over the trench plus spoil storage area. Following pipeline installation, the subsoil would be returned to the trench and the topsoil replaced in the area from which it was stripped. As necessary, the working side of the right-of-way would be de-compacted prior to final grading and restoration.

Where livestock fences (including electric fences) need to be crossed to access the construction right-of-way, a fencing crew would cut, brace, and secure the fencing prior to construction, and would repair the fences to preconstruction condition or better during the restoration phase of the Project. WBI Energy may install temporary gates in accordance with individual landowner requests. WBI Energy would work with landowners to either remove livestock to alternate fields during construction or maintain adequate fencing in grazing areas. If cattle are present during construction, WBI Energy would install temporary construction fencing around the right-of-way in areas where the pipe trench is left open overnight if requested by landowner. WBI Energy would also negotiate with landowners regarding a potential grazing deferment to allow vegetation to establish within the right-of-way after construction is complete.

To date, WBI Energy has not identified any drainage or irrigation facilities along the proposed pipeline routes. Prior to construction, WBI Energy would contact landowners to determine whether the pipelines would cross any unknown permanent drainage or irrigation facilities. If any such facilities are discovered and disturbed during construction, WBI Energy would restore them to preconstruction condition or better through the disturbed area.

It is not expected that drain tiles would be encountered during construction. However, if drain tiles are identified and/or encountered, WBI Energy would take precautions to maintain flow during construction to avoid ponding in nearby areas. Following construction, WBI Energy would restore impacted drain tiles to preconstruction conditions.

Side Slopes

Portions of the pipelines would cross areas of steep side slope or rolling terrain that may require the use of cut-and-fill grading to provide for safe working conditions. In these areas, grading activities would cut down the upslope side of the construction right-of-way. Material from the cutting would be used to fill the downslope side of the construction right-of-way to create a safe and level surface for travel lanes and equipment operation. The trench would be excavated from the newly graded right-of-way. Following pipeline installation and backfilling, the excavated material would be placed back on the area of the cut, compacted to restore the surface of the right-of-way to original contours, and the surface stabilized in accordance with the FERC Plan.

In areas of steep side slope or rolling terrain, WBI Energy would install temporary sediment barriers such as silt fences and straw bales to prevent the movement of disturbed soil off the right-of-way. Temporary slope breakers consisting of mounded and compacted soil would be installed across the right-of-way during construction in accordance with the FERC Plan. Permanent slope breakers would be installed during final cleanup or as soon as weather conditions permit. Following construction, restoration would be completed in accordance with the FERC Plan.

7.3 Aboveground Facility Construction Procedures

Construction of the proposed aboveground facilities would include a standard sequence of events. Construction would begin with clearing (or snow removal, as necessary) and grading of the sites to establish suitable grades for the facilities. Subsequent activities would include preparing foundations, installing underground piping, erecting and installing buildings, installing aboveground piping and equipment, testing the piping, testing the control equipment, cleaning up the work area, and graveling access roads and parking areas. Once construction is complete, areas within the fence line but outside the new facilities would be covered with gravel/scoria or maintained in an herbaceous state. Each station site would be fenced for security. Safety and control devices would be installed and tested prior to operation.

Construction of block valves would include grading, installing the underground assembly, testing the control equipment, cleaning up the work area, and graveling the site area. Block valve construction would be concurrent with the construction of the pipeline, with installation of the block valves occurring prior to hydrostatic testing of the pipeline. At each site, the disturbed area would be stabilized with gravel/scoria. Outside of the fenced area, revegetation would be conducted in accordance with the FERC Plan.

None of the existing facilities that WBI Energy would replace or modify has known asbestos-containing materials (ACM). Per Chapter 33.1-15-13 of the North Dakota Administrative Code (NDAC), an inspector certified in North Dakota to identify all ACM would conduct a thorough asbestos inspection prior to the demolition/renovation of Project facilities. If ACM is identified, notification of asbestos removal activities would be submitted to the NDDEQ's Asbestos Control Program for all demolition activities involving ACM and any renovation activity that requires removal or disturbance of 160 square feet or more of regulated ACM on facility components, or 260 linear feet or more of regulated ACM on pipes. Appropriately trained and certified individuals would remove any ACM in accordance with applicable requirements. ACM would be transported off Project facilities in accordance with applicable regulations and disposed at a facility permitted to manage asbestos waste.

7.4 Environmental Compliance, Training, and Inspection and Post-Construction Monitoring and Reporting

WBI Energy states that it would minimize environmental impacts by complying with applicable permits and approvals; the FERC Plan and Procedures; and other construction, restoration, or mitigation plans identified in this EA. WBI Energy has committed to training company and contractor personnel to familiarize them with environmental requirements, and would provide environmental inspectors (EI) to monitor compliance during construction.

Prior to construction, WBI Energy would conduct environmental training for company and contractor supervisory personnel. The training program would focus on the FERC Plan and Procedures, Project-specific Certificate and permit conditions, and Project-specific mitigation plans. In addition, WBI Energy would provide large-group training sessions before each work crew begins construction. Periodic follow-up training for groups of newly assigned personnel would be provided as necessary by the EIs.

WBI Energy's EIs would have peer status with other inspectors and would report directly to the WBI Energy environmental personnel. The EIs' responsibilities would be as specified in the FERC Plan, and would include the following: 1) monitoring the contractor's compliance with environmental measures required by the Certificate, other environmental permits or approvals, the FERC Plan and Procedures, and all other construction, restoration, and mitigation plans; 2) taking corrective actions, including issuing stop-activity orders; 3) documenting compliance with environmental requirements; and 4) preparing status reports for submittal to the Commission's environmental staff. The EIs would also act as liaisons between WBI Energy and representatives of environmental regulatory agencies that may visit the Project during construction.

WBI Energy would conduct post-construction monitoring to document restoration and revegetation of the right-of-way and other disturbed areas. WBI Energy would monitor wetlands for a period of 3 years or until revegetation is successful in accordance with the FERC Procedures. WBI Energy would monitor most upland areas after the first and second growing seasons following restoration or until revegetation is successful in accordance with the FERC Plan. WBI Energy would submit annual monitoring reports to FERC to document the status of revegetation in disturbed areas. The reports would describe the composition of developing plant communities, identify areas meeting performance standards, and provide recommendations for remedial measures, if warranted. Areas meeting performance standards at the end of the second year (or in any subsequent year) no longer would be monitored. WBI Energy would continue to submit annual reports until restoration activities are complete.

7.5 Operations and Maintenance

WBI Energy would operate and maintain the new pipeline and aboveground facilities in accordance with all applicable federal and state requirements, including the minimum federal safety standards identified in *Transportation of Natural and Other Gas by Pipeline*, Title 49 CFR Part 192.

WBI Energy periodically would inspect the pipelines on foot or by all-terrain vehicle or other vehicle as required by applicable regulatory requirements to identify potential concerns that may affect the safety and operation of the pipeline. Pipeline markers and signs would be inspected and maintained or replaced, as necessary, to ensure that pipeline locations are clearly identified. Field personnel would advise the appropriate operations personnel of new construction along or near the pipeline system. Line patrol of highway and railroad crossings would be completed as required by the USDOT. If pipeline patrols or vegetation maintenance identify areas on the right-of-way where erosion is occurring, WBI Energy would repair existing erosion control devices or install additional devices as necessary to stabilize the area and prevent future erosion.

Vegetation along the pipeline rights-of-way would be cleared periodically, and where necessary, in accordance with the FERC Plan and Procedures (except in areas crossed by HDD or guided bore, where vegetation maintenance would not be conducted) to maintain accessibility to the right-of-way and accommodate pipeline integrity surveys. Active cropland would be allowed to revert to preconstruction use for the full width of the right-of-way. In non-cultivated uplands, the entire 50-foot-wide permanent easement would be maintained in an herbaceous state. In wetlands, a 10-foot-wide corridor centered over the pipelines would be maintained in an herbaceous state, and trees greater than 15 feet in height within 15 feet of the pipelines would be cut and removed from the right-of-way. WBI Energy typically would use mechanical mowing or cutting along its right-of-way for normal vegetation maintenance.

WBI Energy personnel also would perform regular operation and maintenance activities on equipment at the proposed compressor stations and delivery, receipt, and transfer stations. These activities would include calibration, inspection, and scheduled routine maintenance. Operational testing would be performed on safety equipment to ensure proper functioning, and problems would be corrected. Operation and maintenance of block valves would be performed in accordance with information provided by the valve manufacturers.

8. Non-jurisdictional Facilities

To date, WBI Energy has not identified any known non-jurisdictional interconnecting pipelines or facilities between customer processing plants and the Project. **[Note to FERC: If any are identified after interconnect agreements are final, WBI Energy will provide the information in a supplemental filing.]**

At the Tioga Compressor Station, the existing electric supply and rural water supply would be sufficient to support the compressor station modifications, and no additional interconnects for these services would be required.

At the Elkhorn Creek Compressor Station, WBI Energy would obtain electric service from McKenzie Electric Cooperative via an overhead powerline that crosses the southern portion of the tract; all associated ground disturbance would be within the facility workspace. WBI Energy anticipates obtaining water for potable water and cleaning needs from the McKenzie County Water Resource District via a 2-inch-diameter poly line leading from the new compressor station to an existing 6-inch-diameter water line located in an easement that abuts the southern portion of the station tract.

[Note to FERC: Third-party power and communication services would be required at the delivery, receipt, and transfer stations; however, these details are not yet final. This information will be provided in a supplemental filing when available.]

9. Public Review and Comment

On July 3, 2019, the Commission granted WBI Energy's request to use FERC's Pre-filing Review Process in Docket No. PF19-7-000. The pre-filing process was established to encourage early involvement by citizens, governmental entities, non-governmental organizations, and other interested parties in the development of proposed natural gas transmission projects. During the pre-filing process, FERC staff worked with WBI Energy and interested stakeholders, including federal and state agencies, to identify and resolve Project-related issues. We participated in bi-weekly conference calls with WBI Energy to discuss relevant Project issues, and we encouraged WBI Energy to communicate frequently with the public throughout the pre-filing process.

WBI Energy hosted four private landowner meetings to introduce the Project to affected landowners and receive input: two on May 8, 2019 in Tioga, North Dakota and two on May 9, 2019 in Watford City, North Dakota. On April 18, 2019, WBI Energy sent letters of invitation to all affected landowners along the Project route. In total, 25 landowners attended the meetings. The Project team, which included WBI Energy personnel and their consultants, had productive conversations with landowners and received valuable feedback regarding potential Project concerns and the proposed pipeline routes. Discussion topics included the purpose of the Project, route siting, construction, and land use and restoration.

WBI Energy hosted four open house meetings to inform stakeholders about the Project and provide an opportunity for stakeholders to ask questions and express comments and concerns: two on August 6, 2019 in Tioga, North Dakota and two on August 7, 2019 in Watford City, North Dakota. On July 17, 2019 WBI Energy mailed an open house invitation letter to Project stakeholders, including affected landowners, and published announcements for the open houses in local newspapers. Attendees at the open houses included several affected landowners; a number of federal, state, and local elected officials or their representatives; a representative from the USACE; representatives from the Three Affiliated Tribes Pipeline Authority; representatives from state and local agencies including the North Dakota Pipeline Authority, North Dakota Department of Commerce, NDDEQ, North Dakota State Water Commission (NDSWC), McKenzie County Road Department, and the City of Watford City Public Works Department; a representative of the Northwest Landowners Association; and WBI Energy personnel and their consultants. Additionally, FERC environmental staff attended the open house meetings. Questions or comments from stakeholders at the meetings generally concerned the purpose of the Project, the easement acquisition process, and private landowner impacts.

On September 13, 2019, the Commission issued a *Notice of Intent to Prepare an Environmental Assessment for the Planned North Bakken Expansion Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Session* (NOI). The NOI was published in the *Federal Register* (FR) and was mailed to over 330 **FERC to verify (may be different due to A-95)** interested parties, including federal, state, and local officials; agency representatives; affected landowners; environmental and public interest groups; potentially interested Indian tribes; and local libraries and newspapers. Written comments were requested from the public on specific concerns about the Project or issues that should be considered during the preparation of the EA.

FERC environmental staff conducted two public scoping sessions on October 1 and 2, 2019 in Tioga and Watford City, North Dakota, respectively, to receive verbal scoping comments on the Project. Attendees at the scoping sessions included several affected landowners, a representative of the USACE, a representative of the USFS, and WBI Energy personnel and their consultants. No formal comments were received during the scoping sessions. Four individuals (two comment letters) provided written comments to the Commission during the scoping period. The scoping comments are addressed in relevant sections of this EA as indicated in table A-5.

TABLE A-5	
Issues Identified During the Public Scoping Process	
Issue	EA Section
Access roads	A.6.4
Alternatives	C.3.2
Construction traffic	B.6.2
Cumulative impacts	B.10
Dakota skipper habitat	B.4.1
Dust control	B.1.2
EA vs. environmental impact statement [For FERC to Address]	XXX
Eminent domain	B.5.1
Erosion and sediment control	B.1.2
Fence/gate repair	B.5.2
Land values	B.5.1
Little Missouri National Grassland/Dakota Prairie Grasslands	B.5.6
Maintaining access to property	B.5.2
Noxious weeds	B.3.1
Pipeline engineering/placement	A.5.1
Placement of pipeline markers	B.9.3
Potential effects on Cherry Creek	B.2.2
Potential topsoil loss	A.8.1
Restoration/seeding	B.1.2
Right-of-way easement terms	B.5.1
Stormwater pollution prevention	B.2.2
Wildlife	B.3.3

10. Permits and Approvals

WBI Energy has committed to obtaining applicable permits and regulatory approvals relating to construction and operation of the proposed facilities. Table A-6 provides a list of the federal and state permits required for the Project, and identifies the status of each permit.

TABLE A-6

Environmental Permits, Approvals, and Consultations

Agency	Permit/Approval/Consultation	Anticipated Submittal Date	Anticipated Approval Date
Federal			
FERC	Certificate under section 7(c) of the Natural Gas Act	February 2020	January 2021
U.S. Army Corps of Engineers – Omaha District and U.S. Army Corps of Engineers – Garrison Project Office	Issuance of a section 404 permit for discharges of dredged or fill material into waters of the United States, including jurisdictional wetlands Issuance of a section 408 permit for projects that affect (i.e., modify or occupy) any U.S. Army Corps of Engineers-constructed public works projects that include dams, basins, levees, channels, navigational channels, or other local flood protection works Issuance of an easement and temporary construction license for crossing Lake Sakakawea	February 2020	February 2021
U.S. Fish and Wildlife Service – Region 6 – North Dakota Field Office and U.S. Fish and Wildlife Service Crosby Wetland Management District	Issuance of a section 10 permit for structures or work in or affecting navigable Waters of the United States Consultations for impacts on federally listed threatened and endangered species and critical habitat under section 7 of the Endangered Species Act, the Migratory Bird Treaty Act, the Bald and Gold Eagle Protection Act, and the Fish and Wildlife Coordination Act	February 2020	December 2020
U.S. Department of the Interior, Bureau of Land Management - Eastern Montana/Dakotas District Office	Consultation for impacts on federal conservation easements for grasslands and wetlands Coordination of National Environmental Policy Act process when more than one federal land management agency's lands are crossed. The U.S. Bureau of Land Management is responsible for issuing right-of-way over lands managed by two or more federal agencies	February 2020	February 2021
U.S. Forest Service – Dakota Prairie Grasslands Little Missouri National Grassland	Consultation to cross Forest Service Lands and issuance of a Special Use Permit Clearance to work on U.S. Forest Service property	February 2020	February 2021
U.S. Department of Agriculture, Natural Resources Conservation Service – North Dakota	Consultations regarding erosion and sedimentation controls and seed mixes, and Agricultural Conservation Easement Program	February 2020	May 2020

TABLE A-6 (cont'd)

Environmental Permits, Approvals, and Consultations

Agency	Permit/Approval/Consultation	Anticipated Submittal Date	Anticipated Approval Date
North Dakota			
North Dakota Department of Environmental Quality, Division of Air Quality	Permits to Construct an Air Contaminant Source –Tioga Compressor Station and Elkhorn Creek Compressor Station	February 2020	July 2020
	Permits to Operate – Tioga Compressor Station and Elkhorn Creek Compressor Station	Between October 2021 and October 2022	Between January 2022 and January 2023
North Dakota Department of Environmental Quality, Division of Water Quality	General Permit for Construction Stormwater Discharge under the National Pollutant Discharge Elimination System	July 2020	October 2020
	General Permit for Construction Dewatering and Discharge of Hydrostatic Test Water under the National Pollutant Discharge Elimination System		
	Water Quality Certificate under section 401 of the Clean Water Act	February 2020	June 2020
North Dakota State Water Commission	Navigable Water Crossing Permit under North Dakota Century Code Chapter 61-33 (Sovereign Lands)	March 2020	June 2020
	Temporary Water Permit – Water appropriation permit for withdrawals associated with hydrostatic test water and drilling fluid	July 2020	October 2020
North Dakota Department of Game and Fish	Consultation for impacts on fisheries and wildlife	February 2020	March 2020
North Dakota Parks and Recreation Department	Consultation under the North Dakota Natural Heritage Program	June 2019	May 2020
State Historical Society of North Dakota	Consultation for impacts on historic properties under section 106 of the National Historic Preservation Act	February 2020	January 2021
North Dakota State Lands Board	Right-of-Way Grant to cross state lands	June 2020	July 2020

B. ENVIRONMENTAL ANALYSIS

The following sections discuss the Project's potential direct and indirect impacts on environmental resources. When considering the environmental consequences of the Project, the duration and significance of any potential impacts are described according to the following four levels: temporary, short-term, long-term, and permanent. Temporary impacts generally occur during construction, with the resources returning to preconstruction conditions almost immediately. Short-term impacts could continue for up to 3 years following construction. Long-term impacts would require more than 3 years to recover, but eventually would recover to preconstruction conditions. Permanent impacts are defined as activities that modify resources to the extent that they may not return to preconstruction conditions during the life of the Project, such as with the construction of an aboveground facility. An impact would be considered significant if it would result in a substantial adverse change in the physical environment. Our analysis also addresses direct and indirect effects collectively by resource.

The analysis contained in this EA is based upon WBI Energy's application and supplemental filings and our experience with the construction and operation of natural gas infrastructure. However, if the Project is approved and proceeds to the construction phase, it is not uncommon for a project proponent to require modifications (e.g., minor changes in workspace configurations). These changes are often identified by a company once on-the-ground implementation work is initiated. Any Project modifications would be subject to review and approval from FERC's Director of the Office of Energy Projects (OEP) and any other permitting/authorizing agencies with jurisdiction.

1. Geology and Soils

1.1 Geology

The Project would be within the Great Plains physiographic province, which is separated from the Central Lowlands province to the east by a linear topographic boundary referred to as the Missouri Escarpment (Keefer, 1974). Project area elevations range from approximately 1,850 feet above mean sea level at the Lake Sakakawea crossing (MPs 22.9 and 25.8 of the Tioga-Elkhorn Creek pipeline) to approximately 2,500 feet above mean sea level near MP 6.0 of the Line Section 25 Loop.

The Project area is underlain by Precambrian age basement rock overlain by sedimentary rocks of Paleozoic, Mesozoic, and Cenozoic age that range in thickness up to about 15,000 feet, and generally dip gently to the south, except near the Nesson Anticline in eastern Williams County (Freers, 1970). The surficial geology underlying the Project area north of Lake Sakakawea in Burke, Mountrail, and Williams Counties consists primarily of Pleistocene glacial sediments of Late Wisconsin age (North Dakota Geological Survey [NDGS], 2015). The Pleistocene surface deposits, referred to as the Coleharbor Group, predominantly consist of till and glaciofluvial deposits, with some lake sediments, colluvium, and recent alluvium and landslide deposits (NDGS, 2015). In addition to glacial deposits, portions of the Project area are underlain by fluvial sediments including sand, silt, and clay of late Quaternary age referred to as the Oahe Formation (Freers, 1973). North of Lake Sakakawea, the Tioga-Elkhorn Creek pipeline would cross windblown deposits and river sediments of the Oahe Formation. South of Lake Sakakawea in McKenzie County, the Coleharbor Group and Oahe Formation deposits become less widespread and the sandstones and shales of the Sentinel Butte and Bullion Creek formations become the predominant surface deposit (NDGS, 2015). Based on well logs in McKenzie County, the Sentinel Butte and Bullion Creek formations are about 1,220 feet thick. The Bullion Creek Formation consists of interbedded sand, silt, clay, carbonaceous shale, and lignite (silt and clay are dominant lithologies), and the Sentinel Butte Formation consists of interbedded sand, silt, mudstone, lignite, and carbonaceous shale, with ironstone nodules and petrified wood (Carlson, 1985). Table B-1 provides a summary of the surficial geology that the Project would cross.

TABLE B-1

Surficial Geology Crossed by the Project

Facility	Start Milepost	End Milepost	Surficial Geology
Tioga-Elkhorn Creek	0.0	15.3	Coleharbor Group
	15.3	17.1	Bullion Creek
	17.1	18.1	Coleharbor Group
	18.1	18.8	Oahe Formation
	18.8	19.5	Bullion Creek
	19.5	23.1	Oahe Formation
	23.1	25.4	Water
	25.4	29.9	Bullion Creek
	29.9	31.7	Oahe Formation
	31.7	32.5	Coleharbor Group
	32.5	33.0	Oahe Formation
	33.0	34.4	Coleharbor Group
	34.4	34.6	Oahe Formation
	34.6	34.9	Coleharbor Group
	34.9	36.6	Oahe Formation
	36.6	42.7	Sentinel Butte
	42.7	44.5	Coleharbor Group
	44.5	44.9	Sentinel Butte
	44.9	46.6	Coleharbor Group
	46.6	48.4	Oahe Formation
48.4	61.9	Sentinel Butte	
Elkhorn Creek-Northern Border	0.0	0.3	Sentinel Butte Formation
Line Section 25 Loop	0.0	20.4	Coleharbor Group
Line Section 30 Loop	0.0	9.4	Coleharbor Group
Tioga Compressor Lateral	0.0	0.5	Coleharbor Group
Uprate Line Section 25	N/A	N/A	Coleharbor Group

Source: NDGS, 2015

Paleontological Resources

Paleontological resources on land owned by the State of North Dakota and its political subdivisions are protected and managed under Chapters 54-17.3 and 43-04 of the North Dakota Century and Administrative Codes, respectively. A permit is required to investigate, excavate, collect, or otherwise record paleontological resources on these lands (NDGS, 2019a). The Project would cross North Dakota state lands between MPs 4.2 and 5.2 of the Line Section 25 Loop. Century Code Chapter 54-17.3-05 requires the reporting of all Quaternary age paleontological finds potentially or actually containing cultural resources to the State Historical Society of North Dakota (SHSND) and to the State Geologist (State of North Dakota, 2019).

The Paleontological Resources Preservation Act per 36 CFR 291.1 protects paleontological resources on USACE and USFS lands. The Project would cross USFS lands between MPs 27.2 to 27.6 and MPs 28.1 to 29.7 of the Tioga-Elkhorn Creek pipeline. The Project would cross USACE land between MPs 23.0 and 25.7 of the Tioga-Elkhorn Creek pipeline; however, all of the USACE land would be encompassed within the proposed HDD crossing of Lake Sakakawea. WBI Energy obtained an Archaeological Resources Protection Act permit from each agency, which is required to conduct paleontological surveys within USFS and USACE lands, and completed surveys in October 2019. WBI Energy did not identify any fossil localities during the field survey; however, WBI Energy did identify multiple isolated poorly preserved fossils during surveys. WBI Energy states that if paleontological resources are discovered during construction of the Project, they would be treated as cultural resources in accordance with WBI Energy's Plan for Unanticipated Discovery of Paleontological Resources during Construction.

Based on the preceding information, no significant impacts would be expected with respect to geologic resources or hazards for the Project.

Mineral Resources

North Dakota's primary mineral resources include fuel (oil and gas production) and non-fuel mineral resources (coal, sand and gravel, and salt). The entire Project is within NDDMR-mapped oil fields. Table B-2 provides the approximate mileposts where Project pipeline facilities would cross oil and gas fields.

The Project would be within 0.25 mile of 310 oil and gas wells. Approximately 103 of these identified wells are plugged and abandoned, abandoned, temporarily abandoned, or inactive. The status of an additional 85 wells is listed as confidential, dry, the permit has been cancelled, or permitted location to drill. The remaining 122 wells are currently active or drilling, the closest of which is about 260 feet from the proposed Tioga-Elkhorn Creek pipeline right-of-way at MP 5.6 (NDDMR, 2019). Table B-3 below summarizes the number of wells within 0.25 mile of each Project facility. Appendix G provides a detailed list of the oil and gas well information.

During construction, WBI Energy would utilize the One-Call System, which notifies third-party utilities of a potential crossing. When the third-party representative arrives to locate and mark their line/well, WBI Energy's contractor would discuss any special crossing criteria or avoidance measures that the third-party utility may have. Prior to crossing the marked line, a hydrovac excavator would be used to daylight the line and verify depth. Crossing of the third-party lines would be conducted according to any agreements between WBI Energy and the third-party utility.

TABLE B-2			
Oil and Gas Fields Crossed by the Project			
Facility	Start Milepost	End Milepost	Oil and Gas Field
Tioga-Elkhorn Creek	0.0	3.1	Tioga
	3.1	16.1	Beaver Lodge
	16.1	21.7	West Capa
	21.7	26.2	Grinnell
	26.2	33.2	Sand Creek
	33.2	41.5	Banks
	41.5	43.6	Garden
	43.6	55.0	Siverston
	55.0	61.9	Pembroke
Elkhorn Creek-Northern Border	0.0	0.3	Pembroke
Line Section 25 Loop	0.0	11.4	Tioga
	11.4	20.4	North Tioga
Line Section 30 Loop	0.0	5.2	West Bank
	5.2	9.4	Tioga
Tioga Compressor Lateral	0.0	0.5	Tioga
Uprate Line Section 25	N/A	N/A	North Tioga, Foothills, and Black Slough

Source: NDDMR, 2019

TABLE B-3			
Summary of Oil and Gas Wells Within 0.25 Mile of the Project			
Facility	Active or Drilling	Inactive ^a	Other Status ^b
PIPELINE FACILITIES			
Tioga-Elkhorn Creek	86	28	70
Line Section 25 Loop	19	61	10
Line Section 30 Loop	2	5	0
Tioga Compressor Lateral	0	1	0
Uprate Line Section 25			
86 th Street NW/Norse Plant Reroute	0	0	0
Highway 40 Bore	0	0	0
Bore #4	0	0	0
92 nd Avenue Bore	0	0	0
STAGING AREAS	12	6	5
ABOVEGROUND FACILITIES			
Elkhorn Creek Compressor Station	2	0	0
Lignite Tract	1	2	0
Total	122	103	85

Source: NDDMR, 2019

^a "Inactive" includes plugged and abandoned, abandoned, temporarily abandoned, or inactive wells.

^b "Other Status" includes confidential, dry, permit has been cancelled, or permitted location to drill.

Approximately 13 of the 310 oil and gas wells are located within 500 feet of proposed guided bore sites associated with roadway crossings. Of these 13 wells, the closest is an oil and gas well (permit now cancelled) approximately 240 feet from the guided bore across 40th Street NW near MP 36.8 of the Tioga-Elkhorn Creek pipeline. Conditions are typically favorable for drilling operations in North Dakota because the soil is not very rocky and the rock does not fracture easily. On past construction projects in McKenzie and Williams Counties in North Dakota, WBI Energy has used the guided bore method to cross 30 county and state roads and highways without any cross-contamination with existing oil and gas wells. Because the depth of most guided bore road crossings is less than or equal to 20 feet, any drilling fluid would most likely surface in a road ditch instead of traveling downward and deep enough to cross-contaminate existing oil or gas wells.

In addition to abundant petroleum resources, lignite coal and industrial sand and gravel are the predominant exploitable mineral resources in the Project area (Murphy, 2019a, 2019b; U.S. Geological Survey [USGS], 2019a). Although lignite beds underlie the entire Project area, there are no active lignite coal mines in the vicinity of the proposed pipeline routes. Additionally, based on publicly available information from the North Dakota Public Service Commission (NDPSC), no formal notices for proposed coal mines have been filed in counties that the Project would cross. The most recent coal permit issued by the NDPSC was in 2014 for a mine located in Mercer County (NDPSC, 2014, 2020a).

Based on review of the NDPSC Abandoned Mine Lands Program database (NDPSC, 2019), one abandoned subsurface coal mine and two abandoned surface coal mines were identified within 0.25 mile of the proposed Tioga-Elkhorn Creek pipeline. The Quality Coal Company mine is located approximately 0.1 mile south of MP 19.0 in Williams County; however, based on review of available aerial imagery and correspondence with the NDPSC (NDPSC, 2020b), no sinkholes or signs of subsidence were identified in the mapped mine location and the NDPSC was not able to verify the location of the subsurface mine in NDPSC records. At MP 19.0, the proposed Tioga-Elkhorn Creek pipeline is located immediately adjacent to an existing, previously cleared utility corridor in an area with existing infrastructure. Due to the distance from the abandoned mine location and the presence of existing infrastructure, the potential that the Project would be affected by subsidence associated with the mine or acid mine drainage is low.

The Skogheim Coal Mine and John Gustafson Mine are abandoned surface coal mines located approximately 0.1 mile west and 0.2 mile east of the Tioga-Elkhorn Creek pipeline at MP 38.3 and MP 39.8, respectively. Based on available information from the NDPSC, the precise location and boundary of the Skogheim Coal Mine is not well documented; however, aerial imagery and local topography do not indicate the presence of a former surface coal mine near the Project area. The John Gustafson Mine surface mine boundary is visible in aerial imagery and does not extend north of the tributary to Tobacco Garden Creek or west near the Project area. As such, it is unlikely that the Project would have an impact on coal mining or be affected by geologic hazards associated with the abandoned mine sites. In addition, the NDPSC confirmed that no known coal seam fires are located within 0.25 of Project facilities (NDPSC, 2020c).

Sand and gravel is the third largest mineral industry in the state after oil, natural gas, and lignite. According to the 2014 Minerals Yearbook for North Dakota published in 2019 (USGS, 2019a), mining of construction sand and gravel decreased while crushed stone volumes increased from 2013 to 2014. Based on a review of information from the USGS Mineral Resources Data System, no active, inactive, or abandoned surface or subsurface industrial were identified within 0.25 mile of the Project (USGS, 2011).

There currently are no commercial halite or potash mines near the Project area, and the Project does not cross any significant natural pothole lakes. Any impacts on smaller, seasonally flooded wetlands from

which salts might be harvested would be temporary and localized. As a result, the Project is unlikely to have any substantial impact on mining of salt deposits.

Based on review of available aerial imagery, USGS topographic maps, and landmarks mapped by the North Dakota Department of Transportation (NDDOT), the Project would be within 0.25 mile of 14 gravel or scoria pits (USGS, 2019b; NDDOT, 2019a). The closest gravel or scoria pit is mapped less than 0.1 mile east of the Tioga-Elkhorn Creek pipeline at MP 38.3; however, the status of the pit is listed as inactive. The closest gravel pit with an active status is located approximately 0.2 mile southeast of MP 58.7 of the Tioga-Elkhorn Creek pipeline; however, the portion of the pit that appears to be actively mined based on 2018 aerial photography is farther than 0.25 mile from the Project. As such, it is unlikely that mining activities and/or any required blasting would affect the Project area. Additionally, a retired and depleted scoria pit is located within the footprint of the proposed Elkhorn Creek Compressor Station. This unpermitted scoria pit was used for personal use by the landowners. Per the landowners, bulldozers and backhoes were used to excavate the private scoria pit, and no blasting occurred at the site. WBI Energy has a signed purchase agreement to acquire the compressor station property in fee and negotiations with the current landowners prohibit any continued scoria extraction within the easement boundaries. WBI Energy would perform earthwork to prepare and grade the site, including the depleted scoria pit, prior to compressor station construction. WBI Energy plans to maintain open communication with this landowner regarding any future plans for scoria extraction. If the landowner intends to extract scoria in lands adjacent to the compressor station property, no blasting is expected to occur. Therefore, no impacts on the compressor station are anticipated.

Geologic Hazards and Impact Mitigation

Geologic hazards are natural, physical conditions that can result in damage to land and structures or injury to people. Such hazards typically include seismicity (e.g., earthquakes, surface faults, soil liquefaction), landslides, flooding, and subsidence (including karst terrain). These hazards, as well as the feasibility of utilizing HDD/guided bore construction based on hydrogeologic conditions present in the Project area, are discussed below.

Seismic Hazards

The shaking during an earthquake can be expressed in terms of the acceleration as a percent of gravity (g), and seismic risk can be quantified by the motions experienced at the ground surface or by structures during a given earthquake expressed in terms of g. For reference, a peak ground acceleration of 10 percent g (0.1g) is generally considered the minimum threshold for damage to older structures or structures not constructed to resist earthquakes. USGS National Seismic Hazard Probability Mapping shows that for the Project area, within a 50-year period, there is a 2 percent probability of an earthquake with an effective peak ground acceleration of 2 to 4 percent g; and a 10 percent probability of an earthquake with an effective peak ground acceleration of 0 to 1 percent g being exceeded (Rukstales and Petersen, 2019). Even under much higher ground vibrations, the main risk to pipelines and aboveground facilities would be a slip fault that displaces laterally during an earthquake. Project facilities would not cross any faults (USGS, 2019c). Given these conditions, we conclude [placeholder for FERC conclusion].

A study of induced seismicity in the Williston Basin recorded nine earthquakes in the region between 2008 and 2011 (Frohlich et al., 2015). Three of these earthquakes were located near injection wells; however, based on the results of the study, only one earthquake may have been induced. This potentially induced magnitude-2.5 earthquake occurred in 2010 and was located approximately 37 miles west of the Tioga-Elkhorn Creek pipeline at MP 40.0. Overall, the study noted that the Williston Basin produced the fewest number of potentially induced earthquakes compared to oil and gas production areas in Texas, Oklahoma, and Arkansas. A 2018 study concluded that induced seismicity is low or absent in the

Williston Basin because the vertical distance between faults in the Precambrian basement rock and depth of wastewater injection is greater than 1 kilometer (Skoumal et al., 2018). Based on the observations that induced seismicity is very low or absent in the Williston Basin, it is not anticipated that induced earthquakes would affect the Project area.

Landslides

Landslides involve the downslope mass movement of soil, rock, or a combination of materials on an unstable slope. Potential causes of construction-induced landslides include vibrations from machinery or traffic, alterations to slope morphology caused by earthwork, the addition of new loads on an existing slope, the removal of deep-rooted vegetation that binds shallow soils to bedrock, or changes in water volume infiltrating into the soil as a result of construction. In areas with steep slopes, soils may be unstable and present erosion management problems when disturbed, often requiring erosion and sedimentation control measures during pipeline construction and operation. The entire Project area has a low incidence of landslides. Two segments from approximately MPs 3.0 and 61.9 of the Tioga-Elkhorn Creek pipeline and MPs 0.0 and 5.6 of the Line Section 25 Loop would be within an area of moderate landslide susceptibility; however, the incidence is still classified as low (NDGS, 2019b). Landslide deposit maps indicate that most landslide deposits in the Project area are associated with high-relief topography, such as those about 5 miles east of MP 5.1 of the Line Section 25 Loop and approximately 3 miles east of MP 60.2 of the Tioga-Elkhorn Creek pipeline (NDGS, 2019b). Smaller-scale landslide deposits are associated with the north and south banks of Lake Sakakawea (NDGS, 2019b); however, the bore entry and exit sites for the proposed HDD crossing of Lake Sakakawea would be set back from the bank by approximately 750 and 2,000 feet, respectively. Based on review of the USGS National Elevation Dataset, the Project would not cross slopes greater than 15 percent. Because the Project is primarily located within areas of rolling hills and lower relief, WBI Energy has not proposed to conduct additional slope studies or prepare a landslide mitigation plan. **[Placeholder for FERC conclusion]**

Flooding

Hazards associated with flooding include stream bank erosion, scour, channel relocation, bedload movement, and debris flows. Based on information available from the Federal Emergency Management Agency for McKenzie County, the Project area is located within a minimal flood hazard zone (Zone X). Flood hazard information is not available for the Project area located within Williams, Mountrail, and Burke Counties. In these counties, WBI Energy would consult with county floodplain managers and would obtain approvals, as necessary, prior to construction within a flood zone. No aboveground structures would be installed within the mapped floodplain. As such, construction and operation of the Project would not affect flood storage or floodplain elevations.

Heavy or excessive rainfall in a relatively short time period can cause flash flooding and scour along streambanks and within flood zones. The USACE manages the water level of the Lake Sakakawea reservoir through operations at the Garrison Dam to control flooding. Depth of this crossing would be finalized based on the over water geotechnical analysis to be completed in the spring of 2020. Estimated depth of cover is between 200 and 300 feet; which would prevent damage to the pipeline from scour. A search of publicly available information did not return studies or evidence of past scour or flash flooding events where the Project crosses perennial waterbodies, including Tobacco Garden Creek, Beaver Creek, Cherry Creek, and White Earth Creek. Where the Project crosses these perennial waterbodies, the Project would be designed and installed at a burial depth necessary to prevent scour from exposing the pipelines in accordance with 49 CFR 192.

Subsidence

Ground subsidence, involving the localized or regional lowering of the ground surface, may be caused by karst dissolution; sediment compaction due to oil, gas, and/or groundwater extraction; and underground mines. Potential subsidence in the vicinity of the Project area could occur from the dissolution of evaporate rocks (salt) deep beneath the land surface, dissolution and collapse of karst or pseudokarst features, underground coal seam fires, or mining exploration and extraction activities (Trimble, 1979). As described previously, there are no documented salt mines within 0.25 mile of Project facilities; as such, the risk of dissolution of evaporates affecting the Project is low. The USGS Digital Map Compilation and Database for karst in the U.S. indicates that areas of the Sentinel Butte Formation may locally contain pseudokarst features including erosional piping; the closest of these areas is located approximately 0.8 mile east of MP 60.4 of the Tioga-Elkhorn Creek pipeline (USGS, 2014). Erosional piping has been documented within the Sentinel Butte Formation basal sandstone in Theodore Roosevelt National Park at the base of steep slopes. In these areas, percolating water dissolves and removes soluble materials and sheetwash erosion form rills and gullies that can lead to the formation and collapse of pipe structures (KellyLynn, 2007). The Project facilities that cross the Sentinel Butte Formation are not located at the base of steep slopes where erosional piping features typically form; as such, the risk that the collapse of piping features would impact the Project is low.

Per correspondence with the NDPSC (NDPSC, 2020c), there are no documented coal seam fires within 0.25 mile of the Project facilities. As described previously, three abandoned mines (one abandoned subsurface coal mine and two abandoned surface coal mines) are located within 0.25 mile of the Project; however, based on available information regarding the mines, aerial imagery, and discussion with the NDPSC (NDPSC, 2020b), the risk of abandoned mine-related subsidence affecting the Project is low. Therefore, there is low risk for subsidence to occur in the Project area or to significantly affect the pipelines or aboveground facilities.

Shallow Bedrock and Blasting

Based on prior construction experience in the area, field observations, and publicly available data, WBI Energy does not anticipate the need to conduct blasting activities during construction of the Project. Based on a query of the Soil Survey Geographic (SSURGO) database for soil characteristics in the Project area, about 10 percent (144.3 acres) of the Project overlies soils where bedrock is shallower than 60 inches from the ground surface. The shallow bedrock in the Project area is classified as paralithic, indicating it is weathered and could be ripped using typical construction equipment.

If shallow bedrock or boulders are encountered that cannot be removed by conventional methods, blasting may be required. If blasting is necessary, WBI Energy's construction contractor would conduct blasting activities in accordance with the Project Blasting Plan and in compliance with state and federal regulations governing the use of explosives to assist in the removal of rock from the pipeline trench. WBI Energy would use the minimum explosive charge necessary to fracture bedrock and keep shot-rock from leaving the construction right-of-way. To avoid damage, the contractor would conduct pre-blasting evaluations of the rock, as needed, and develop specific blasting operations and monitoring plans. Control of blasting would limit stresses on existing pipelines, nearby domestic structures, water supply wells, or electric transmission tower footings that may be located near the Project area. In the unforeseen event that blasting were to be required for the Project, WBI Energy would conduct blasting activities during daylight hours and would not begin until occupants of nearby buildings, stores, residences, places of business, and farms have been notified.

HDD Feasibility and Geotechnical Investigations

The length of an HDD alignment, the pipeline diameter, and subsurface material are factors in the technical feasibility of an HDD installation. Subsurface conditions that can affect feasibility of an HDD installation include excessive rock strength and abrasiveness, unconsolidated gravel and boulder materials, poor bedrock quality, solution cavities, and artesian conditions. It is also possible for HDD installations to fail, primarily due to encountering unexpected geologic conditions such as transitioning from coarse unconsolidated materials into bedrock or if the pipe were to become lodged in the hole during pullback operations. During HDD operations, drilling fluid consisting primarily of water and bentonite clay is pumped under pressure through the inside of the drill pipe and flows back (returns) to the drill entry point along an annular space between the outside of the drill pipe and the drilled hole. Because the drilling fluid is pressurized, in certain conditions it can seep into the surrounding rocks and sediment. Formational drilling fluid losses typically occur when the drilling fluid flows through the pore spaces in soil or within fractures in rock formations. Inadvertent returns are more likely to occur in more permeable soils or via fractures or fissures in bedrock. Chances for an inadvertent return of drilling fluid to occur are greatest near the drill entry and exit points where the drill path has the least amount of ground cover.

WBI Energy proposes to use the HDD intersect method to cross Lake Sakakawea. To confirm the surficial and bedrock geology and evaluate the feasibility of the proposed 15,371-foot-long HDD crossing, WBI Energy completed a geotechnical survey involving installing three land borings (LB-1, LB-2, and LB-3) to depths of 370, 400, and 400 feet below the ground surface in April and May 2019. The land borings encountered sedimentary sequences of interlayered sand, silt, clay, coal seams, and shale to the final termination depths. Near the surface, the borings encountered primarily poorly graded sand to a depth of approximately 25 feet below ground surface in LB-1, silt or silty sand to a depth of approximately 35 feet in LB-2, and well-graded sand to a depth of approximately 70 feet in LB-3. The shallow well-graded sands encountered in LB-3 correlate with the documented alluvial deposits present on the north side of Lake Sakakawea that are up to 100 feet thick (Freers, 1970). Based on coal layers observed in the boring logs, nearby bedrock outcrops on the south side of Lake Sakakawea, and high (greater than 50) standard penetration test values, the study determined that bedrock strata associated with the Tertiary Sentinel Butte Formation would be the primary material encountered during the HDD.

The geotechnical investigation provided data for a model of the HDD crossing that used a “poorly graded silt, clay, and sand” parameter to represent the overlying glacial deposits and a “shale bedrock” parameter to represent the Sentinel Butte bedrock. The model assumed that the intersect drill method would be used due to the length of the crossing, and estimated that there would be sufficient overburden (478 feet based on the assumed mudline) to minimize the risk of hydraulic fracture. Based on the geotechnical information available to date, stress analysis, and model results, the feasibility study determined that the proposed HDD would be geometrically feasible, and recommended that additional over-water borings be completed to finalize the HDD design. Future proposed over-water borings would involve drilling at six sites across Lake Sakakawea to at least 20 feet below the depth of the drill path. The over-water borings would inform the final detailed HDD design and identify any potential bedrock fractures, cobbles, and/or other geotechnical issues that may exist along the drill path that could cause an inadvertent return of drilling fluids. Given that the geotechnical analysis is pending for this crossing, **we recommend that:**

- **Prior to construction, WBI Energy should file with the Secretary of the Commission (Secretary) a final HDD feasibility assessment and HDD Plan including information collected during the overwater geotechnical analysis on Lake Sakakawea.**

WBI Energy would implement the measures in its HDD Plan in the event of an inadvertent return. WBI Energy’s HDD Plan states that WBI Energy would monitor drilling pressures continuously during active drilling operations and use a down-hole annular pressure tool during the pilot hole drilling phase to

ensure that the drilling contractor could respond to a loss or spike in drilling fluid pressure which would be indicative of a potential hydrofracture and inadvertent return. Drilling operations would be stopped immediately at the first sign of an inadvertent return and WBI Energy would implement response and cleanup efforts specific to the location of the inadvertent return (e.g., upland, waterbodies or wetlands, sensitive resources areas). WBI Energy would contact appropriate agencies as needed depending on the location of the inadvertent return. Further, drilling fluids would consist primarily of fresh water and a high yield bentonite clay. WBI Energy would supply a list of any additional proposed additives (and their respective safety data sheets) to FERC for review and approval prior to construction. WBI Energy will continue to update the HDD Plan with additional information from the HDD/guided bore contractors and the results of the overwater geotechnical survey work scheduled to occur in the spring of 2020.

WBI Energy did not conduct geotechnical investigations for guided bore installations associated with the Project. WBI Energy would employ the guided bore method to provide additional depth at the crossings, maintain function of the ditches and roads during construction, and minimize disturbance to these features. The majority of the guided bores associated with Project activities are short and shallow guided bores under roads and railroads; however, a few select environmental features (e.g., waterbodies, wetlands, sensitive habitats) would be crossed via the guided bore method. Generally, these crossings could be installed using the traditional open-cut method; however, WBI Energy has elected to install the crossings using a guided bore to avoid direct impacts on these features. More information regarding the guided bore method is provided in section A.7.2. WBI Energy would employ a qualified bore contractor to complete guided bore operations. The bore contractor would minimize risks by being prepared with the proper equipment, tools, and supplies prior to drilling and closely adhering to the measures described in WBI Energy's HDD Plan to monitor drill activities and immediately respond to any abnormal conditions or inadvertent returns.

Based on the above analyses, we conclude that subsurface conditions identified by the geotechnical studies completed to date **[placeholder for FERC conclusion]**. With consideration of WBI Energy's mitigation measures and currently available information, we conclude **[placeholder for FERC conclusion]**.

1.2 Soils

Construction activities such as clearing, grading, trench excavation, backfilling, heavy equipment traffic, and restoration along the construction right-of-way have the potential to adversely affect natural soil characteristics such as water infiltration, storage and routing, and soil nutrient levels, thus reducing soil productivity. Clearing removes protective vegetative cover and exposes soils to the effects of wind and water which increases the potential for soil erosion and the transport of sediment to sensitive resource areas.

WBI Energy identified and assessed soil characteristics in the Project area using the SSURGO database (Soil Survey Staff, 2019a), which is a digital version of the original county soil surveys developed by the USDA's Natural Resources Conservation Service (NRCS) for use with geographic information systems (GIS). Table B-4 provides a summary of the significant soil characteristics and acreage that would be affected by the Project facilities. The Hartels provided comments about erosion and sediment control, dust control, topsoil loss, revegetation, and seeding. Individual soil characteristics and the mitigation measures that would be employed for each characteristic are discussed separately below.

TABLE B-4

Acres of Soil Characteristics Affected by the Project ^a

Facility	Total Acres	Prime Farmland ^b	Compaction Prone ^c	Highly Erodible		Reveg. Concerns ^f	Rocky ^g	Shallow Bedrock ^h
				Water ^d	Wind ^e			
Pipeline Facilities ⁱ								
Tioga-Elkhorn Creek	793.3	386.2	3.4	258.9	52.8	206.9	32.9	137.6
Elkhorn Creek-Northern Border	3.5	0.0	0.0	0.5	0.0	0.3	0.4	0.1
Line Section 25 Loop	214.9	91.3	15.4	60.6	0.0	24.3	24.1	0.4
Line Section 30 Loop	96.0	62.4	2.2	21.4	0.0	17.8	4.9	0.0
Tioga Compressor Lateral	4.4	3.1	0.0	0.6	0.0	0.0	0.0	0.0
Uprate Line Section 25	15.4	2.8	2.8	7.6	0.0	6.6	1.6	0.0
Subtotal	1,127.5	545.8	23.8	349.6	52.8	255.9	63.9	138.1
Aboveground Facilities ^j								
Elkhorn Creek Compressor Station	12.0	0.0	0.0	4.9	0.0	3.8	3.4	1.4
Tioga Compressor Station	8.5	8.5	0.0	0.0	0.0	0.0	0.0	0.0
Lignite Plant Receipt Station and Lignite Town Border Station	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Norse Plant Receipt Station	0.6	0.2	0.0	0.0	0.0	0.0	0.4	0.0
Norse Transfer Station	1.3	0.9	0.0	0.0	0.0	0.0	0.4	0.0
Northern Border Interconnect	2.1	0.0	0.0	0.4	0.0	0.4	0.0	0.1
Robinson Lake Plant Receipt Station	1.4	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Springbrook Plant Receipt Station	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Tioga Plant Receipt Station	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Block valves ^k	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Pig launchers/receivers ^l	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	29.6	14.7	0.0	5.3	0.0	4.3	4.3	1.6
Access Roads								
Temporary Access Roads	54.9	17.9	1.1	2.0	24.1	4.5	18.9	4.4
Permanent Access Roads	3.7	0.9	0.2	0.0	1.4	0.0	0.6	0.2
Subtotal	58.6	18.8	2.0	25.4	4.5	19.5	6.1	4.6
Staging Areas								
68th Street Yard	20.4	0.0	0.6	5.0	0.0	5.0	13.5	0.0
Boehm Staging Yard	6.2	4.9	0.0	0.0	0.0	0.0	1.3	0.0
CRS Yard	22.8	0.5	0.0	3.2	0.0	10.5	22.3	0.0
Delta Contractors Yard	23.6	22.3	0.0	1.4	0.0	1.4	0.0	0.0
Enget Yard	39.8	0.0	0.3	33.6	0.0	39.2	39.2	0.0
Flatlands Yard 1	4.9	4.4	0.0	0.4	0.0	0.3	0.0	0.0
Flatlands Yard 2	6.1	0.0	0.0	1.9	0.0	1.9	5.5	0.0
Lobell Yard	39.5	36.6	0.1	1.8	0.0	0.0	0.0	0.0
Schmidt Yard	8.4	1.4	0.0	4.5	0.0	0.0	0.0	0.0
Weflen Staging Yard	17.7	15.6	0.0	1.4	0.0	0.0	0.0	0.0
Subtotal	189.4	85.6	1.0	53.2	0.0	58.3	81.7	0.0
Total	1,405.1	664.9	26.8	433.5	57.3	338.0	156.0	144.3

TABLE B-4 (cont'd)

Acres of Soil Characteristics Affected by the Project ^a

Sources: Soil Survey Staff, 2019a and 2019b

a	The area affected includes all permanent and temporary workspace (including ATWS). The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends. The values in each row do not add up to the total acreage for each facility because the soils may occur in more than one characteristic class or may not occur in any class listed in the table. The soils in the table do not include areas of open water.
b	As designated by the NRCS. Prime farmland includes those soils that are considered prime if a limiting factor is mitigated (e.g., through artificial drainage) and soils designated as farmland of statewide importance.
c	Soils in somewhat poor to very poor drainage classes with surface textures of sandy clay loam and finer.
d	Soils in land capability subclasses 4E through 8E and soils with an average slope greater than 8 percent.
e	Soils with a Wind Erodibility Group classification of 1 or 2.
f	Soils with a surface texture of sandy loam or coarser that are moderately well to excessively drained, and soils with an average slope greater than 8 percent.
g	Soils with one or more horizons that have a cobbly, stony, bouldery, channery, flaggy, very gravelly, or extremely gravelly modifier to the textural class and/or contain greater than 5 percent by weight rocks larger than 3 inches.
h	Soils identified as containing bedrock within 60 inches of the soil surface.
i	Includes the appurtenant facilities within the pipeline rights-of-way (e.g., cathodic protection facilities).
j	Includes the appurtenant facilities within the aboveground facility sites (e.g., pig launcher/receiver).

Pipeline Facilities

Prime Farmland

The USDA defines prime farmland as land that has the best combination of physical and chemical characteristics for growing food, feed, forage, fiber, and oilseed crops. Unique farmland is land, other than prime farmland, that is used for production of specific high-value food and fiber crops. Soils that do not meet all of the requirements to be considered prime or unique farmland may be considered farmland of statewide or local importance if soils are capable of producing a high yield of crops when treated or managed according to accepted farming methods.

About 3 percent (28.6 acres) of the soils that would be crossed by the pipeline facilities are considered prime farmland. An additional 46 percent (517.2 acres) of the soils that would be crossed by the pipeline facilities are considered farmland of statewide importance.

Impacts on prime farmland soils resulting from pipeline construction and operation would be temporary and short-term because the pipelines would be buried and the disturbed soils within the construction and permanent rights-of-way would revert to preconstruction uses. Agricultural use would be allowed to continue within the pipeline right-of-way, with the exception of deep-rooted crops, such as orchards or tree farms.

Compaction Potential

Approximately 2 percent (23.8 acres) of the soils that would be affected by pipeline construction are prone to compaction. In accordance with the FERC Plan, EIs could restrict construction activities in areas with unfavorable conditions (e.g., saturated soils) to minimize compaction and rutting. WBI Energy would further mitigate compaction by using a paraplow or similar implement to conduct deep tillage operations during restoration. In areas where topsoil segregation occurs, plowing to alleviate subsoil compaction would be conducted before replacement of the topsoil.

Soil Erosion

The majority of Project area soils are not highly susceptible to erosion by wind or water; however, clearing, grading, and equipment movement can accelerate the erosion process and, without adequate protection, result in discharge of sediment to waterbodies and wetlands. Specifically, about 31 percent (349.6 acres) of the soils affected by pipeline construction are considered susceptible to erosion by water and 5 percent (52.8 acres) of the soils that would be affected by pipeline construction are considered highly wind erodible. WBI Energy states that it would implement measures identified in the FERC Plan and Procedures to address erosion issues during construction and restoration of the Project. WBI Energy's Plan requires installation of temporary erosion controls, including interceptor diversions and sediment filter devices such as silt fences, immediately following land disturbing activities. These controls would be inspected on a regular basis and after each rainfall event of 0.5 inch or greater to ensure proper functioning. As required, WBI Energy would install temporary trench breakers following trench excavation and maintain temporary erosion control devices until workspaces are successfully revegetated.

As necessary, in accordance with their Fugitive Dust Control Plan, WBI Energy would also apply water to exposed work areas and/or topsoil storage piles during construction to control fugitive dust. Magnesium chloride may be used on unpaved roads as a dust suppressant, only water would be used on the right-of-way. Therefore, significant impacts from wind erosion are not anticipated as a result of the Project.

Revegetation Potential

About 23 percent (255.9 acres) of the soils that would be affected by pipeline construction are considered to have poor revegetation potential. To aid in successful revegetation, WBI Energy would complete topsoil segregation in all areas impacted by standard pipeline construction. Successful restoration and revegetation are important for maintaining agricultural productivity and to protect the underlying soil from erosion. In accordance with the FERC Plan, during the appropriate season, WBI Energy would condition the construction right-of-way for planting, prepare a seedbed, and incorporate soil amendments, where necessary, at rates agreed to by the landowner or as specified in writing by an appropriate soil conservation authority. In saturated upland soils on steep slopes, additional mitigation may be required to accelerate the stabilization of soils prone to slips or erosion.

WBI Energy's preferred method is to mechanically mix saturated topsoil or spoil piles to allow evaporation to achieve target moisture levels. While WBI Energy does not anticipate the need for additional mitigation, should it be required based on field conditions, WBI Energy may elect to incorporate soil amendments (e.g., hydrated lime) to saturated upland soils. Application rates, material storage, and handling would be conducted in accordance with the manufacturer's recommendation. In accordance with the FERC Procedures, WBI Energy would not use soil amendments in wetlands unless required in writing by the appropriate federal agency. In addition, WBI Energy would not use hydrated lime within 100 feet of wetlands or waterbodies in order to reduce the potential for downgradient water quality impacts. WBI Energy has consulted with the NRCS and USFS to obtain recommendations for seed mixtures to be used in non-cropland areas during right-of-way restoration. As of January 2020, WBI Energy has received comments from one of the four NRCS offices. WBI Energy continues to consult with the NRCS and would provide any additional responses and incorporated recommendations as they are available. The current seed mixes recommended by the NRCS and USFS are identified in appendix H.

Rocky and Shallow Depth to Bedrock

Construction through soils with shallow bedrock could result in the incorporation of bedrock fragments into surface soils. The pipeline routes would cross about 12 percent (138.1 acres) of soils that contain shallow bedrock (i.e., bedrock within 60 inches of the surface). This bedrock is paralithic and

would likely be rippable using standard construction equipment (see section B.1.1 for more information regarding bedrock in the Project area). In accordance with the FERC Plan, WBI Energy would minimize the introduction of subsoil rocks/stones into agricultural topsoil by segregating and replacing topsoil. WBI Energy would also remove excess rock/stone from surface soils disturbed by construction such that the size, density, and distribution of rock on the construction right-of-way would be similar to adjacent off-right-of-way areas and would replace rock in the trench to a level not higher than the original bedrock profile.

Aboveground Facilities

The Project would require construction of one new compressor station (Elkhorn Creek Compressor Station), modifications to the Tioga Compressor Station, and construction of or modifications to measurement, delivery, receipt, and transfer stations, block valves, pig launcher and receiver facilities, and associated appurtenances. Each of these facilities would be fenced and retained for Project operations.

Construction of the proposed aboveground facilities would affect about 29.6 acres (16.5 acres for new facilities and 13.1 acres for existing facilities), of which 21.0 acres (13.3 acres for new and 7.7 acres for existing) would be retained for facility operations and permanently converted from their existing land use to developed land. Of the soils affected by these facilities, only about 14.6 acres (2.0 acres for new and 12.7 acres for existing) of the soils at the aboveground facilities are classified as farmland of statewide importance in the SSURGO database. Soils underlying the aboveground facilities would be permanently impacted, however these impacts would be highly localized and minor. Construction of the Project aboveground facilities would cause a permanent removal of available farmland soils from agricultural production; however these impacts would be minor based on the minimal acres of permanent impacts and the quantity of available prime farmland and farmland of statewide importance in the Project area. During construction, impacts on soils outside the permanent fence line at the aboveground facilities would be minimized by the implementation of the measures specified in the FERC Plan. Areas associated with aboveground facilities would be stabilized with gravel cover or maintained in an herbaceous state, therefore no permanent erosion impacts would occur.

Access Roads

Use of temporary access roads would affect approximately 54.9 acres. Ten permanent access roads (affecting approximately 3.7 acres) would be graveled or paved and retained during operation to provide access to the proposed aboveground facilities. Of these 3.7 acres, 2.0 acres would consist of new impacts associated with either a new permanent road to the extension of an existing permanent road. The remaining 1.7 acres would consist of existing roads. Use of the permanent access roads would not affect any soils considered to be prime farmland. Approximately 0.9 acres are considered farmland of statewide importance; however, this land is not currently being used for agricultural purposes. Soils underlying permanent access roads would be permanently impacted, however these impacts would be highly localized and minor. Construction of the Project permanent access roads would cause a permanent removal of available farmland soils from agricultural production; however these impacts would be minor based on the minimal acres of permanent impacts and the quantity of available prime farmland and farmland of statewide importance in the Project area.

Staging Areas

WBI Energy anticipates the need for about 189.4 acres of land for use as staging areas. None of the soils within the proposed staging areas are considered prime farmland. Of these 189.4 acres, 158.4 acres have been previously disturbed and are areas that are primarily being used for industrial or commercial uses. The remaining 31.0 acres consist of land currently being used for agricultural purposes and 21.4 of these acres are classified as farmland of statewide importance. Impacts on soils at these previously

undisturbed sites would be minimized by the implementation of the measures specified in the FERC Plan for topsoil segregation and replacement. WBI Energy would complete topsoil segregation at staging areas currently being used for agricultural purposes. Topsoil segregation would not occur at staging areas that have already been disturbed any utilized for commercial/industrial uses. After construction is complete, staging areas would be return to preconstruction uses and no permanent impacts would occur.

Inadvertent Spills or Discovery of Contaminants

Contamination from inadvertent spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils. The effects of contamination are typically minor because of the low frequency and small volumes of spills and leaks. WBI Energy and its contractor would implement the SPCC Plan to prevent and contain, if necessary, accidental spills of any material that may contaminate soils, and to ensure that inadvertent spills are contained, cleaned up, and disposed of in an appropriate manner. It is possible that unknown contaminated sites could be encountered along the pipeline routes during construction. Section B.5.3 identifies known hazardous waste sites within 0.25 mile of Project facilities. If contaminated soils or groundwater are encountered, all on-site personnel would stop work, evacuate the area, and implement the measures specified in the Plan for Unanticipated Discovery of Contaminated Environmental Media. This plan includes measures to be taken by the EI, Spill Coordinator, and construction personnel to isolate the contaminated area, notify the appropriate agencies, gather information, and monitor hazardous conditions, if possible.

No significant impacts on soils are expected as a result of this Project, given the implementation of the FERC Plan and Procedures and SPCC Plan.

2. Water Resources and Wetlands

2.1 Groundwater Resources

Existing Groundwater Resources

The Project area is underlain by sedimentary bedrock aquifers of Lower Tertiary age and by Quaternary-aged glacial outwash aquifers. The Tertiary bedrock aquifers are composed mostly of sandstone and lignite and are highly variable in horizontal extent and thickness, which make them less reliable than the overlying glacial aquifers for groundwater development. Most farms and ranches and many small communities, however, are able to obtain sufficient quantities of water from these Tertiary aquifers for most purposes, excluding large-scale irrigation due to high mineral content and insufficient water quality (Paulson, 1983).

Overlying the bedrock aquifers in the Project area are localized alluvial and glacial aquifers comprised of unconsolidated glacial deposits. These unconsolidated aquifers consist of loose beds of gravel, sand, silt, and/or clay resulting from glacial outwash deposits, and they are generally more productive and of better water quality than aquifers found in the underlying bedrock (NDSWC, 2005; Paulson, 1983). As shown in table B-5, the Project would cross three alluvial and glacial aquifers for a distance of about 9.1 miles: the Hofflund aquifer, the Tobacco Garden aquifer, and the Cherry Creek aquifer.

TABLE B-5				
Areas Underlain by Unconsolidated Glacial Aquifers ^{a, b}				
Facility/County	Aquifer Name ^b	Approximate Start Milepost	Approximate End Milepost	Miles Crossed
Tioga-Elkhorn Creek Pipeline				
Williams County	Hofflund	19.6	23.1	3.5
McKenzie County	Tobacco Garden	27.6	27.6	<0.1
McKenzie County	Tobacco Garden	29.4	31.1	1.7
McKenzie County	Tobacco Garden	31.7	32.1	0.4
McKenzie County	Tobacco Garden	36.1	37.0	0.9
McKenzie County	Tobacco Garden	39.5	39.9	0.4
McKenzie County	Cherry Creek	46.5	48.3	1.8
McKenzie County	Cherry Creek	52.1	54.5	0.4
McKenzie County	Cherry Creek	54.6	54.7	0.1
Total				9.1
^a The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends. ^b Source: NDDEQ, 2019a				

The Hofflund aquifer consists of a glaciofluvial deposit of sand and gravel overlain by alluvial sand, gravel, silt, and clay. The average aquifer thickness is approximately 45 feet. The depth to the top of the aquifer ranges from 10 to over 100 feet below the ground surface (Armstrong, 1969). The Tobacco Garden aquifer consists of a bed of alluvial material deposited along the floor of the pre-glacial Little Missouri valley. The maximum aquifer thickness ranges from 80 to 99 feet. The depth to the top of the aquifer ranges from approximately 50 to 1,000 feet below the ground surface (Croft, 1985). The Cherry Creek aquifer consists of a glaciofluvial deposit of sand and gravel underneath the portion of Cherry Creek southeast of Watford City, North Dakota. The maximum aquifer thickness is approximately 100 feet (Croft, 1985). The depth to the top of the aquifer ranges from approximately 6 to 30 feet below the ground surface (USGS, 2019d).

Water quality in the unconsolidated glacial aquifers is generally less mineralized than in the underlying bedrock aquifers; generally, the deeper the aquifer the more saline the water. The dissolved-solids concentration in the unconsolidated aquifers is commonly less than 1,000 milligrams per liter, although in many places the water is very hard and may also be high in iron and manganese. Generally, these upper aquifers are suitable for irrigation, but there are local exceptions based on water quality, crop, and soil type (Paulson, 1983).

Designated Sole Source Aquifers and Wellhead Protection Areas

The U.S. Environmental Protection Agency (EPA) oversees the Sole Source Aquifer Protection Program to protect high production aquifers that supply 50 percent or more of the region’s water supply and for which there are no reasonably available alternative drinking water sources should the aquifer become contaminated. There are currently no designated sole source aquifers in North Dakota (EPA, 2019a). Further, based on a review of maps prepared by the NDDEQ, there are no wellhead protection areas within 0.25 mile of the construction workspace (NDDEQ, 2019b). Therefore, the Project would have no effect on wellhead protection areas.

Public and Private Water Supply Wells

Groundwater is the most common source of domestic water in North Dakota (NDSWC, 2005). According to the NDSWC well permit database and online map system, there are no water supply wells within 150 feet of the Project footprint (NDSWC, 2019). WBI Energy also recorded the location of private wells identified during civil surveys and through landowner interviews. One private livestock watering well was identified within 150 feet of the proposed Project footprint. This well is about 30 feet from MP 25.8 of the Tioga-Elkhorn Creek pipeline.

Based on a review of USGS topographic maps and conversations with landowners, WBI Energy identified two springs near MP 12.1 of the Tioga-Elkhorn Creek pipeline. The exact location of these springs is not currently known; however, WBI Energy would coordinate with the landowners to identify these springs prior to construction. If these springs are within 150 feet of the proposed workspace, WBI Energy would clearly demarcate the spring using orange construction fencing. No blasting is anticipated to be required for the Project; therefore, impacts on springs are not anticipated.

Contaminated Groundwater

The primary potential sources of groundwater contamination in the vicinity of the Project are related to agricultural activities, including the leaching of pesticides, herbicides, and fertilizers into underlying aquifers. Other possible sources of groundwater contamination in the area include cattle feedlots, municipal landfills, septic tanks, sewage lagoons, oil wells, and leaking underground storage tanks (Paulson, 1983). On-site septic systems are the primary form of waste water treatment in rural North Dakota. WBI Energy preferentially routed the pipelines to avoid residences, thereby minimizing potential impacts on farm and ranch septic systems. The pipeline routes would pass within 500 feet of residences at 11 locations near MPs 22.4, 23.0, 28.1, 30.3, 38.9, and 54.8 of the Tioga-Elkhorn Creek pipeline; MPs 8.0, 10.9, 11.6, and 19.4 of the Line Section 25 Loop; and MP 5.1 of the Line Section 30 Loop. In all instances, the pipelines would be greater than 350 feet from the nearest farmstead or residence. It is not anticipated that construction activity would affect active septic systems; however, WBI Energy would coordinate with the landowners in these 11 locations during construction to ensure no impacts occur. In the unforeseen instance that an active septic system is impacted by Project construction, WBI Energy would repair the system to its previous condition or better.

Based on a review of aerial photographs and field surveys, no livestock feedlots, municipal landfills, sewage lagoons or contamination due to oil and gas development would occur within 0.25 mile of the Project workspace. Additional information on hazardous waste sites and potential groundwater contamination can be found in section B.5.3.

Impacts and Mitigation

Construction of the pipeline would generally require the excavation of a trench that would typically be 6 feet in depth, with the exception of short stretches under streams, roads, utilities, foreign pipelines or areas crossed by HDD or guided bore, which would require a deeper trench. Water collected in trench excavations would be removed as necessary during construction activities. WBI Energy would discharge trench dewatering to upland areas as outlined in the FERC Plan and Procedures. With implementation of these measures, no adverse impacts on groundwater, water wells, or aquifers from trench excavation activities are anticipated.

WBI Energy's SPCC Plan contains specific construction measures to protect groundwater resources, soils, and wetlands from spills of fuels, oils, and other hazardous fluids. The SPCC Plan contains measures for refueling, storage, handling, containment, and cleanup of fuels, oils, and other hazardous fluids. In addition, WBI Energy would prohibit refueling activities and storage of hazardous liquids within at least a 200-foot radius of all private wells and at least a 400-foot radius of all municipal or community water supply wells. Refueling activities would be restricted to designated areas in accordance with the requirements of the FERC Procedures and WBI Energy's SPCC Plan. If WBI Energy encounters contaminated groundwater during construction, it would follow the procedures within the Plan for Unanticipated Discovery of Contaminated Environmental Media. Work in the area of contamination would be halted until the applicable agencies are notified and the extent of contamination is determined. As discussed in section B.5.3 there are multiple potentially contaminated sites located within 0.25 of the Project. While the extent of contamination of these sites in relation to the Project area is unknown, with the implementation of the measures identified in the Unanticipated Discovery of Contaminated Environmental Media impacts are not anticipated.

For known active wells and any additional active wells identified within 150 feet of construction work areas, WBI Energy would conduct preconstruction and post-construction water quality and yield testing and/or sampling to verify that Project construction does not permanently affect water wells. WBI Energy would obtain landowner or municipality permission prior to testing. WBI Energy would analyze any damaged well or water supply system (including changes in water quality or yield) and perform the necessary repairs and/or modifications to return it to its former capacity as determined by testing and/or sampling. In the event that a private well or water supply system is damaged beyond repair due to construction-related activities, WBI Energy would provide for a temporary water source and replace the well as necessary. Within 1 year of the completion of construction, WBI Energy would file a report identifying all potable water supply systems damaged by construction and how they were repaired. With implementation of these measures, it is anticipated that Project-related impacts on groundwater resources would be temporary and insignificant.

2.2 Surface Water Resources

Watersheds are classified by regions that drain into the same river system, which can be defined by topography. Many smaller watersheds (also known as sub-basins and sub-watersheds) are contained within larger watersheds. The Project is located entirely within the Missouri River Watershed and within two sub-basins; the Lower Little Missouri River (Hydrologic Unit Code [HUC] 10110205) and Lake Sakakawea (HUC 10110101).

Based on review of USGS mapping, aerial photography, and WBI Energy's field investigations to-date, the Project would involve 26 waterbody crossings, consisting of 11 perennial streams, 10 intermittent streams, 2 ephemeral stream, and 3 open water ponds. Information on each of the waterbodies crossed by the Project, including name, water quality classification, flow regime, crossing width, and crossing method, is provided in table B-6. Waterbodies that were not surveyed due to a lack of survey permission, or route adjustments that occurred after the end of the 2019 survey season, are referred to in the Feature ID column of table B-6 as National Hydrography Dataset (NHD); waterbody characteristics for these features are based on the NHD and/or recent aerial photography.

TABLE B-6

Waterbodies Crossed by the Pipeline Routes^a

Approximate Milepost	Feature ID	Waterbody Name ^b	Waterbody Classification ^c	Flow Regime ^d	Width (feet) ^e	Crossing Method ^f
Tioga to Elkhorn Creek						
0.7	s-wm-ea-001p	Unnamed tributary to Paulson Creek	Class III	PN	38	Open Cut
2.2	s-wm-ea-002	Unnamed tributary to Dry Fork Creek	Class III	PN	<10	Open Cut
12.1	s-wm-ee-001	Unnamed tributary to Beaver Creek	Class III	PN	7	Open Cut
18.1	s-wm-eb-002	Beaver Creek	Class III	PN	<10	Guided Bore
24.3	s-wm-eb-003p	Lake Sakakawea	Class I	PN	12,560	HDD
25.5	o-mk-ee-001	Natural Pond	Class 4	NA	34	HDD
27.0	s-mk-eb-001	Unnamed tributary to Sand Creek	Class III	E	<10	Open Cut
27.3	s-mk-ea-001	Unnamed tributary to Sand Creek	Class III	E	<10	Open Cut
30.0	s-mk-eb-002	Tobacco Garden Creek	Class III	PN	40	Guided Bore
36.2	s-mk-ea-003	Tobacco Garden Creek	Class III	PN	46	Guided Bore
39.0	s-mk-ea-002	Unnamed tributary to Tobacco Garden Creek	Class III	IT	<10	Open Cut
39.7	DSK_NHD_8 ^g	Unnamed tributary to Tobacco Garden Creek	Class III	IT	<10	Open Cut
40.1	DSK_NHD_7 ^g	Unnamed tributary to Tobacco Garden Creek	Class III	IT	<10	Open Cut
44.6	DSK_NHD_11 ^g	Timber Prong Creek	Class III	IT	<10	Open Cut
44.7	DSK_NHD_5 ^g	Timber Prong Creek	Class III	IT	<10	Open Cut
51.3	s-mk-eb-005	Northfork Creek	Class III	IT	<10	Guided Bore
52.1	DSK_NHD_4 ^g	Cherry Creek	Class III	PN	20	Guided Bore
54.5	NHD ^g	Unnamed tributary to Sevenmile Creek	Class III	IT	<10	Open Cut
54.6	DSK_NHD_3 ^g	Unnamed tributary to Sevenmile Creek	Class III	IT	<10	Open Cut
55.3	DSK_NHD_12 ^g	Sevenmile Creek	Class III	IT	20	Open Cut
57.5	DSK_NHD_2 ^g	Unnamed tributary to Sevenmile Creek	Class III	IT	<10	Open Cut
Line Section 25 Loop						
13.5	s-bk-eb-001p	White Earth Creek	Class III	PN	28	Guided Bore
Line Section 30 Loop						
7.2 ^h	s-wm-ea-002	Unnamed tributary to Dry Fork Creek	Class III	PN	<10	Open Cut
8.8 ^h	s-wm-ea-001p	Unnamed tributary to Paulson Creek	Class III	PN	38	Open Cut
Tioga Compressor Station						
NA	o-wm-eb-001	Man-made pond ⁱ	Class 4	NA	NA	N/A
Staging Areas						
Enget Yard	o-mt-ee-001	Man-made pond ^j	Class 4	NA	NA	N/A

TABLE B-6 (cont'd)

Waterbodies Crossed by the Pipeline Routes^a

a	Based on the following data: Project field surveys to date, USGS mapping, NHD data, the NDSWC's GIS data viewer, and review of aerial photographs.
b	Waterbody names are based on USGS topographic maps.
c	See the following sections for category definitions (source: NDDEQ, 2019c). None of the Class III streams are specifically identified in the Stream Classifications Table located in appendix I of the NDDEQ Standards of Quality for Waters of the State, and are classified as Class III as a default based on specifications included in that appendix.
d	Based on field surveys, NHD designations, and/or aerial photography interpretation for unmapped streams: IT = Intermittent PN = Perennial E = Ephemeral (USACE, 2012) NA = Not applicable
e	Approximate width based on field surveys and/or estimated from aerial photography. Where NHD data have been used to supplement areas where surveys are not complete an assumed <10 feet wide has been used for all intermittent NHD features.
f	Open Cut = If the waterbody has no flow at time of construction, the crossing would be installed using the open-cut method. If the waterbody has perceivable flow at the time of construction, the waterbody would be crossed using either the guided bore crossing method or a dry crossing method (flume or dam-and-pump) based on site-specific conditions. See section A.7.2 for a detailed description of each crossing method.
g	Survey permission has not been granted in this area or a reroute occurred after the end of the 2019 survey season; information provided is based on NHD data.
h	Overlaps with the Tioga-Elkhorn Creek pipeline.
i	Waterbody consists of a man-made pond to address stormwater permitting requirements at the Tioga Compressor Station. The final location of this pond would likely change after final engineering of the compressor station is complete.
j	Waterbody consists of a man-made pond which would be avoided and fenced off during use of the yard.

Sensitive Waterbodies

Section 303(d) of the Clean Water Act requires that each state review, establish, and revise water quality standards for the surface waters within the state. States develop monitoring and mitigation programs to ensure that water standards are attained and designated. Waters that fail to meet their designated beneficial use(s) are considered impaired and are listed under a state's 303(d) list of impaired waters. The Project crosses one waterbody, Lake Sakakawea, which is listed in North Dakota's 2018 Integrated Section 305(b) Water Quality Assessment Report and Section 303(d) List of Waters Needing Total Maximum Daily Loads.

As discussed in section A.1.2, water quality is one of the congressionally authorized purposes of the USACE Garrison Project. Water quality in Lake Sakakawea must comply with the State of North Dakota's standards for a Class 1 lake. The USACE has a water quality monitoring program in place. The Garrison Project has identified silt control; soil erosion prevention; pollution abatement; adequate and safe municipal water supplies; improving quality of water for irrigation; provision of water suitable for domestic, sanitary, and industrial purpose; and improving clarity of water for recreation and for fish and wildlife as means of maintaining and improving water quality (USACE, 2007).

WBI Energy would cross Lake Sakakawea and a small natural pond using the HDD crossing method. With implementation of this crossing method, and adherence to the mitigation measures set for in the FERC Plan and Procedures, SPCC Plan, and HDD Plan, impacts on sensitive waterbodies would be adequately minimized.

Surface Water Intakes and Surface Water Protection Areas

As discussed in section A.1.2, water supply is one of the congressionally authorized purposes of the USACE Garrison Project. In 2007, according to the USACE, the cities of Garrison, Parshall, Pick City, and Riverdale, along with three industrial water systems, were obtaining water from Lake Sakakawea or Garrison Dam's penstocks for industrial and municipal uses. Additionally, 19 communities and 186 homes located close to the lake had water supply intakes for withdrawing water from Lake Sakakawea (USACE, 2007). According to water permits on file with the NDSWC, there are no potable surface water intakes within 3.0 miles downstream of the pipeline routes. The nearest surface water intake is a rural water permit for the Paradise Point Association. This permit is located approximately 2.8 miles upstream from the northern Lake Sakakawea HDD entry point (NDSWC, 2019).

The North Dakota Source Water Protection Program has three federally mandated program elements for public water systems including: (1) the delineation of a wellhead protection area or source water protection area based on existing hydrogeologic and geologic information; (2) a contaminant source inventory, which identifies the presence and location of sources or activities within the protection area that may contaminate groundwater or surface water; and (3) a susceptibility analysis that determines the susceptibility (ranking) of the public water systems wells or intakes to contamination by sources inventoried within the protection area (NDDEQ, 2019b). Based on the review of the source water protection status list of North Dakota's public water systems, no surface water-dependent communities, non-transient non-communities, or transient non-community systems exist within the Project area (NDDEQ, 2019b). WBI Energy would not divert or appropriate water from the Missouri River during Project construction or operation; therefore, the Project would not have any impacts on the reservoir water capacity.

General Impacts and Mitigation

WBI Energy has routed the pipeline facilities to avoid and minimize the number of stream crossings to the extent practicable. Pipeline construction activities that potentially could affect water resources include clearing and grading, pipeline installation across waterbodies, HDD and guided bore crossings, hydrostatic testing, and potential spills or leaks of hazardous materials. Pipeline construction can affect surface waters in several ways, including modifying the existing aquatic habitat, increasing runoff and the rate of in-stream sediment loading, and increasing turbidity levels. The clearing and grading of the waterbody banks, in-stream trenching and backfilling, and trench dewatering associated with non-HDD/guided bore crossings would disturb the riparian vegetation and soils, exposing the site(s) to erosion. It could also introduce sediment directly or indirectly into the water column. The Hartels provided comments about potential impacts on surface waters, with specific concerns regarding Cherry Creek. WBI Energy proposes to use various waterbody crossing techniques including open-cut, guided bore, and HDD. WBI Energy would cross Cherry Creek using the guided bore method. The use of the dry crossing method is not currently proposed at any waterbodies, but would be used if site-specific conditions at the time of construction prevent the use of the open-cut method.

WBI Energy states that it would avoid, minimize, or mitigate impacts on surface waters in accordance with the FERC Plan and Procedures. To minimize impacts, WBI Energy would implement measures to limit the effects of clearing and grading, in-stream trenching, trench dewatering, and backfilling operations on aquatic habitats. WBI Energy would implement the measures in its SPCC Plan to prevent a potential inadvertent release of contaminants into waterbodies due to spills. Additionally, construction activities at waterbody crossings would comply with other federal, state, and local regulations and permit requirements.

As shown in table B-6, WBI Energy proposes 16 open-cut and 8 HDD or guided bore waterbody crossings during Project construction. WBI Energy anticipates that most of the intermittent and ephemeral streams crossed by the Project would have no or low flows at the time of construction. This would avoid or minimize the potential for increased turbidity within waterbodies as well as potential impacts on fisheries. If at the time of construction there is flow present at waterbodies currently proposed to be crossed using the open-cut method, either a guided bore or dry crossing would be used. No waterbodies with flowing water at the time of construction would be crossed using the open-cut crossing method.

WBI Energy would complete in-stream construction activities within 24 hours for minor waterbodies and 48 hours for intermediate waterbodies, unless site-specific conditions (such as unusually high water flows or hard bedrock substrate) make completion within these time frames impractical. To minimize sedimentation during construction across flowing waterbodies, WBI Energy would place silt fences and/or straw bales around the spoil piles to prevent spoil from flowing into the waterbody.

Once the pipe is placed in the trench, the excavated spoil would be replaced in the trench, and the stream banks and streambed would be restored as close as practicable to their preconstruction contours. WBI Energy would implement additional measures, such as the installation of erosion control blankets, as necessary, to stabilize the bed and banks of the waterbody. During final restoration, stream banks and riparian areas would be revegetated using appropriate seed mixes to further stabilize the banks.

Additional measures WBI Energy would implement to minimize the impacts of construction at stream crossings would include but not be limited to the following:

- locating workspace at least 50 feet away from the waterbody (except as indicated in table A-4);
- storing chemicals and lubricating, washing, or refueling equipment in designated areas greater than 100 feet from the waterbody at stream crossings;
- mixing concrete at a distance greater than 100 feet from a river, stream bank, or any area where contamination from concrete may reach a water course or wetland; and
- monitoring spoil pile placement and erosion control devices during construction across streams.

WBI Energy would use the HDD or guided bored method to install the pipeline beneath Lake Sakakawea, a small natural pond, Beaver Creek, Tobacco Garden Creek (two crossings), Northfork Creek, Cherry Creek, and White Earth Creek. Use of the HDD or guided bore method would avoid direct impacts on the bed and banks of these waterbodies; however, a temporary, localized increase in turbidity could occur in the event of an inadvertent release of drilling fluid. To minimize potential impacts of inadvertent releases of drilling fluids, WBI Energy would implement the measures identified in its HDD Plan. In the event of an inadvertent release of drilling fluid to surface waters, WBI Energy would contain the release to the extent practical. Where feasible, underwater releases would be collected using pumps. In wetlands, the drilling fluid would be contained using hand-placed barriers (e.g., hay bales, sand bags) and collected using pumps. If the amount of any drilling fluid release within a waterbody or wetland exceeds that which could be practically contained and collected, drilling operations would be suspended until the release is controlled. In the event that an HDD or guided bore cannot be completed, WBI Energy would implement a contingency plan for the crossing, such as abandoning the drill hole, drilling along a new path, or utilizing an alternate crossing method subject to agency review and any required permits or approvals.

During the HDD crossing of Lake Sakakawea, the primary method for monitoring for a potential inadvertent release would be through the instrumentation in the drilling rig monitoring annulus mud pressure and flowrates. If these gauges indicate a loss of return, then either a drone would be used to view the water surface for turbidity or a small boat would be launched from a dedicated boat ramp to view surface conditions. No impacts on surface waters would occur from these monitoring activities. Additionally, no guide wires would be used during construction of the Lake Sakakawea HDD.

Dewatering of the pipeline trenches may require pumping of groundwater in areas where the water table is high. During construction, WBI Energy would discharge water removed from excavations by directing it to upland vegetated land surfaces (where available) to control erosion and runoff. If adequate vegetation is not present, water would be filtered through appropriate dewatering structures.

The Hartels provided comments on the need for a Stormwater Pollution Prevention Plan for the Project and that it should be the responsibility of FERC inspectors to enforce the requirements of the plan. Prior to construction, WBI Energy would obtain authorization under North Dakota's General Permit for Construction Stormwater Discharge for the Project under the National Pollutant Discharge Elimination System and prepare a Project Stormwater Pollution Prevention Plan as required. **[Placeholder for FERC to discuss FERC inspection process.]**

As shown in table A-4, WBI Energy is requesting a modification from section V.B.2.a of our Procedures to allow ATWS areas within 50 feet of waterbodies at site-specific locations. We have reviewed these requested modifications **[placeholder for FERC conclusion].**

With the implementation of the FERC Plan and Procedures, WBI Energy's SPCC Plan, and HDD Plan, as well as compliance with the conditions of USACE crossing and other permits, the Project's impacts on surface water resources would be minor and temporary.

Blasting

According to the soils data provided by the USDA, there are no streams with shallow bedrock that would likely require blasting during construction. In the unlikely event that hard bedrock is encountered during construction, WBI Energy would implement the Project Blasting Plan, which includes measures to mitigate the effects of in-water blasting.

Water Use

Water use for the Project would primarily consist of hydrostatic testing of the pipe, dust control, HDD/guided bore drilling fluid, and operational water needs. Pursuant to USDOT regulations (49 CFR 192), WBI Energy would verify the integrity of the pipeline facilities by conducting hydrostatic testing prior to placing them into service. This testing would involve filling the pipelines with water, pressurizing it, and then checking for pressure losses due to pipeline leakage. WBI Energy anticipates testing the pipeline facilities in segments as shown in table B-7.

TABLE B-7				
Estimated Construction Water Volume Requirements				
Pipeline Hydrostatic Test Segment	Hydrostatic Testing (gallons)	HDD and Guided Bore Drilling Fluid (gallons)	Dust Suppression (gallons)	Water Source ^a
Tioga-Elkhorn Creek ^b	3,042,000	2,000,000	4,800,000	Water depot and/or surface waters
Line Section 25 Loop	627,000	151,000	475,000	Water depot and/or surface waters
Line Section 30 Loop	388,000	57,000	260,000	Water depot and/or surface waters
Tioga Compressor Lateral	50,400	0	8,500	Water depot and/or surface waters
Lake Sakakawea HDD	663,000	1,000,000	0	Water depot and/or surface waters
Uprate Line Section 25	141,000	25,000	16,000	Water depot and/or surface waters
Subtotal	4,911,400	3,233,000	5,559,500	
TOTAL	13,703,900			
^a	If WBI Energy determines that it is necessary to obtain water from surface water sources for hydrostatic testing it would obtain any required permits or approvals in accordance with state regulations and FERC requirements.			
^b	The Tioga-Elkhorn Creek pipeline is anticipated to be tested in a minimum of three sections.			

As shown in table B-7, WBI Energy would obtain approximately 13.7 million gallons of water from local water depots or surface waters in accordance with state regulations for a combination of hydrostatic testing of the pipelines, HDD and guided bore drilling fluid, and dust control. Although not proposed at this time, if WBI Energy determines it would be necessary to pipe water to the right-of-way in lieu of transporting it via truck, it would provide site-specific information and any associated impacts in a supplemental filing to FERC. Of these 13.7 million gallons, about 4.9 million would be required for hydrostatic testing. Depending on the source of water, WBI Energy may use dechlorination tablets to treat water prior to testing. The test segments and smaller test sections would be filled from the identified water depots by a pump with pressure recorders, gauges, and bi-directional filling pigs. After successfully testing each segment or section, the pipeline would be dewatered or the test water would be moved or cascaded into the next section of the pipeline. To minimize water withdrawals, WBI Energy anticipates cascading water between test segments and sections, where feasible, to reuse as much water from prior test segments as possible. WBI Energy would dewater the hydrostatic test water into a well-vegetated upland area with appropriate erosion control devices in accordance with the FERC Plan and Procedures and applicable permits. WBI Energy would utilize diffusers, sediment control devices, and other energy dissipating devices to minimize the potential for scour in waterbodies to which test water is discharged and to prevent erosion from discharges that occur in upland areas.

Estimates provided in table B-7 for dust suppression assume that WBI Energy would only use water in areas where stringing, welding, coating, ditching, and backfilling are taking place. The following additional assumptions are included in the estimated volumes.

- Elkhorn Creek-Tioga pipeline—Two construction spreads working concurrently during construction. WBI Energy would use water to spray only the working side of the right-of-way (70 feet). The spoil dirt side of the right-of-way would not be sprayed. Assumes 70 days of construction would require dust suppression.

- Line Section 25 Loop—One construction spread. WBI Energy would use water to spray only the working side of the right-of-way (50 feet). The spoil dirt side of the right-of-way would not be sprayed. Assumes 45 days of construction would require dust suppression.
- Line Section 30 Loop—One construction spread. WBI Energy would use water to spray only the working side of the right-of-way (50 feet). The spoil dirt side of the right-of-way would not be sprayed. Assumes 25 days of construction would require dust suppression.
- Uprate Line Section 25—One construction spread. Assumes 10 days of construction would require dust suppression.

Project operational water needs would be limited to the Tioga Compressor Station and Elkhorn Creek Compressor Station. The source of water at the Tioga Compressor Station is a commercial service provided by R&T Water Supply Commerce Authority. Average water usage during 2019 was approximately 150 gallons/month. During operation of the Project, this average is expected to increase to 450 gallons/month under normal operations given the additional staff, buildings, and equipment to maintain. The new Elkhorn Creek Compressor Station would receive water from the McKenzie County Rural Water District. The water usage under normal operations is expected to be 150 gallons/month.

Irrigation

As discussed in section A.1.2, irrigation is one of the congressionally authorized purposes of the USACE Garrison Project. The USACE authorized the Garrison Diversion Unit in 1965 with the purpose of diverting Missouri River water to central and eastern North Dakota for irrigation, water supply (industrial and municipal), fish and wildlife conservation, flood control, and recreation. Construction of the Garrison Diversion Unit was started in 1967. Various projects have been completed (including the Snake Creek Pumping Plant, New Rockford Canal, and McClusky Canal) as part of the Garrison Diversion Unit. Additionally, over 30 agricultural irrigation water systems have intakes for withdrawing water from Lake Sakakawea (USACE, 2007).

Project construction and operation would not divert or appropriate water from the Missouri River; therefore, the Project would not affect the lake water volumes. Based on field surveys and discussions with landowners, the Project would not cross or affect any irrigation systems or directly affect any water diversions or irrigation systems. Should any systems be affected during construction, WBI Energy states that it would restore/repair any damaged systems in accordance with the FERC Plan.

Flood Control

As discussed in section A.1.2, flood control is one of the congressionally authorized purposes of the USACE Garrison Project. The Garrison Project is approximately 75 miles upstream from Bismarck, North Dakota at river mile 1,389.9. Lake Sakakawea is one of six major reservoirs on the Missouri River created in effort to minimize annual flooding on adjacent river lowlands. The maximum storage capacity of the lake reaches 1,854.0 feet mean sea level (24,200,000 acre-feet). As of September 2005, the Missouri River main stem dams (including the Garrison Project) had prevented over \$30 billion in flood damages, \$9 billion of which is directly attributed to the Garrison Project (USACE, 2007).

The proposed Project will be reviewed by the USACE Floodplain office for its compliance with EO 11988 as part of the USACE permitting process. **[Placeholder for findings from review here].**

The proposed pipeline would be installed under the Missouri River floodplain using the HDD intersect method as described in section A.7.2. The northern entry side would be about 750 feet from the

shoreline at an elevation of about 1,850 feet. The southern entry side would be approximately 2,000 feet from the shoreline at an elevation of about 1,925 feet. As described in section B.1.1, based on the geotechnical information available to date, stress analysis, and model results, the feasibility study determined that the proposed HDD would be geometrically feasible. WBI Energy would implement its HDD Plan to minimize the potential for an inadvertent returns of drilling fluid and outline mitigation measures if a return were to occur. No aboveground structures would be installed within the floodplain. Project construction and operation would not affect floodplain elevations, river flows, or flood storage capacities. Additionally, project construction and operation would not affect the occupancy of the floodplain nor would it result in modifications to the floodplain or promote floodplain development.

2.3 Wetlands

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of wetland vegetation adapted for life in saturated soil conditions. Wetlands can be a source of substantial biodiversity and serve a variety of functions that include providing wildlife habitat, recreational opportunities, and flood control, and naturally improving water quality.

Existing Wetland Resources

Representatives of WBI Energy conducted a wetland delineation survey between June and October 2019. The survey examined about 84.3 miles (90 percent) of the proposed pipeline routes as well as the proposed aboveground facilities, access roads, and yards. Approximately 8.9 miles (10 percent) of the pipeline routes and some additional access roads and yards were not examined due to lack of survey permission from landowners or as a result of route variations identified after the conclusion of the 2019 field season. Wetlands potentially present on those portions of the pipeline right-of-way where survey has not been completed were identified using digital data from the National Wetlands Inventory (NWI). Based on the field surveys and NWI data, the Project would affect 32 wetlands encompassing a combined 5.2 acres. In total, approximately 2,993 linear feet of wetlands would be crossed by the pipeline centerlines. The wetland classifications, milepost locations, crossing lengths, and acreage of wetland that would be affected by construction and operation of the Project are provided in appendix I.

All of the wetlands that would be crossed by the pipeline are classified as palustrine emergent wetlands. Cowardin et al. (1979) describes palustrine emergent wetlands by erect, rooted, herbaceous hydrophytes not including mosses and lichens. Dominant vegetation in the emergent wetlands in the Project area includes *Bromus* spp., *Brassica* spp., *Alopecurus* spp., *Carex* spp., *Juncus* spp., and *Rumex* spp. Other hydrophytic vegetation such as: water smartweed (*Persicaria amphibian*), narrowleaf cattail (*Typha angustifolia*), alkali plantain (*Plantago eriopoda*), common threesquare (*Schoenoplectus pungens*), spike-rush (*Eleocharis palustris*), green bulrush (*Scirpus atrovirens*), stinging nettle (*Urtica dioica*), foxtail barley (*Hordeum jubatum*), marsh arrowgrass (*Triglochin palustris*), three-way sedge (*Dulichium arundinaceum*), and marsh skullcap (*Scutellaria galericulata*) were also observed during field surveys.

FWS Wetland Easements

A number of private parcels in the vicinity of the proposed pipeline routes are subject to wetland easements obtained by the FWS under regulations described at 16 USC 668dd(c). The easements define permanent agreements between the FWS and all present and future landowners to protect wetland basins within the easements in perpetuity. WBI Energy coordinated with the FWS and incorporated several route variations into the proposed route to avoid or minimize crossings of wetland easements.

The FWS advised WBI Energy that its interests in wetland easements are limited to individual wetland basins as opposed to the entire area within the easements. Ground-disturbing activities which affect protected wetland basins within easements are prohibited without prior approval of the FWS. Such

activities are subject to review by FWS staff to determine if they are appropriate and compatible with the objectives of the easement program and require a special use permit/right-of-way grant if they are found to be compatible. Ground-disturbing activities that do not affect protected wetland basins within easements are not subject to review by the FWS.

The FWS provided WBI Energy with maps depicting locations of protected wetland basins within the wetland easements crossed by the proposed pipeline. WBI Energy made route adjustments to avoid all of the wetland basins within the FWS easements. As shown in table B-8, the proposed pipeline would cross wetland easements at seven locations but would not cross any protected basins within those easements. If any route changes were to occur that would affect wetland basins within FWS easements, WBI Energy would submit a request for compatibility determinations for these crossings to the FWS.

TABLE B-8		
U.S. Fish and Wildlife Service Wetland Easements Crossed by the Pipeline Routes		
Pipeline Facility/Approximate Starting and Ending Mileposts	Length of Easement Crossing (miles)	Number of Protected Basins Within the Crossing
Line Section 25 Loop		
0.6 to 1.6	1.0	0
5.2 to 5.8	0.6	0
18.8 to 20.4	1.6	0
Line Section 30 Loop		
0.5 to 1.0	0.5	0
Uprate Line Section 25		
NA (Bore 1)	<0.1	0
NA (Bore 2)	<0.1	0
NA (Bore 4)	<0.1	0
Total	3.7	0

Impacts and Mitigation

WBI Energy developed the proposed route with the intention of avoiding wetlands where possible. WBI Energy would construct wetland crossings in accordance with the FERC Procedures and any measures that may be identified in state and USACE crossing permits. Construction impacts in wetlands typically would be limited to a 75-foot-wide corridor. In most cases, WBI Energy has sited ATWS areas at least 50 feet from wetlands in accordance with the FERC Procedures; exceptions in site-specific areas are identified in table A-4. To minimize impacts on these wetland resources that would not be directly affected by the Project, but would be in close proximity to construction activities, WBI Energy would install double row silt fence to prevent sedimentation into adjacent wetlands and would not conduct refueling operations within 100 feet of these wetlands. Project construction and operation would not permanently convert any wetlands to uplands.

WBI Energy would stabilize the working side of the construction right-of-way with timber mats or travel pads, as necessary, to provide a firm surface for construction equipment. Where the pipeline trench may drain a wetland, WBI Energy would place trench plugs in the trench to maintain the original wetland hydrology. Exposed soil in wetland areas would be restored in accordance with the FERC Procedures as well as any requirements that may be identified in state and USACE crossing permits.

WBI Energy would install silt fence, straw bales, or other appropriate sedimentation control devices at the edges of the construction right-of-way in areas where spoil may flow into undisturbed areas of

wetland to prevent sediment migration. Topsoil over the trenchline would be segregated and stockpiled separately from subsoil (except in areas of standing water or saturated soils). The trench would be backfilled with subsoil and the topsoil would be replaced at the time of construction in accordance with the FERC Procedures. Contours in wetlands would be restored as near as practicable to preconstruction conditions.

WBI Energy would implement restoration, monitoring, and maintenance programs for wetlands along the pipeline as described in the FERC Procedures and would comply with the conditions of the USACE crossing permits. Wetlands would be allowed to revegetate naturally in accordance with the FERC Procedures. Following restoration, WBI Energy would monitor disturbed areas in accordance with the FERC Procedures until revegetation is successful.

To facilitate periodic pipeline corrosion/leak surveys, a corridor up to 10 feet in width centered on the pipeline would be maintained in an herbaceous state. In addition, trees within 15 feet of the pipeline and greater than 15 feet in height would be selectively cut and removed from the permanent right-of-way. Vegetation maintenance activities during pipeline operation would affect less than 1 acre of palustrine emergent wetlands.

As shown in table A-4, WBI Energy is requesting a modification from section VI.B.a of our Procedures to allow ATWS within 50 feet of wetlands at site-specific locations. We have reviewed these requested modifications [placeholder for FERC conclusion].

The primary effect of Project construction and operation activities on wetlands would be alteration of wetland vegetation. In emergent wetlands, the impact of construction on vegetation is anticipated to be relatively short term and minor, because the herbaceous vegetation is expected to regenerate within 2 to 3 growing seasons.

As discussed above, the Project would have temporary impacts on wetlands and would not result in any permanent impacts on wetlands. The implementation of mitigation measures outlined in the FERC Plan and Procedures would minimize wetland impacts and help ensure the successful restoration of wetland areas. We conclude that temporary wetland impacts would [placeholder for FERC conclusion] by WBI's implementation of mitigation measures and, therefore, [placeholder for FERC conclusion].

3. Vegetation, Fisheries, and Wildlife

3.1 Vegetation

Construction of the proposed Project facilities would occur in the Missouri Coteau and Missouri Slope geographic regions of North Dakota. The Missouri Coteau extends from the Missouri River to the western edge of the Drift Prairie Region. Characteristics of these regions include numerous wetlands, particularly on the eastern edge, decreasing toward the Missouri River and irregular topography comprised of layers such as sandstone and shale. Land use in these regions is dominated with agricultural farming and livestock ranching (North Dakota Game and Fish Department [NDGFD], 2016a).

Project construction and operation would affect four general vegetation cover types: agricultural land, open land (non-native grassland), open land (native grassland), and forested land. Forested land is limited in North Dakota and is primarily found in riparian zones, which are areas between waterbodies and adjacent upland (NDGFD, 2016a). Forest land, which includes hedgerows, forested wetlands, and upland tree stands, comprises less than 1 percent of the Project area. Developed land, which supports only limited vegetation such as grasses or other maintained cover, is not discussed in this section. Our discussion of specific wetland types and impacts is found in section B.2.3. Table B-9 summarizes Project-related impacts on vegetation cover types in the Project area.

Table B-9

Vegetation Types Affected by Construction and Operation of the Project (acres)^a

Facility	Agricultural Land ^b		Open Land (Non-Native Grassland) ^c		Open Land (Native Grassland) ^d		Forested Land ^e		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
Pipeline Facilities										
Tioga-Elkhorn Creek	466.8	233.9	125.8	66.9	43.2	26.0	2.0	1.1	606.4	308.1
Elkhorn Creek-Northern Border Lateral	2.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0	2.8	1.4
Line Section 25 Loop	119.7	79.6	41.4	27.8	4.6	2.9	0.0	0.0	161.1	107.4
Line Section 30 Loop	71.1	47.4	9.0	5.9	0.0	0.0	0.0	0.0	80.1	53.3
Tioga Compressor Lateral	1.5	1.0	0.1	0.1	0.0	0.0	0.0	0.0	1.6	1.1
Uprate Line Section 25	0.7	0.5	1.5	1.3	0.0	0.0	0.0	0.0	2.2	1.8
Subtotal	662.6	363.8	177.8	102.0	47.8	28.9	2.0	1.1	854.2	473.1
ATWS										
Tioga-Elkhorn Creek	52.0	0.0	11.4	0.0	5.7	0.0	0.1	0.0	63.5	0.0
Line Section 25 Loop	17.8	0.0	7.7	0.0	0.3	0.0	0.0	0.0	25.5	0.0
Line Section 30 Loop	8.3	0.0	0.7	0.0	0.0	0.0	0.0	0.0	9.0	0.0
Tioga Compressor Lateral	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Uprate Line Section 25	3.2	0.0	6.9	0.0	0.0	0.0	0.0	0.0	10.1	0.0
Subtotal	81.4	0.0	26.8	0.0	6.0	0.0	0.1	0.0	108.3	0.0
Staging Areas										
Boehm Staging Yard	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	5.9	0.0
Weflen Staging Yard	17.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.3	0.0
68th Street Yard	14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2	0.0
CRS Yard	9.7	0.0	11.7	0.0	0.0	0.0	0.0	0.0	21.4	0.0
Delta Contractors Yard	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.1	0.0
Enget Yard	0.0	0.0	38.7	0.0	0.0	0.0	0.0	0.0	38.7	0.0
Flatlands Yard 1	4.2	0.0	0.4	0.0	0.0	0.0	0.0	0.0	4.7	0.0
Flatlands Yard 2	0.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.7	0.0
Lobell Yard	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0

Table B-9 (cont'd)										
Vegetation Types Affected by Construction and Operation of the Project (acres) ^a										
Facility	Agricultural Land ^b		Open Land (Non-Native Grassland) ^c		Open Land (Native Grassland) ^d		Forested Land ^e		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
Schmidt Yard	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9	0.0
Subtotal	72.5	0.0	57.2	0.0	0.0	0.0	0.0	0.0	129.7	0.0
Access Roads										
Access Roads	27.9	<0.1	13.8	0.0	0.1	0.0	0.0	0.0	41.7	<0.1
Subtotal	27.9	<0.1	13.8	0.0	0.1	0.0	0.0	0.0	41.7	<0.1
Aboveground Facilities										
Elkhorn Creek Compressor Station (new)	9.6	8.6	1.5	1.5	0.0	0.0	0.0	0.0	11.1	10.1
Tioga Compressor Station (existing)	0.0	0.0	8.0	4.4	0.0	0.0	0.0	0.0	8.0	4.4
Springbrook Plant Receipt Station (existing)	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.4
Northern Border Interconnect (new)	0.6	0.2	0.2	<0.1	0.0	0.0	0.0	0.0	0.8	0.2
Norse Plant Receipt Station (existing)	< 0.1	< 0.1	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.3
Norse Transfer Station (new)	< 0.1	< 0.1	1.1	0.3	0.0	0.0	0.0	0.0	1.1	0.3
Tioga Plant Receipt Station (existing)	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1
Robinson Lake Plant Receipt Station (existing)	1.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.6
Block valves (new)	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Subtotal	13.8	11.0	11.1	6.5	0.0	0.0	0.0	0.0	24.9	17.5
Project Total	858.2	374.8	286.7	108.5	53.9	28.9	2.1	1.1	1,158.8	490.6
<p>^a The subtotals and totals in this table may not reflect the sum of the addends due to rounding. In addition, surveys identified segments of native grassland (i.e., native prairie) within all vegetation classes. The acres of native grassland were subtracted from each of the vegetation class acreage totals accordingly. Therefore, the acres shown in this table may not match the acres listed in B.5.a-1 for agricultural, open, and forested land.</p> <p>^b Includes cultivated crops, hayfields, and pastureland.</p> <p>^c Includes herbaceous land, scrub/shrub, and non-forested wetlands.</p> <p>^d Includes surveyed segments of native grassland.</p> <p>^e Includes deciduous and mixed forestland (hedgerows, upland wooded areas, and deciduous forests).</p>										

The dominant vegetation type that would be affected by the Project is agricultural land, which includes permanent or rotated croplands, working areas of farms, hayfields, and pastureland. Small grains such as, durum wheat, barley, spring wheat, and oats, as well as canola, dry edible beans, corn, and sunflowers are crops grown in the region (USFS, 2019a). Much of the remainder of the Project area consists of open land that includes expanses of non-native and native grassland. Much of the open land in the Project area is used for grazing or hay.

Non-native grassland in the Project area appears to have been tilled in the past, but is currently used for grazing, wildlife habitat, or hay production. Species typical of these communities in the Project area include planted non-native grasses, such as smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*), as well as clovers such as alfalfa (*Medicago* spp.). Non-native forbs, like Canada thistle (*Cirsium arvense*) and bindweed (*Convolvulus arvensis*), also are common throughout the area.

Native prairie is generally divided into three categories including tallgrass, mixed-grass, and shortgrass communities. Each of these categories is comprised of a blend of grasses and forbs (NDGFD, 2016a). Tallgrass prairie is predominantly found in eastern North Dakota in the Red River Valley and is outside of the Project area. The Project area would primarily overlap mixed-grass and shortgrass communities. Mixed-grass prairie includes a combination of tallgrass and shortgrass species and is dominated by warm and cool season grasses and sedges. Common grasses include prairie junegrass, western wheatgrass (*Pascopyrum smithii*), green needlegrass, needle and thread (*Hesperostipa comata*), blue grama, little bluestem, and needleleaf sedge (*Carex duriuscula*). Mixed-grass prairie includes a variety of forbs such as pasque flower (*Pulsatilla patens*), prairie smoke (*Geum triflorum*), Missouri milkvetch (*Astragalus missouriensis*), and purple prairie clover (*Dalea purpurea*) (USFS, 2019a; NDGFD, 2016a). Shortgrass prairie is primarily found in the higher elevations within the Missouri Slope region. Dominant species in shortgrass prairie include warm season grasses such as spikemoss (*Selaginella densa*), blue grama, needleleaf sedge, and buffalograss (*Bouteloua dactyloides*). A variety of forb species are often found in North Dakota shortgrass prairie and species may include purple locoweed (*Oxytropis lambertii*), white wild onion (*Allium* spp.), prickly pear (*Opuntia humifusa*), and white beardtongue (*Penstemon digitalis*) (USFS, 2019a; NDGFD, 2016a).

WBI Energy documented locations of native prairie in the Project area as part of its environmental field survey. Native prairie was distinguished from other grasslands based on the species diversity and the absence of indicators of previous agricultural activities (e.g., tillage patterns in soil, rock piles along margins of fields). As a result of its survey, WBI Energy documented locations of native prairie at 46 locations along the proposed pipeline routes with a combined crossing length of approximately 4.8 miles of pipeline centerline crossing.

Forest land in the Project area predominantly consists of small stands of deciduous trees, primarily in wooded riparian areas and along the edges of wetlands, and hedgerows along roads and fields. Trees common in these areas include green ash (*Fraxinus pennsylvanica*) and eastern cottonwood (*Populus deltoids*).

Vegetation Communities of Special Concern or Value

The proposed Project would cross about 1.8 miles of the Little Missouri National Grassland (LMNG). In conjunction with Dakota skipper (DASK) habitat mapping, WBI Energy conducted sensitive plant surveys along approximately 1.8 miles where the Project crosses the USFS-managed lands within the LMNG. Prior to surveys, biologists reviewed the most recent *Biological Survey and Report Guidelines – Little Missouri National Grassland* (USFS, 2019b) and associated GIS data with known DASK locations. Biologists visited known and easily accessible reference plots prior to the survey to ensure habitat and plant characteristics. In addition to surveying for sensitive plant species, biologists also surveyed for any occurrence

of USFS watch list plant species. One instance of a sensitive plant species was identified during field surveys, which would be bored under to avoid impacts on the species.

The Conservation Reserve Program (CRP) is a voluntary program that provides technical and financial assistance to farmers and ranchers to address soil, water, and related natural resource concerns on their lands. The Farm Service Agency administers the program, with the NRCS providing technical land eligibility determinations, conservation planning, and practice implementation. The NRCS also administers the Agricultural Conservation Easement Program (ACEP), which assists landowners, land trusts, and other entities in the protection, restoration, and enhancement of wetlands, grasslands, and working farms and ranches through conservation easements. Additional information on these programs can be found in section B.5.

Noxious Weeds

Noxious weeds include non-native, undesirable native, or introduced species that are able to exclude and/or out-compete desired native vegetation, thereby decreasing overall species diversity. The North Dakota Department of Agriculture maintains a statewide list of noxious weeds. Counties have the option to add additional weeds onto a list for enforcement in their jurisdictions. McKenzie, Williams, Burke, and Mountrail Counties list 19 noxious weed species potentially occurring in the Project area including: absinth wormwood (*Artemisia absinthium L.*); baby's breath (*Gypsophila paniculata*); black henbane (*Hyoscyamus niger L.*); common tansy (*Tanacetum vulgare*); common burdock (*Arctium minus*); Canada thistle (*Cirsium arvense (L.) Scop.*); calmatian toadflax (*Linaria genistifolia* spp. *dalmatica*); ciffuse knapweed (*Centaurea diffusa Lam.*); halogeton (*Halogeton glomeratus*); houndstongue (*Cynoglossum officinale L.*); leafy spurge (*Euphorbia esula L.*); musk thistle (*Carduus nutans L.*); narrowleaf hawksbeard (*Crepis tectorum*); Palmer amaranth (*Amaranthus palmeri*); purple loosestrife (*Lythrum salicaria L., Lythrum virgatum L.,* and all cultivars); Russian knapweed (*Centaurea repens L.*); saltcedar (*Tamarisk* spp.); spotted knapweed (*Centaurea maculosa Lam.*); and yellow toadflax (*Linaria vulgaris*).

As a result of field surveys conducted along a majority of the proposed pipeline route between June and October 2019, WBI Energy documented 18 locations of noxious weed species along the route, including observations of five noxious weed species (absinth wormwood, Canada thistle, leafy spurge, Russian knapweed, and purple loosestrife).

Impacts and Mitigation

The primary impact of the Project on vegetation would result from clearing and grading of the construction right-of-way. The amount of time it would take for vegetation in disturbed areas to recover would vary by vegetation type. Impacts on vegetation in agricultural areas crossed by the pipelines would be temporary and short term as these areas would be restored to active production in the season following restoration of the right-of-way. Approximately 11.0 acres of agricultural land would be permanently converted to developed land at the proposed aboveground facility sites. Impacts on non-native grassland would be temporary and short term because herbaceous vegetation in these areas would be expected to regenerate relatively quickly once the right-of-way has been restored. Impacts on native prairie likewise would be temporary, but additional time would be required to restore the species diversity in these areas; therefore, impacts on disturbed native prairie (including areas within temporary workspaces and within the permanent right-of-way) would be considered long term.

WBI Energy avoided forested areas to the extent practicable in routing the proposed pipelines, and forest land comprises less than 1 percent of the area that would be affected by the Project. The Project would result in the long-term conversion of forested land to earlier successional stages in temporary work

areas (a total of approximately 0.9 acre) and the permanent conversion of forest land to scrub/shrub and/or non-woody herbaceous species in the permanent pipeline easement (1.1 acres).

In general, the revegetation rate along the pipeline right-of-way would depend on several factors, including rainfall, soil type, land use, existing vegetation, reseeding, and vegetation maintenance practices. Following construction, WBI Energy would revegetate disturbed non-agricultural upland areas within the right-of-way and ATWS areas with seed mixes recommended by the NRCS, landowners, or other appropriate agencies. Wetlands would be allowed to revegetate naturally in accordance with the FERC Procedures. Following restoration, WBI Energy would monitor revegetation success within all disturbed areas in accordance with the FERC Plan and Procedures and continue revegetation efforts until revegetation is successful. Per the FERC Plan, revegetation would be considered successful if the density and cover of non-invasive vegetation were similar in density and cover to adjacent undisturbed land, or in accordance with any state or local permit requirements. WBI Energy would maintain the permanent right-of-way in low-growing herbaceous vegetation.

The FWS and NDGFD expressed concern about impacts on native prairie, which provides habitat for migratory birds (see also section B.3.3 below). WBI Energy would implement the measures in the FERC Plan and Procedures to minimize impacts on these areas. Native prairie areas would be reseeded in accordance with agency recommendations for seed mixes, rates, techniques, and dates. The seed mixes would take into account growth patterns, forage characteristics, and wildlife values, and would include a diverse mixture of cool and warm season grasses and forbs.

The Hartels provided comments about the spread of noxious weeds as a result of construction of the Project. WBI Energy states that it would implement measures identified in its Noxious Weed Management Plan to control the spread of weeds. The measures contained in the Noxious Weed Management Plan are designed to identify areas supporting noxious weeds prior to construction; prevent the introduction and spread of weeds from construction equipment moving along the right-of-way; contain weed seeds and propagules by preventing segregated topsoil from being spread to adjacent areas or along the construction right-of-way; and address weed infestations that develop during operation of the Project.

Based on the types and amounts of vegetation affected by the Project and WBI Energy's proposed avoidance, minimization, and mitigation measures to limit Project impacts, we conclude that impacts on vegetation from the Project **[placeholder for FERC conclusion]**.

3.2 Fisheries

Fisheries occur in surface waterbodies that provide habitat for fish and other aquatic species. The quality of fisheries is influenced by the water quality of waterbodies. North Dakota has established water quality classification systems for streams and lakes/reservoirs that provide information on the quality of fisheries. Based on these systems, the proposed Project would have 22 individual crossings of Class III streams, 1 Class I stream (Lake Sakakawea), and 3 Class 4 open water ponds (NDDEQ, 2019c). The Project does not cross any Category 3 waterbodies designated as Outstanding State Resource Waters.

All of the waterbodies crossed by the Project with the exception of Lake Sakakawea are considered warmwater fisheries. Representative fish species in the area include bass, crappie, blue gill, goldeye, sunfish, and white sucker. Smaller streams may also support species including darters and minnows. Fish typical of Lake Sakakawea include walleye, yellow perch, northern pike, bullhead, and burbot.

Fisheries of Special Concern

Fisheries of special concern may include waterbodies such as those that contain fisheries of exceptional recreational value, support commercial fishing, or provide habitat for fish species listed for

protection at the federal, state, or local level. One federally listed endangered fish species, the pallid sturgeon, occurs in waters within McKenzie County, but only in the Missouri and Yellowstone Rivers (NDGFD, 2015). This species is discussed in more detail in section B.4.1.

The USFS lists the northern redbelly dace as a sensitive wildlife species for the LMNG (USFS, 2019b). This is an uncommon species in North Dakota where suitable habitat including cold, clear headwater streams are found. Currently, the proposed Project area would overlap with the secondary range for the northern redbelly dace (NDGFD, 2016b).

The Project would cross Lake Sakakawea which is an actively stocked lake and supports recreational fishing. According to the 2018 fish stocking report, Chinook salmon, paddlefish, and walleye were all stocked in the lake (NDGFD, 2018). As discussed in section B.2.2, Lake Sakakawea would be crossed using the HDD crossing method and no impacts on fisheries are anticipated from this crossing.

Impacts and Mitigation

The proposed pipeline segments would cross a total of 26 surface waterbodies. Construction methods at waterbody crossings are discussed in section A.7.2. Construction impacts on fisheries resources may include:

- temporary increases in sedimentation or turbidity immediately downstream of construction activities;
- alteration or removal of aquatic habitat cover;
- introduction of pollutants through potentially contaminated bottom sediments or spills of fuels or lubricants; and
- impingement or entrainment of fish and other biota associated with the use of water pumps.

As discussed in section A.1.2, fish and wildlife is one of the congressionally authorized purposes of the USACE Garrison Project. WBI Energy proposes to use the HDD method to cross Lake Sakakawea and a natural pond, and the guided bore method to cross Beaver Creek, Tobacco Garden Creek, Northfork Creek, Cherry Creek, and White Earth Creek. These methods would reduce or eliminate potential impacts on fisheries in these waterbodies because it would not require disturbance of the streambeds or banks. While HDDs and guided bores generally minimize impacts on aquatic resources, an inadvertent release of drilling fluids to a waterbody would cause increased turbidity that could adversely affect fish in the vicinity of the release. If a release were to occur, it could cause short-term increases in turbidity and sedimentation that in turn could reduce dissolved oxygen levels in the water column. Increased turbidity could also reduce the ability for aquatic species to find food sources or avoid prey as well as cause physiological effects in fish such as gill clogging. WBI Energy would implement the measures in its HDD Plan to prevent, detect, contain, and clean up any drilling fluid releases.

The remainder of waterbodies would be crossed using open-cut construction methods if no flow is present during construction. While WBI Energy's proposed construction schedule would occur during the wet season in North Dakota, based on past project experience, WBI Energy anticipates that most intermittent and ephemeral streams crossed are not likely to be flowing at the time of construction. Other waterbodies with perceptible flow at the time of construction would be crossed using either the guided bore crossing method or a dry open-cut crossing method (flume or dam-and-pump) based on site-specific conditions.

To minimize potential turbidity impacts, WBI Energy would place silt curtains instream to prevent long distance dispersal of sediments. Fisheries could be affected by spills or leaks of fuels, oils, lubricants, or coolant during construction of the Project; however, WBI Energy would avoid or mitigate these impacts by implementing the measures identified in its SPCC Plan. This plan describes procedures for refueling, storage, handling, containment, and cleanup of fuels, oils and other hazardous fluids.

WBI Energy would implement the measures in the FERC Plan and Procedures to minimize the potential for erosion and sedimentation during waterbody crossings and to restore these areas to preconstruction conditions. Although dry crossing methods, such as the flume and dam-and-pump methods, are not proposed for the Project, they may be considered if warranted by site-specific conditions at the time of construction. If in-stream construction is required due to use of the dam-and-pump method, in accordance with the FERC Plan, the appropriate timing windows would be adhered for in-water work.

Impacts on aquatic resources from construction and operation of the Project would be temporary and WBI Energy would limit impacts on aquatic species by implementing its proposed construction methods and mitigation measures. With the implementation of measures identified in the FERC Procedures, the SPCC Plan, and HDD Plan, the Project’s impacts on fisheries would be short-term and minimal.

3.3 Wildlife

The suitability of an area as habitat for wildlife is closely related to the vegetation of that particular area. The Project would cross three major vegetation classes comprising many distinct cover types as well as small amounts of developed land and some open water. The vegetation classes and their associated habitats include: agricultural land (cultivated crops, hayfields, and pastureland), open land (short- and mixed-grass prairie, shrubland, and non-forested wetlands), and forest land (hedgerows, isolated upland tree stands, and deciduous forests). Developed land includes roads, railroads, utility corridors, and light industrial areas. Agricultural land, open land, and developed land comprise over 99 percent of the Project area. Table B-10 provides a list of the common wildlife species present in each of these cover types within the Project area.

TABLE B-10 Common Wildlife Species in the Project Area	
Vegetation Cover Type	Common Wildlife Species
Agricultural Land	Coyote, mule deer, pronghorn, raccoon, striped skunk, white-tailed deer, white-tailed jackrabbit, Canada goose, greater white-fronted goose, gray partridge, magpie, mallard, mourning dove, northern harrier, northern shoveler, prairie falcon, red-tailed hawk, ring-necked pheasant, sandhill crane, snow goose, boreal chorus frog, plains spadefoot toad
Open Land or Grasslands	American badger, American beaver, American mink, common muskrat, coyote, deer mouse, eastern cottontail, eastern fox squirrel, elk, long-tailed weasel, meadow vole, mule deer, pronghorn, raccoon, red fox, striped skunk, white-footed mouse, white-tailed deer, white-tailed jackrabbit, American wigeon, blue-winged teal, Canada goose, clay-colored sparrow, gadwall, greater white-fronted goose, gray partridge, least flycatcher, magpie, mallard, mourning dove, northern harrier, northern shoveler, prairie falcon, red-eyed vireo, redhead, red-tailed hawk, ring-necked pheasant, sandhill crane, sedge wren, snow goose, western kingbird, yellow warbler, boreal chorus frog, bullsnake, common gartersnake, eastern yellow-bellied racer, great plains toad, northern leopard frog, plains gartersnake, plains spadefoot toad, prairie rattlesnake, sharp-tailed grouse, short-tailed lizard, tiger salamander, western painted turtle, Woodhouse’s toad.
Developed Land	Coyote, eastern fox squirrel, raccoon, white-tailed deer, mourning dove, boreal chorus frog, Woodhouse’s toad

Cultivated cropland in the Project area supports relatively low wildlife diversity, but may provide a food source for opportunistic species such as deer, ring-necked pheasant, and migrating waterfowl, and

can serve as surrogate grassland habitat for grassland bird species. The majority of the non-agricultural land in the Project area is open land. Mammals that inhabit open land include game species such as elk, mule deer, antelope, pocket gopher, gray partridge, and white-tailed jackrabbit, and non-game species such as coyote, badger, ground squirrel, and several types of voles and mice. Reptiles and amphibians that inhabit grasslands include the bullsnake, plains garter snake, prairie rattlesnake, short-horned lizard, Great Plains toad, and plains spadefoot toad. Several neotropical migratory songbirds prefer to nest in open herbaceous vegetation including the western meadowlark, chestnut-collared longspur, grasshopper sparrow, and lark bunting. Grasslands also provide forage food sources for migrating songbirds. Mixed-grass prairie is important breeding habitat for sharp-tailed grouse. Emergent wetlands contained within open land may provide feeding and resting areas for migrating waterfowl. Prairie pothole wetlands also provide breeding habitat for reptile and amphibian species such as the western painted turtle and northern leopard frog and provide year-round habitat for muskrats and American mink.

Developed land generally provides poor habitat for wildlife. Typical wildlife species that may be found in developed land include squirrels, mice, skunks, raccoons, and mourning doves. Many species found in developed areas are considered opportunistic species that inhabit a number of the other habitat types found along the Project. These species have adapted to developed areas. In addition to fish, a number of mammal species, waterfowl, and a variety of amphibians and reptiles utilize open water habitat. Some mammal and bird species are dependent on aquatic habitats for food and cover, while other species, such as the raccoon, are less restricted, but prefer to be close to water.

Forested land, which includes primarily small stands of deciduous trees in riparian areas or along wetland edges and hedgerows along roads or fields, comprises less than 1 percent of the Project area that would be affected by construction. Forested land in the Project area may provide food, cover, and young-rearing habitat for small- to medium-sized mammals such as deer, red fox, eastern fox squirrel, raccoon, and bats. Standing dead trees may provide nesting or roosting sites for a variety of birds and mammal species as well as foraging opportunities for birds. Secondary canopy shrubs and saplings, brush piles, and fallen logs provide cover for a number of small- to medium-sized mammals.

Significant Wildlife Habitats

The Project would not cross any National Park Service Wilderness Areas, National Wild and Scenic Rivers, or state-designated high quality or outstanding natural resource waters (Wild and Scenic Rivers Council, 2014). The Project would cross about 1.8 miles of USFS property through the LMNG. The LMNG is the largest grassland in the country and was once considered part of the Custer National Forest, but is now part of the Dakota Prairie Grasslands (USFS, 2019c). The LMNG manages a list of sensitive and watch list wildlife species of interest for the LMNG.

In conjunction with DASK habitat mapping, WBI Energy conducted sensitive plant surveys along approximately 1.8 miles where the Project crosses the USFS lands within the LMNG. Prior to surveys, biologists reviewed the most recent *Biological Survey and Report Guidelines – Little Missouri National Grassland* (USFS, 2019b) and associated GIS data with known DASK locations. Biologists surveyed the Project area on the USFS land using meandering transects with an emphasis on areas having habitat features suitable to the USFS sensitive plant species. In addition to surveying for sensitive plant species, biologists also surveyed for any occurrence of USFS watch list plant species. WBI Energy completed a Biological Evaluation for the USFS sensitive and watch list plants and animals, raptor species of concern, and management indicator species which was submitted to the USFS for review on February 14, 2020.

The Project would cross FWS conservation easements or management areas including wetland easements and Waterfowl Production Areas (WPA) (FWS, 2019a). WPAs provide habitat for a variety of waterfowl, shorebirds, grassland birds, plants, insects, and wildlife. These WPAs are acquired as public

lands or protected through easements within the FWS National Wildlife Refuge System (FWS, 2012). WPAs are primarily located within the prairie wetlands or potholes of the Dakotas, Minnesota, and Montana. WBI Energy is continuing to consult with the FWS regarding these easements and working to adjust the route and workspaces as needed to minimize or avoid impacts where feasible.

Impacts and Mitigation

The Hartels provided comments about the Project's potential impacts on wildlife. General wildlife impacts and mitigation measures are described in this section. Construction and operation of the Project would result in short- and long-term impacts on wildlife. The extent and duration of impacts on wildlife would vary depending on the species present in each affected habitat type and their individual life histories. Mobile species may be disturbed temporarily or displaced from portions of their habitats, and mortality of individuals of less mobile species, such as some small mammals, reptiles, or amphibians, may occur. Because the Project would not permanently alter the characteristics of the majority of the available wildlife habitats, most Project-related impacts on wildlife are anticipated to be temporary. During construction, most wildlife in the area would be able to migrate to other, nearby locations with suitable habitat. Wooded habitats, which comprise less than 1 percent of the Project area, would be affected to a greater extent than other habitat types due to the long-term conversion of wooded areas to earlier successional stages in the temporary right-of-way, and the permanent conversion to scrub/shrub and/or non-woody herbaceous species in the permanent, maintained easement. Construction and operation of the proposed aboveground facilities would result in minimal impacts on wildlife because they are located on predominantly agricultural (cultivated) lands that tend to support a lower diversity of species.

As discussed in section A.1.2, fish and wildlife is one of the congressionally authorized purposes of the USACE Garrison Project. All lands associated with the Garrison Project are managed to benefit and enhance wildlife species. The Lake Audubon and Lake Sakakawea General Plans identify 51,000 acres at Lake Sakakawea to be used primarily for the conservation and management of wildlife. All Garrison Project lands would be crossed within the span of the proposed HDD crossing of Lake Sakakawea. Impacts associated with general wildlife species on USACE lands would be similar in scale to those for the Project as a whole (USACE, 2007).

In its review of the Project, the NDGFD identified its primary wildlife concern as the disturbance of native prairie and wooded draws (NDGFD, 2019a). During Project planning, WBI Energy incorporated several reroutes into the proposed pipeline routes to avoid and/or minimize potential impacts on many of the higher quality habitats in the Project area, including native prairie and wooded areas, as well as wetlands. For example, in coordination with the FWS, WBI Energy incorporated several route variations and workspace adjustments to avoid or minimize impacts on private lands subject to conservation easements held by the FWS. WBI Energy is also working with the FWS to avoid crossings of wetland basins within FWS wetland easements. As shown in table B-9 in section B.3.1, less than 1 percent of the route crosses wooded areas. Crossings of native prairies, although minimized to the extent practicable, could not be entirely avoided as discussed in section B.3.1.

The area that would be disturbed by construction would be a limited area within the broader landscape, and similar wildlife habitat is available nearby. WBI Energy would restore wildlife habitat in accordance with the FERC Plan and Procedures. Agricultural land and most open lands (e.g., non-native grassland) would be expected to revert to preconstruction condition relatively quickly, generally within 1 or 2 years following construction. As shown in table B-9, this accounts for about 1,145 acres. Native grasslands areas may take longer to restore (approximately 3 to 5 years based on previous experience in the Project area) and forested areas can take between 5 to 10 years. As shown in table B-9, native grassland accounts for 53.9 acres and forested land 2.1 acres. WBI Energy has routed the proposed pipelines to avoid native grasslands to the extent practicable and would implement measures identified in the FERC Plan and

Procedures to minimize and mitigate impacts on these areas where they cannot be avoided. To aide in revegetation efforts, WBI Energy would complete topsoil segregation in all areas impacted by standard pipeline construction.

Based on the types of wildlife in the Project area discussed above, WBI Energy's proposed route, and the measures included in WBI Energy's construction, restoration, and mitigation plans, it is anticipated that impacts on wildlife resources would be short-term and minimal.

Migratory Birds

Migratory birds are protected under the Migratory Bird Treaty Act (16 USC 703-711), and bald and golden eagles are additionally protected under the Bald and Golden Eagle Protection Act (16 USC 668-668d). EO 13186 (66 FR 3853) directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the FWS.

On March 30, 2011, the FWS and the Commission entered into a MOU that focuses on avoiding or minimizing adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration between the Commission and the FWS by identifying areas of cooperation. This voluntary MOU does not waive legal requirements under the Migratory Bird Treaty Act, the ESA, the Federal Power Act, the NGA, or any other statutes and does not authorize the take of migratory birds.

Although the Migratory Bird Treaty Act provides protection for all migratory birds and their nests, it is standard practice as noted in EO 13186 and the MOU between FERC and the FWS (unless notified otherwise by the FWS) to use the Birds of Conservation Concern (BCC) list when evaluating the potential impact of a project on migratory birds because this list identifies "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing." The BCC for the Bird Conservation Regions (BCR) crossed by the Project are identified in table B-11. This table identifies general habitat, nesting habitat, and breeding habits for each species.

A variety of migratory bird species may occur seasonally along the proposed pipeline route. The Project is within the Central Flyway for waterfowl. Many species of waterfowl such as ducks, geese, doves, and pigeons, as well as sandhill cranes and tundra swans, use the flyway during spring and fall migrations between the Gulf of Mexico and central Canada. All of these species use open land and wetland areas and could be sensitive to Project construction activities.

Migratory birds, particularly ground-nesting birds, could use grassland habitat present in the Project area. Impacts on habitat include the potential temporary disturbance of soils and vegetation during construction. Direct impacts on species include the potential for mortality or injury during construction from destruction of ground nests or vehicle collisions. Construction of the Project is planned to begin in the spring of 2021 subject to receipt of necessary permits and regulatory approvals, which could overlap with the migratory bird nesting season. To minimize impacts, in areas where clearing cannot occur prior to the migratory bird nesting season, WBI Energy would conduct surveys for nesting birds prior to clearing the right-of-way. If nests were to be identified during surveys, depending on local topography and vegetation buffers, work would stop up to 0.1 mile from the nest. Construction activities in these areas would resume when the chicks have fledged or the nest has failed. In areas where clearing occurs prior to migratory bird nesting but construction does not occur right after clearing, the construction area would be maintained (as needed) to avoid the regrowth of potential nesting habitat.

TABLE B-11

Birds of Conservation Concern with Potential to Occur in the Project Area

Species	Habitat Association	BCR ^a
Bald eagle ^{b, c} (<i>Haliaeetus leucocephalus</i>)	Typically breeds in forested areas adjacent to large bodies of water. Nests in trees, and will occasionally nest on cliff faces and ground nest in treeless areas. Stopover habitat during migration includes roosting sites with deciduous trees that are in or near riparian areas, protected from human disturbance, and in proximity to foraging habitat.	11, 17
Baird's sparrow (<i>Centronyx bairdii</i>)	Mixed-grass and fescue [<i>Festuca</i> spp.] prairie with scattered low shrubs and vegetation from previous year's growing season. Associated with club moss [<i>Selaginella densa</i>], pasture sage [<i>Artemisia frigida</i>], june grass [<i>Koeleria pyramidata</i>], and needle grass [<i>Stipa comata</i>] in North Dakota.	11, 17
Black tern (<i>Chlidonias niger</i>)	Shallow freshwater marshes with emergent vegetation, which includes prairie sloughs, margins of lakes, and river or island edges.	11
Bobolink (<i>Dolichonyx oryzivorus</i>)	Fields comprised of mixed grasses and broad-leaved forbs (e.g., red clover [<i>Trifolium pratense</i>] and dandelion [<i>Taraxacum officinale</i>]).	NA ^d
Chestnut-collared longspur (<i>Calcarius ornatus</i>)	Primarily found in grazed or hayed mixed-grassed prairie and/or shortgrass prairie.	11, 17
Franklin's gull (<i>Leucophaeus pipixcan</i>)	Habitat within breeding range includes freshwater marshes nesting over water, on floating mats built on water's surface, muskrat [<i>Ondatra zibethicus</i>] houses, or floating debris.	NA ^e
Golden eagle ^c (<i>Aquila chrysaetos</i>)	Primary habitat includes rugged portions of badlands, buttes overlooking native prairie, large trees, and frequently associated with prairie dog [<i>Cynomys ludovicianus</i>] colonies.	17
Lesser yellowlegs (<i>Tringa flavipes</i>) ^f	Utilizes a variety of habitats during migration including fresh marshes and edges of lakes and ponds.	NA ^e
Marbled godwit (<i>Limosa fedoa</i>)	Associated with a variety of wetlands and nests frequently on grazed native prairie.	11, 17
Seimipalmated sandpiper (<i>Calidris pusilla</i>) ^f	Stopover at wetlands in the prairie pothole region during migration.	NA ^e
Sprague's pipit (<i>Anthus spragueii</i>)	Habitat includes grazed native prairie with few shrubs. Preferred habitat species include blue grama [<i>Bouteloua gracilis</i>], threadleaf sedge [<i>Carex filifolia</i>], june grass, and plains muhly [<i>Muhlenbergia cuspidate</i>].	11, 17
Willet (<i>Tringa semipalmata</i>)	Breeds in prairies comprised of short, sparse cover near wetlands and grasslands.	NA ^e

Sources: Bird Studies Canada and North American Bird Conservation Initiative, 2014; Cornell Lab of Ornithology, 2019; FWS, 2008 and 2019a; NDGFD, 2016c

^a BCRs overlapping the Project facilities include BCR 11 (i.e., Prairie Potholes) and BCR 17 (i.e., Badlands and Prairies).

^b ESA delisted species

^c Protected under the Bald and Golden Eagle Protection Act

^d Not identified within BCR 11 or 17, but identified within the FWS Information, Planning and Conservation System as a BCC species that could be found within the Project area. Bobolinks are found in BCR 23, which is the Prairie Hardwood Transition region located east/southeast of the Project.

^e Not identified within BCR 11 or 17, but identified within FWS Information, Planning and Conservation System as a BCC species that could be found within the Project area.

^f Non-breeding within North Dakota

Following construction, WBI Energy would restore the right-of-way as near as practical to preconstruction conditions in accordance with the FERC Plan and Procedures. Cropland would be returned to active agricultural production, and other areas would be revegetated using methods and seed mixes appropriate to existing land uses. To reduce effects of vegetation maintenance on nesting birds, routine vegetation maintenance clearing would not be done more frequently than every 3 years and would not occur between April 15 and August 1 of any year unless approval in writing from the FWS is obtained. The majority of the route has low growing vegetation, which allows for regular inspection without regular clearing. Therefore, the need for routine vegetation maintenance would be infrequent and limited to specific locations such as areas around pipeline markers and road crossings.

WBI Energy reviewed golden eagle nest habitat range data available from the NDGFD, which shows there is no nest habitat for golden eagles crossed by the Project (NDGFD, 2017). The nearest habitat is located approximately adjacent (less than 20 feet) to MP 19.2 of the Tioga-Elkhorn Creek pipeline. Incidental on-the-ground raptor nest surveys were conducted during wetland and waterbody surveys (limited to the 300-foot-wide wetland/waterbody survey corridor), during which no nesting activity for bald or golden eagles was observed. This survey corridor did not capture potential noise impacts associated with the HDD crossing of Lake Sakakawea and a natural pond. According to the NDGFD golden eagle nest habitat data, there is no known habitat within 0.5 mile of the HDD entry sites. Prior to the start of HDD construction at Lake Sakakawea and the natural pond, WBI Energy would complete surveys for eagle nests within 0.5 mile of the proposed entry sites. If an eagle nest is identified near the Project area, WBI Energy would implement the measures described in the FWS' 2007 National Bald Eagle Management Guidelines (FWS, 2007) to avoid and minimize impacts on nesting eagles. The proposed Project is not expected to result in adverse permanent or cumulative impacts on migratory birds or eagles.

4. Threatened, Endangered, and Other Special Status Species

Special status species are those species for which federal or state agencies afford an additional level of protection by law, regulation, or policy. Included in this category for this EA are federally listed species that are protected under the ESA, as amended, and those species that are state-listed as threatened, endangered, or other special status. Section 7 of the ESA requires each federal agency to confirm that an action authorized, funded, or carried out by the agency does not jeopardize the continued existence of federally listed endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat for federally listed species. As the lead federal agency, FERC is responsible for the Section 7 consultation process with the FWS.

To comply with the requirements of the ESA, WBI Energy, as FERC's non-federal representative, conducted informal coordination with the FWS for the purpose of complying with section 7(a)(2) of the ESA. As part of this coordination, WBI Energy considered the potential for the Project to affect the federally listed threatened and endangered species as well as candidate species and designated critical habitat. WBI Energy conducted habitat assessment surveys to identify potential habitats for threatened and endangered species within the Project area. While North Dakota does not have a state endangered species program, it does track data regarding species identified as species of concern and other significant ecological communities.

We are requesting that the FWS consider this EA, along with the various survey and other reports prepared by WBI Energy,⁷ as the BA for the Project in accordance with section 7 of the ESA. Furthermore,

⁷ WBI Energy prepared a BA for the Project, which was filed as part of WBI Energy's application (appendix 3A to Resource Report 3).

we request concurrence with our findings of effect for the federally listed species as described in section B.4.1.

4.1 Federally Listed Species

Based on publicly available information, agency correspondence, field surveys and other information submitted by WBI Energy, and our own independent analyses, we have determined that eight federally listed species⁸ potentially occur in the Project area that have potential to be affected by the Project. Additionally, two areas of designated critical habitat are within the Project area. Table B-12 lists the federally listed species and designated critical habitat potentially occurring in the Project area, describes the habitat requirements for each species, and identifies our determinations of effect. Further discussion of these species and assessment of potential impacts are described below.

Gray Wolf

The endangered gray wolf is considered extirpated from North Dakota; however, there have been documented but rare occurrences in the state during the 1900s. Gray wolf presence in North Dakota is considered incidental as a result of occasional dispersal from Minnesota, Montana, or Manitoba, Canada. This species occurs in a variety of habitats including mixed-hardwood forests, taiga, tundra, and grasslands where ungulate prey (e.g., elk and deer) are abundant and human disturbance is limited. In North Dakota, preferred habitat is in forested areas in the northcentral and northeastern part of the state with low densities of roads and people; however, they may appear anywhere (NDGFD, 2016d).

After briefly being de-listed, the gray wolf was returned to an endangered species status after a Federal Ruling in December 2014. Populations have significantly declined throughout the historic range due to shooting, trapping, and poisoning (FWS, 2013a; NDGFD, 2016d).

Human disturbance and activity along the Project route may deter wolves from occupying the area during construction, except for the low potential for a transient to pass through. However, there is ample suitable habitat outside the Project area. Additionally, WBI Energy would restore any disturbed habitat to preconstruction conditions following Project construction. For these reasons, the Project would have *no effect* on gray wolves.

Northern Long-eared Bat

The threatened northern long-eared bat (NLEB) ranges across the eastern and northcentral United States, and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (78 FR 61046). NLEBs are considered common in only small portions of the western part of its range (i.e., Black Hills of South Dakota) and uncommon or rare in the western extremes of the range (78 FR 61046). NLEBs spend winter months hibernating in crevices or cracks of caves and mines. Summer months are spent roosting underneath bark or in cavities or crevices of live and dead trees. There are no known NLEB hibernacula within North Dakota; however, there has been limited survey effort in the state (78 FR 61046). The estimated NLEB hibernation season in North Dakota is from October 1 through May 15 (FWS, 2014a).

⁸ No species that are currently candidates for federal listing under the ESA are located in the Project area.

TABLE B-12

Federally Listed Species Potentially Occurring in the Vicinity of the Proposed Project

Species	Federal Status ^a	Habitat Description	Determination of Effect
Mammals			
Gray wolf (<i>Canis lupus</i>)	E	Rare to uncommon in North Dakota. Occasional sightings. No known breeding population. Occupy wide variety of habitats where large ungulates (e.g., elk and deer) are found. Is known to cross into North Dakota from neighboring states and Manitoba, Canada.	<i>No effect</i>
Northern long-eared bat (<i>Myotis septentrionalis</i>)	T	Rare in North Dakota. Primarily found in woodland habitats. A significant loss of individuals to white-nose syndrome in the Eastern and Midwestern United States and Canada have cause population concern throughout this species' range.	<i>May affect, but not likely to adversely affect</i> with implementation of proposed mitigation measures
Birds			
Interior least tern (<i>Sterna antillarum athalassos</i>)	E	Utilizes sparsely vegetated sandbars on the Missouri and Yellowstone Rivers.	<i>May affect, but not likely to adversely affect</i> with implementation of proposed mitigation measures
Piping plover (<i>Charadrius melodus</i>)	T	Utilizes barren sand and gravel shores of rivers, prairie alkali wetlands, natural lakes with salt-encrusted, white beaches, and rangeland with mid- or short-grass prairie during the non-winter season.	<i>May affect, but not likely to adversely affect</i> with implementation of proposed mitigation measures
	CH	Critical habitat is present at the crossing of Lake Sakakawea.	<i>May affect, but not likely to adversely affect</i> with implementation of proposed mitigation measures
Red knot (<i>Calidris canutus rufa</i>)	T	Migrant species occurring in North Dakota during the spring and fall seasons (mid-May and mid-September to October). Utilize alkaline and freshwater lakes in North Dakota during migration. Red knots have been observed in the Missouri River system as well as sewage lagoons and large permanent freshwater wetlands.	<i>No effect</i>
Whooping crane (<i>Grus americana</i>)	E	Migrant species occurring in North Dakota during the spring and fall seasons (April to mid-May and September to early November). Utilize wetlands, lakes, riverine areas, and a variety of cropland for roosting and foraging.	<i>May affect, but not likely to adversely affect</i> with implementation of proposed mitigation measures
Fish			
Pallid Sturgeon (<i>Scaphirhynchus albus</i>)	E	Utilizes main channel areas with island or sandbars present within the upper Missouri River. Dams have substantially fragmented the pallid sturgeon's range in the upper Missouri River basin.	<i>May affect, but not likely to adversely affect</i> with implementation of proposed mitigation measures
Insects			
Dakota skipper (DASK) (<i>Hesperia dacotae</i>)	T	Reliant upon high-quality tall-grass and mixed-grass prairie. Habitat includes wet prairie dominated by bluestem grasses, wood lily, harebell, and smooth camas; dry prairie on ridges and hillsides dominated by bluestem grasses, needlegrass, pale purple coneflower, upright coneflower, and blanketflower.	<i>May affect, but not likely to adversely affect</i> with implementation of proposed mitigation measures

TABLE B-12 (cont'd)

Federally Listed Species Potentially Occurring in the Vicinity of the Proposed Project			
Species	Federal Status ^a	Habitat Description	Determination of Effect
	CH	No critical habitat is crossed by the Project. North Dakota Critical Habitat Units 11 and 12, which are the closest critical habitats to the Project area, are located in McKenzie County about 5 and 12 miles southeast of the HDD crossing of Lake Sakakawea on the south shoreline.	<i>No effect</i>
^a E = Endangered Species; T = Threatened Species; CH = Critical Habitat. No candidate species occur in the Project area.			

The NLEB is very susceptible to white-nose syndrome, which has led to significant losses and caused a population concern range wide. Other sources of mortality for the NLEB include impacts on winter hibernation areas, loss or degradation of summer habitats, and wind farm operations (FWS, 2015a; NDGFD, 2016d).

The proposed Project site is within the probable range of NLEB; however, no documented hibernacula for the species are present in the Project area (NDGFD, 2016d). In addition, there are no known caves or bat hibernacula within 50 miles of the proposed Project. Direct effects could occur if roosting trees actively used by NLEB were removed by construction activities during summer use (March through September). Indirect effects could occur if construction activities were to displace roosting or foraging bats from nearby habitat due to the increase in noise and human activity in the area. Bats would likely move to surrounding undeveloped treed areas in the areas surrounding the Project and any indirect impacts are expected to be insignificant. NLEB habitat is limited within the Project area, there are no documented occurrences of the species in the Project area, and the Project does not cross any forested areas where NLEB more commonly roost. Construction of the Project is anticipated to occur from spring to late fall of 2021, which would overlap the NLEB active and breeding season. Although bats could potentially roost in small patches of trees, windrows, or shelterbelts, there are no large forested habitats in the vicinity of the proposed Project; however, some small tree stands would be cleared as part of the Project.

WBI Energy completed an Information, Planning and Conservation submission for the Project, based on that submission the FWS determined the activities related to the Project are consistent with those analyzed in the Service’s January 5, 2016, Programmatic Biological Opinion. Therefore, given the small amount of tree clearing that would occur, the Project *may affect but is not likely to adversely affect* the NLEB. As noted in the January 5, 2016 Programmatic Biological Opinion, any take that may occur as a result of the Project is not prohibited under the ESA section 4(d) rule adopted for this species at 50 CFR 17.40(o).

Interior Least Tern

The endangered interior least tern inhabits sparsely vegetated sandbars or shoreline salt flats of lakes along the Missouri River System for breeding purposes. Least terns are present in North Dakota from mid-May through August, with peak breeding season ending in mid-July (FWS, 2013b, 2019c). In McKenzie and Williams Counties, known breeding areas for the least tern occur on sandbars of the Missouri and Yellowstone Rivers (FWS, 2018a). In North Dakota, the least tern is found mainly on the Garrison reach of the Missouri River from the Garrison Dam south to Lake Oahe (southeast of the Project), and on the Missouri and Yellowstone Rivers upstream of Lake Sakakawea (west of the Project). Available shoreline habitat can fluctuate depending on water levels in the reservoir, and releases from Garrison Dam are regulated during the nesting season to accommodate nesting terns (USACE, 2018b).

The interior population of least tern is listed as an endangered species under the ESA. The U.S. population of the interior least tern was proposed for delisting on October 23, 2019, with a final determination to be made by the FWS within 1 year (FWS, 2018a). If delisted, the interior least tern would maintain protection under the Migratory Bird Treaty Act, but would no longer receive protection under the ESA. The population has declined due to loss of habitat from dam construction and river channelization on the major rivers they inhabit. Other factors inhibiting interior least tern populations include human disturbance and changes in water temperatures that may affect the quantity of forage fish available (FWS, 2013b; NDGFD, 2016d).

The USACE has monitored the least tern at Lake Sakakawea since at least 1993. Their data (years 1993 to 2018) show several observations of non-nesting birds within the Project area, the closest about 0.2 mile from one of the proposed geotechnical bore locations, and nesting pairs documented near Tobacco Garden Bay about 1 mile west of the HDD crossing on the south side of Lake Sakakawea (USACE, 2018b).

Nesting and foraging habitat for interior least terns is present on Lake Sakakawea. However, WBI Energy proposes to cross Lake Sakakawea via the HDD method, which would minimize impacts on shoreline and open water foraging habitat. Project activity occurring within 0.5 mile of an active nest has the potential to adversely affect nesting terns. Pipeline construction is currently planned to begin in May of 2021. Prior to the start of HDD construction activities at Lake Sakakawea, surveys would be conducted by a trained biologist to verify that no nesting is occurring within line of sight or 0.5 mile of the proposed construction activities (whichever is a shorter distance) to minimize potential impacts on least terns. These surveys would occur on suitable nesting habitat within line of sight or 0.5 mile (whichever is a shorter distance) of the proposed HDD entry sites. If least tern are observed during these preconstruction surveys, WBI Energy would contact the FWS to determine what, if any, avoidance/minimization measures should be implemented. Given that HDD activities would occur 7 days a week from sunrise to sunset, if no least tern are detected during the 7-day preconstruction survey, no additional survey work would be required. With implementation of these measures, the Project *may affect, but is not likely to adversely affect* the interior least tern.

Piping Plover

The threatened piping plover of the Northern Great Plains breeds along barren sand and gravel shores of prairie rivers and alkali wetlands (FWS, 2003, 2018b). North Dakota is the most important state within the Great Plains region for nesting piping plovers (FWS, 2018b). In North Dakota, piping plovers nest on prairie alkali lakes, the free-flowing stretch of the Missouri River, and barren river sandbars typically along the Missouri and Yellowstone Rivers (FWS, 2018b). In North Dakota, piping plovers arrive in early to mid-April and remain until the end of August.

The recent decline in the Northern Great Plains piping plover population is attributed to the destruction of vegetated sandbars and river islands for flood control and navigation, water level regulation policies that endanger nesting habitat, direct disturbance by people, and poor breeding success, primarily because of an increase in predator abundance (FWS, 2018b). Nineteen areas of critical habitat for the Northern Great Plains population of the piping plover have been designated by the FWS (67 FR 57638), totaling about 183,422 acres in Minnesota, Montana, Nebraska, North Dakota, and South Dakota. Within the Project area the entirety of Lake Sakakawea is designated piping plover critical habitat. The habitat features present at Lake Sakakawea that are essential to the conservation of the species include islands composed of sand, gravel, or shale, and the islands interface with water, sparsely vegetated shorelines, and peninsulas.

The USACE has been monitoring the piping plover at Lake Sakakawea since at least 1993. Their data (years 1993 to 2018) show occurrences of nesting plovers near the Project area on the north shoreline

of the proposed Tioga-Elkhorn Creek pipeline crossing at Lake Sakakawea and about 0.1 mile west of the south shoreline crossing (USACE, 2018b).

Piping plovers arrive in the Project area in April for mating and nesting and migrate south in August. Because construction of the Project is anticipated to occur from spring to late fall of 2021, which would overlap the end of the piping plover breeding and nesting season, it is possible that nesting birds would be present during construction. Activity occurring within 0.5 mile of an active nest has the potential to adversely affect nesting piping plovers. Therefore, noise, visual, and physical disturbances from Project activity may affect essential mating, nesting, and foraging behaviors of piping plovers at Lake Sakakawea. Prior to the start of HDD construction activities at Lake Sakakawea, a qualified biologist would conduct surveys to verify that no nesting is occurring within line of sight or 0.5 mile of the proposed construction activities (whichever is a shorter distance) to minimize potential impacts on piping plovers. These surveys would occur on suitable nesting habitat within line of sight or 0.5 mile (whichever is a shorter distance) of the proposed HDD entry sites. If piping plovers are observed during these preconstruction surveys, WBI Energy would contact the FWS to determine what, if any, avoidance/minimization measures should be implemented. Given that HDD activities would occur 7 days a week from sunrise to sunset, if no piping plovers are detected during the 7-day preconstruction survey, no additional survey work would be required. With implementation of these measures, the Project *may affect, but is not likely to adversely affect* the piping plover.

Red Knot

In North America, the threatened red knot is commonly found in marine habitats and coastal areas along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks (FWS, 2014b). Red knots have been documented along the Northern Plains during their spring migration and they have been tracked along the central flyway with geolocators (FWS, 2014b). The red knot is considered a rare migrant in North Dakota, but may pass through in mid-May and mid-September to October during spring and fall migrations. There are no stopover sites in North Dakota that are consistently used by red knots (FWS, 2014b); however, there is potential for them to be present in the Project vicinity during migration. There is a lack of information on the specific non-coastal habitats used by red knots (FWS, 2014b); however, given their specialized molluscivore diet, it can be assumed they would use shallow wetlands, lake margins, and riverine habitats within North Dakota for foraging and/or roosting areas.

Red knot populations have declined due to degradation of wetland areas, reduced food availability, expanding oil and gas development that overlaps migration ranges, and contamination to alkali lakes and the Missouri River system (FWS, 2014b; NDGFD, 2016d). Because of the rare incidence of the species and the probability that they would avoid areas of active construction during migration due to noise disturbance, the Project would have *no effect* on the red knot.

Whooping Crane

The endangered whooping crane utilizes a variety of habitats along their migration route, including croplands, freshwater wetlands with shallow areas, and submerged sandbars in wide, unobstructed river channels isolated from human disturbance (Austin and Richert, 2005; Urbanek and Lewis, 2015). The Aransas-Wood Buffalo population of the whooping crane migrates in the spring and fall through the central portion of North Dakota. Spring migration occurs from late April to mid-June, with most sightings occurring in the western two-thirds of the state. During migration, preferred stopover sites include large shallow marshes with minimal to no emergent zones for roosting, and nearby upland cropland and pastures for foraging. Fall migration normally begins in mid-September, with most birds arriving at the Texas wintering grounds between late October and mid-November.

Only about 430 individual whooping cranes remain in the Aransas-Wood Buffalo population (International Crane Foundation, 2018). Current threats to whooping cranes include loss or deterioration of critical wetland habitat, low genetic diversity, utility line collisions, predation, disease, disturbance at nest sites, and illegal shooting (International Crane Foundation, 2018; Meine and Archibald, 1996). Whooping crane populations have primarily declined due to loss of habitat and illegal shooting. The Aransas/Wood Buffalo whooping crane population has a restricted wintering distribution along the Gulf Intracoastal Waterway of Texas where the risk of contaminant spills is high based on the amount of barge traffic (Urbanek and Lewis, 2015). The status of the species in the wild is precarious because the birds concentrate during the winter, which makes the birds more vulnerable to contaminant spills. Delayed sexual maturity, small clutch sizes, and low recruitment rates have also affected recovery efforts.

Given the abundance of both wetlands and croplands in the Project vicinity, migrant cranes would be able to find suitable feeding and roosting areas away from the Project during the temporary disturbance from construction and post-construction restoration. WBI Energy would train Project EIs in whooping crane identification prior to the start of construction. If individual cranes are observed along the Project right-of-way during construction, the FWS would be notified of the location of the observance, the cranes would be left undisturbed and construction within 1 mile of the cranes would cease until they vacate the area, at which time construction activities would resume.

Whooping cranes that may occur along the pipeline routes or in the Project vicinity would be individual migrants preparing to fly south only, and the likelihood of occurrence of those individuals is reduced with the proposed spring to late fall 2021 construction schedule. Following restoration, WBI Energy would return the right-of-way to preconstruction condition in open lands. With these proposed mitigation measures, the Project *may affect, but is not likely to adversely affect* the whooping crane or its habitat.

Pallid Sturgeon

The endangered pallid sturgeon is a prehistoric fish that can weigh up to 80 pounds, reach 6 feet in length, and live up to 60 years. Habitat for the pallid sturgeon includes large rivers with high turbidity, swift currents, and natural flow. Their preferred habitat has a diversity of depths and velocities formed by braided channels, islands, and mid-channel sandbars. Their habitat is fragmented by dams on the Missouri River; only scarce populations remain in the upper Missouri River above Fort Peck Reservoir, in the Missouri and lower Yellowstone Rivers. While pallid sturgeon have been documented in Lake Sakakawea upstream of the proposed Tioga-Elkhorn Creek pipeline crossing, reservoirs are not considered to be suitable pallid sturgeon habitat due to the alteration of natural flow regimes (FWS, 2019b; Guy et al., 2015).

Factors contributing to the pallid sturgeon decline include habitat loss due to construction of dams, channelization of rivers, commercial fishing, and environmental contaminants (FWS, 2015b). Additionally, hybridization with the more common shovelnose sturgeon poses a threat to species stability (Tranah et al., 2004).

In North Dakota, pallid sturgeon occur primarily in the Missouri and Yellowstone Rivers, but occasionally enter Lake Sakakawea. WBI Energy proposes to cross Lake Sakakawea via the HDD method, which would reduce potential impacts on pallid sturgeon. To minimize potential impacts on water quality due to an inadvertent release of drilling fluid during the HDD, WBI Energy would implement the measures in its SPCC Plan and HDD Plan. Sedimentation of connected waterbodies could also affect water quality in Lake Sakakawea. WBI Energy would implement best management practices during construction and operation of the Project to minimize migration of sediment or fluids to waterbodies, including the use of appropriate erosion control devices. With implementation of WBI Energy's proposed mitigation measures

and because the nearest pallid sturgeon habitat is about 66 miles upstream from the Project area, the Project *may affect, but is not likely to adversely affect* pallid sturgeon.

Dakota Skipper

Historically, the threatened DASK was distributed throughout tallgrass prairie habitats of Illinois, Iowa, Minnesota, South Dakota, North Dakota, Manitoba, and Saskatchewan (Vaughan and Shepherd, 2005). Within the United States, DASK have been extirpated from Illinois and Iowa, and are now only present in scattered isolated sites in western Minnesota, northeastern South Dakota, and the northern half of North Dakota (FWS, 2016). There are three known DASK sites in McKenzie County, North Dakota and two designated critical habitat sites in northern McKenzie County (FWS, 2016; 80 FR 59248).

DASK inhabit two types of prairie habitat; low wet-mesic prairie with little topographic relief that occurs on near-shore glacial lake deposits (Type A) and dry-mesic mixed-grass prairie dominated by mixed bluestem and green needlegrasses occurring primarily on rolling terrain over gravelly glacial moraine deposits (Type B) (FWS, 2016). Both habitat types contain an abundance of flowering plants and alkaline soils (Vaughan and Shepherd, 2005). In dry mixed-grass prairie, DASK can be found along ridges and hillsides (Cochrane and Delphey, 2002).

DASK complete one generation per year (Cochrane and Delphey, 2002). The larvae overwinter at or below ground level. During the spring, the larvae emerge to complete their development. The larvae eventually pupate in June (Vaughan and Shepherd, 2005). Adults generally emerge in mid-June to early July, and mate during a 2- to 4-week flight period (Cochrane and Delphey, 2002; Vaughan and Shepherd, 2005). Females lay eggs on a range of broadleaf plants and grasses, which hatch after incubating for 7 to 20 days (Cochrane and Delphey, 2002). Little bluestem is often selected for both egg laying and as a food source for larvae (Vaughan and Shepherd, 2005). Nectar sources for adults vary regionally and include purple coneflower (*Echinacea* sp.), blanketflowers (*Gaillardia* sp.), black-eyed Susans (*Rudbeckia* sp.), and evening primrose (*Calypphus serrulatus*) (Cochrane and Delphey, 2002; Vaughan and Shepherd, 2005).

Although the proposed Project is within DASK range and habitat; DASK are not specifically known to occur within the Project area. The Hartels provided comments about the Project's potential impacts on DASK habitat. WBI Energy designed the Project to avoid and minimize impacts on DASK to the greatest extent practicable; however, they may be present within the reproductive, foraging, and dispersal habitats adjacent to the construction workspace.

Based on the results WBI Energy's DASK habitat surveys, WBI Energy incorporated some route changes to minimize and/or avoid impacts on potential DASK habitat (see section C.3.c). The FWS designated critical habitat for the DASK in North Dakota, South Dakota, and Minnesota (80 FR 59248). North Dakota Critical Habitat Units 11 and 12, which are the closest critical habitats to the Project area, are approximately 5 and 12 miles southeast of the HDD crossing on the south shoreline of Lake Sakakawea in McKenzie County. Due to the distance between the Project and the North Dakota Critical Habitat Units, the Project would not be anticipated to have an effect on DASK critical habitat.

WBI Energy would use a combination of HDD and/or guided bore crossing methods and installation of orange construction exclusion fencing and/or silt fencing to demarcate exclusion zones/avoidance areas at occurrences of potential DASK reproductive habitat within or adjacent to Project workspace. Implementation of these measures would prevent construction equipment and temporarily stockpiled soil from encroaching into the habitat. Areas identified as potential reproductive habitat that are adjacent to or within the Project would be excluded from the Project area during construction using a combination of HDD and/or guided bore crossing methods and installation of orange construction exclusion

fencing and/or silt fencing to demarcate avoidance areas. Implementation of these measures would prevent construction equipment and temporarily stockpiled soil from encroaching into the habitat. During the annual flight period, areas identified as potential foraging habitat that are adjacent to or within the Project area would be excluded from construction activities using a combination of orange construction exclusion fencing and/or silt fencing to demarcate avoidance areas. DASK flight periods vary annually; however, the FWS confirmed that construction activities should be restricted in DASK foraging and reproductive habitat areas from June 10 through July 15 (FWS, 2020).

After soil is cleared in grassland areas, WBI Energy would focus revegetation efforts on establishing a native grass and forb plant community that provides foraging opportunities for the DASK and reducing habitat fragmentation along the Project alignment. Because noxious weeds and invasive plants can outcompete native forb food sources for DASK (FWS, 2016), WBI Energy would implement weed control measures to reduce the threat of introducing or spreading noxious weeds and invasive plant species within the Project area.

The Project would involve disturbances related to the physical presence of people, development activities, and moving vehicles and equipment within the Project area, which may be visually or physically disruptive to DASK. There is no evidence suggesting that acoustics from the construction and operation of the Project would elicit a disruptive (positive or negative) behavioral response or injurious physiological impairment to adults or larvae of the species (FWS, 2016). It is expected that human presence would have no effect on the DASK egg or larval stages, but adults could be consistently disturbed during the adult flight period. The disturbance could cause individuals to move from resting/nectaring locations or alter the adult flight paths. Adult DASK are generally believed to avoid areas of active disturbance (FWS, 2016); however, they can traverse areas of disturbance or be driven by wind into disturbed areas. To reduce the likelihood of disrupting adult DASK during the flight period, WBI Energy would conduct clearing and grading activities outside the flight period, the exact dates of which will be determined in coordination with the FWS. With implementation of WBI Energy's proposed mitigation measures, the Project *may affect, but is not likely to adversely affect* DASK.

As described above, the Project would not be anticipated to have an effect on DASK critical habitat due to the distance between the Project and the nearest North Dakota Critical Habitat Units. Additionally, WBI Energy would avoid or establish an exclusion zone around any identified DASK reproductive or foraging habitat during construction. Furthermore, the Project would be *not likely to adversely affect* the species with implementation of WBI Energy's proposed mitigation measures.

Conclusion

Based on the analyses above, WBI Energy's survey results and proposed mitigation/conservation measures, and the implementation of the FERC Plan and WBI Energy's other Project-specific plans and best management practices, the Project would have *no effect* on the gray wolf and red knot, and would be *not likely to adversely affect* the NLEB, interior least turn, piping plover, whooping crane, pallid sturgeon, and DASK. In addition, the Project would have *no effect* on critical habitat for DASK and would be *not likely to adversely affect* critical habitat for the piping plover.

Because consultation with the FWS is ongoing for federally listed species, **we recommend that:**

- **WBI Energy should not begin construction activities until:**
 - a. **the FERC staff receives written comments from the FWS regarding the proposed action;**

- b. **the FERC staff completes formal consultation with the FWS, if required; and**
- c. **WBI Energy has received written notification from the Director of OEP that construction or use of mitigation may begin.**

4.2 State Species of Concern

While North Dakota does not have a state endangered species program, it does track data regarding species identified as species of concern and other significant ecological communities. Field surveys conducted by WBI Energy reported observations of short-eared owl (*Asio flammeus*) and Hooker's townsendia in the Project area. Impacts on species of concern would be avoided or minimized through implementation of the measures in the FERC Plan and Procedures. These measures are designed to decrease potential for erosion, restore preconstruction contours, increase the potential for successful revegetation of the right-of-way, minimize impacts on native grassland habitat, and prevent or control the spread of noxious weeds. Given the nature of the habitats crossed and the mitigation measures that WBI Energy would implement as part of the Project, impacts on state species of concern would be minimal.

5. Land Use, Recreation, and Visual Resources

5.1 Land Use

Construction of the proposed facilities would affect approximately 1,405.1 acres of land, including the pipeline construction right-of-way, ATWS, staging areas, access roads, and aboveground facilities. Following construction, approximately 817.4 acres, including the temporary construction right-of-way, ATWS, staging areas, and temporary access roads, would be restored to preconstruction conditions and uses. The remaining approximately 587.8 acres, including 563.2 acres for the permanent pipeline easement, 3.7 acres for permanent access roads, and 21.0 acres for the aboveground facilities would be retained for operation of the Project. Table B-13 summarizes the acreage of each land use type that would be affected by construction and operation of the Project facilities.

Agricultural Lands

The majority of land affected by the Project would be agricultural land. Agricultural lands in the Project area include those used for cultivated fields, working areas within farms, pastures used for grazing, and hayfields. Construction of the Project would affect about 859.7 acres of agricultural land, of which 376.6 acres would be within the permanent pipeline easement and aboveground facility sites or permanent access roads. Following construction, agricultural lands would be restored to pre-existing condition and uses, except at the aboveground facility sites and permanent access roads, which would be converted to developed land. The Project would not affect agricultural drain tile or irrigation systems.

Open Land

Open lands in the Project area, which comprise the second most prevalent land use, include non-forested areas such as grassland and shrubland, isolated stands of trees, emergent wetlands, and shrub/scrub wetlands. Construction of the Project would affect about 434.6 acres of open land, of which 179.9 acres would be within the permanent pipeline easement. Following construction, open lands would be restored to pre-existing conditions. Areas affected by construction would be revegetated using seed mixes as determined through recommendations from the NRCS, landowners, and/or other appropriate agencies. These areas would be monitored until final stabilization and revegetation establishment is reached.

TABLE B-13

Land Uses Affected by Construction and Operation of the Project (in acres) ^a

Facility/County/Workspace	Agricultural		Open Land		Forest		Developed		Open Water		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
BURKE												
Pipeline Facilities												
Line Section 25 Loop	61.5	40.9	26.4	17.8	0.0	0.0	2.9	1.9	<0.1	<0.1	90.8	60.6
Uprate Line Section 25	0.7	0.5	2.4	2.0	0.0	0.0	0.8	0.6	0.0	0.0	3.8	3.0
ATWS												
Line Section 25 Loop	9.5	0.0	5.5	0.0	0.0	0.0	0.6	0.0	0.0	0.0	15.6	0.0
Updating Existing Site	3.9	0.0	7.4	0.0	0.0	0.0	0.3	0.0	0.0	0.0	11.6	0.0
Aboveground Facilities												
Norse Plant Receipt Station	<0.1	<0.1	0.3	0.3	0.0	0.0	0.3	0.3	0.0	0.0	0.6	0.6
Norse Transfer Station	<0.1	<0.1	1.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	1.3	0.3
Lignite Plant Receipt Station and Lignite Town Border Station	0.0	0.0	0.1	0.1	0.0	0.0	0.4	0.4	0.0	0.0	0.5	0.5
Access Roads	6.6	0.1	3.5	0.1	0.0	0.0	2.0	<0.1	0.0	0.0	12.2	0.2
Subtotal	82.2	41.5	46.6	20.6	0.0	0.0	7.6	3.2	<0.1	<0.1	136.6	65.4
MCKENZIE												
Pipeline Facilities												
Tioga-Elkhorn Creek	233.0	116.2	178.4	98.1	2.0	1.1	9.1	4.8	2.0	2.0	424.5	222.2
Elkhorn Creek-Northern Border	2.8	1.4	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	3.5	1.8
ATWS												
Tioga-Elkhorn Creek	11.3	0.0	18.5	0.0	0.1	0.0	2.3	0.0	<0.1	0.0	32.2	0.0
Staging Areas												
Boehm Staging Yard	0.0	0.0	6.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	6.2	0.0
Delta Contractors Yard	13.1	0.0	0.0	0.0	0.0	0.0	10.5	0.0	0.0	0.0	23.6	0.0
Flatlands Yard 1	4.2	0.0	0.4	0.0	0.0	0.0	0.3	0.0	0.0	0.0	4.9	0.0
Flatlands Yard 2	0.3	0.0	1.1	0.0	0.0	0.0	4.8	0.0	0.0	0.0	6.1	0.0

TABLE B-13 (cont'd)

Land Uses Affected by Construction and Operation of the Project (in acres) ^a

Facility/County/Workspace	Agricultural		Open Land		Forest		Developed		Open Water		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
Aboveground Facilities												
Elkhorn Creek Compressor Station	9.6	8.6	2.2	2.2	0.0	0.0	0.2	0.1	0.0	0.0	12.0	10.9
Northern Border Station	0.6	0.2	1.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	2.1	1.0
Cherry Creek Valve Site	0.0	0.0	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9
Access Roads	5.8	1.0	7.4	1.8	0.0	0.0	2.1	0.2	0.0	0.0	15.4	3.1
Subtotal	280.8	127.4	217.1	104.2	2.1	1.1	29.5	5.1	2.0	2.0	531.5	239.8
MOUNTRAIL												
Pipeline Facilities												
Line Section 25 Loop	23.0	15.3	9.4	6.2	0.0	0.0	0.9	0.6	0.0	0.0	33.4	22.2
ATWS												
Line Section 25 Loop	2.8	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Aboveground Facilities												
Robinson Lake Plant Receipt Station	1.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.6
Valve No. 6.8	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1
Staging Areas												
Enget Yard	0.0	0.0	39.3	0.0	0.0	0.0	0.1	0.0	0.4	0.0	39.8	0.0
Access Roads	1.7	0.1	2.6	0.0	0.0	0.0	0.6	<0.1	0.0	0.0	4.9	0.1
Subtotal	28.9	16.0	52.0	6.3	0.0	0.0	1.6	0.7	0.4	0.0	82.9	22.9
WILLIAMS												
Pipeline Facilities												
Tioga-Elkhorn Creek	234.2	117.9	37.2	18.8	0.0	0.0	5.6	3.2	12.8	12.7	289.8	152.5
Line Section 25 Loop	35.1	23.4	24.5	16.5	0.0	0.0	1.3	0.9	0.0	0.0	60.9	40.7
Line Section 30 Loop	71.6	47.7	11.9	8.0	0.0	0.0	2.4	1.5	0.1	0.1	85.9	57.2
Tioga Compressor Lateral	1.5	1.0	1.6	1.2	0.0	0.0	0.8	0.6	0.0	0.0	3.9	2.8

TABLE B-13 (cont'd)

Land Uses Affected by Construction and Operation of the Project (in acres) ^a

Facility/County/Workspace	Agricultural		Open Land		Forest		Developed		Open Water		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
ATWS												
Tioga-Elkhorn Creek	40.7	0.0	4.4	0.0	0.0	0.0	1.7	0.0	0.0	0.0	46.8	0.0
Line Section 25 Loop	5.5	0.0	5.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	10.7	0.0
Line Section 30 Loop	8.3	0.0	1.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	10.1	0.0
Tioga Compressor Lateral	0.1	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Staging Areas												
Weflen Staging Yard	17.2	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	17.7	0.0
68th Street Yard	14.2	0.0	5.6	0.0	0.0	0.0	0.6	0.0	0.0	0.0	20.4	0.0
CRS Yard	9.8	0.0	13.0	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	22.8	0.0
Lobell Yard	5.8	0.0	0.0	0.0	0.0	0.0	33.7	0.0	0.0	0.0	39.5	0.0
Schmidt Yard	7.9	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	8.4	0.0
Aboveground Facilities												
Tioga Compressor Station	0.0	0.0	8.0	4.4	0.0	0.0	0.5	0.0	0.1	<0.1	8.5	4.4
Tioga Plant Receipt Station	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1
Springbrook Plant Receipt Station	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.4
104th Ave NW Pig Launcher	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.2
Access Roads	13.9	<0.1	6.1	0.0	0.0	0.0	6.1	0.2	0.0	0.0	26.1	0.3
Subtotal	468.0	191.6	118.7	48.9	0.0	0.0	54.9	6.5	12.9	12.8	654.4	259.8
SUBTOTALS BY FACILITY TYPE												
Pipeline Facilities	663.4	364.3	292.4	169.0	2.0	1.1	23.7	13.9	14.8	14.7	996.4	563.2
ATWS	82.0	0.0	43.0	0.0	0.1	0.0	5.8	0.0	<0.1	0.0	131.1	0.0
Staging Areas	72.4	0.0	65.4	0.0	0.0	0.0	51.2	0.0	0.4	0.0	189.4	0.0
Aboveground Facilities	13.8	11.1	14.1	8.9	0.0	0.0	1.7	0.9	<0.1	<0.1	29.6	21.0
Access Roads	28.1	1.2	19.7	2.0	0.0	0.0	10.9	0.5	0.0	0.0	58.6	3.7
PROJECT TOTAL	859.7	376.6	434.6	179.9	2.1	1.1	93.3	15.3	15.3	14.8	1405.1	587.8

^a The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.

Forest Land

Forest lands in the Project area consist of woodland upland, hedgerows, and tree stands near wetlands. Construction of the Project would affect about 2.1 acres of forest land, all of which would be associated with the temporary and permanent right-of-way (2.0 acres) and ATWS (0.1 acre) for the Tioga-Elkhorn Creek pipeline. Once construction is complete, 1.1 acres of forested land would be retained as open land within the permanent right-of-way. Construction in forested areas would require the removal of trees to prepare the construction corridor and workspace. Areas affected by construction would be revegetated using seed mixes as determined through recommendations from the NRCS, landowners, and/or other appropriate agencies. Trees and shrubs would be allowed to grow within the temporary construction right-of-way and ATWS or other workspace areas, but the permanent 50-foot-wide pipeline easement would be maintained in an herbaceous state.

Developed Land

Developed lands in the Project area primarily consist of existing roads and utility lines crossed by the proposed pipeline rights-of-way. Construction of the Project would affect approximately 93.3 acres of developed land, of which 15.3 acres would be within the permanent pipeline easement for the rights-of-way, access roads, and aboveground facilities. The Project would have minimal impacts on these lands because most paved roads and highways would be crossed by conventional subsurface boring. Existing transmission line corridors would be crossed by methods agreed upon with the facility operators. Additionally, unpaved roads, two-tracks, and driveways, as well as areas with a high water table, would be crossed using the open-cut method and would be restored to preconstruction conditions. Further, WBI Energy states that it would implement traffic control measures to minimize impacts on major roadways during construction and to assist with transportation of construction equipment and materials to and from the construction right-of-way (see section B.6). WBI Energy would use the guided bore method for most road crossings to minimize the impacts on vehicle traffic.

Open Water

Open water in the Project area consists of lakes, including Lake Sakakawea, prairie pothole wetlands, and smaller creeks. Construction of the Project would affect approximately 15.3 acres of open water, most of which would be within the HDD path for the crossing of Lake Sakakawea. Because WBI Energy has proposed this crossing method, no permanent impacts on open water would result from construction of the Project. WBI Energy would cross waterbodies and wetlands using methods described in section A.7.2 of this EA.

Impacts and Mitigation

WBI Energy would mitigate impacts on land use in accordance with the FERC Plan, Procedures, and the other construction, restoration, and mitigation plans identified in this EA. Most impacts on land use would be temporary because they would occur within temporary work areas. Further, agricultural and open land within the permanent pipeline right-of-way, would be restored to pre-existing conditions and uses. Forested lands within the 50-foot-wide permanent right of way would be permanently affected due to maintenance activities described in the FERC Plan and Procedures. Buildings, structures, wells, reservoirs, obstructions or removal/addition of cover, however, would not be allowed within the permanent pipeline right-of-way.

To minimize impacts on land use (including agricultural land), WBI Energy has proposed full topsoil segregation and would remove the entire topsoil layer from the pipeline corridor and maintain proper topsoil and subsoil segregation. Agreements would be made with individual landowners to provide

compensation for crop damages or losses caused by Project construction. WBI Energy would bury the pipeline with a minimum depth of 48 inches to prevent interference with agricultural activities such as plowing and planting.

About 11.1 acres of agricultural land, 8.9 acres of open land, and 0.9 acre of developed land would be retained for operation of the aboveground facilities (compressor stations, receipt stations, and valve sites), resulting in the conversion of 11.1 acres of agricultural land and 8.9 acres of open land to developed land. Additionally, permanent access roads would affect 1.2 acres of agricultural land, 2.0 acres of open land, and 0.5 acre of developed land, resulting in a conversion of 1.2 acres of agricultural land and 2.0 acres of open land to developed land.

Based on the land use characteristics identified in the Project area and the implementation of WBI Energy's mitigation plans, it is anticipated that the impacts resulting from construction and operation of the Project on land uses would not be significant.

5.2 Residential Areas and Planned Developments

There are no houses (or any other structures) within 50 feet of the construction corridor or other work areas. In routing the pipeline, WBI Energy states that it attempted to avoid residences. The Project would not affect residential areas.

WBI Energy consulted with the Williams, Mountrail, McKenzie, and Burke County Planning and Zoning Offices as well as the planning and zoning offices for Tioga and Watford City to obtain information on any planned future developments (i.e., permitted or proposed residential or commercial developments) in the vicinity of the Project. Based on data provided by each county, there are no planned residential or commercial developments within 0.5 mile of the proposed pipeline.

The Hartels provided comments on maintaining access to a landowner's property during construction and repairing fences and gates damaged during construction. WBI Energy is committing to working with landowners and would work out any potential issues with property access and potential damage to gates and fences on an as-needed basis with individual landowners.

5.3 Landfills and Hazardous Waste Sites

WBI Energy reviewed the EPA's EnviroFacts website (EPA, 2019b) and an EPA data set for hazardous sites to identify hazardous waste sites, landfills, or other sites with the potential for soil or groundwater contamination within 0.25 mile of the Project (EPA, 2019c). Additionally, WBI Energy reviewed NDDEQ databases including Solid Waste Facilities; Environmental Incident Reports; Underground Storage Tank Registry; Leaking Underground Storage Tank Registry; Brownfield Sites in North Dakota; and publically available North Dakota Department of Environmental GIS data (NDDEQ, 2020). Table B-14 identifies the known hazardous waste sites within 0.25 mile of Project facilities.

TABLE B-14						
Hazardous Waste Sites Within 0.25 Mile of the Project						
Facility Site	Location	Distance to Project (miles)	Direction from Project to Site	Media Affected	Substance of Concern	Status of Remediation
Andeavor High Plains Company LLC Tioga Station	10318 68th Street NW Tioga, ND 58852	0.1	Southeast	N/A	N/A	N/A
Former "The Attic" Building	302 Elm St. NE Tioga, ND 58852	0.2	North	N/A	N/A	N/A
Triple Aggregate LLC – White Earth Pit	1027 S Welo St Tioga, ND 58852	0.1	North	N/A	N/A	N/A
Tioga Gas Processing Plant	10340 68th Street Northwest	0.1	Southeast	N/A	N/A	N/A
Tioga Airport Authority – Tioga Municipal Airport	67th St. NW Tioga, ND 58852	<0.1	South	N/A	N/A	N/A
Hess Corporation – Tioga Gas Plant Lab	10340 68th Street NW Tioga, ND 58852	0.1	Southeast	Surface Water	Effluent	Complete
Hess Corporation	48.379807, -102.928248	<0.1	North	N/A	N/A	N/A
Lignite Gas Plant	10050 84th Avenue Lignite, ND 58752	<0.1	South	Soil	Brackish Water	In Progress
Lignite Gas Plant	10050 84th Avenue Lignite, ND 58752	<0.1	South	Soil	Condensate	In Progress
Slawson Exploration Company, Inc. – Gunslinger 327 Right of Way	48.08890, -103.10250	<0.1	West	Soil	Bentonite Clay and Water	Complete
Area Adjacent to WBI Energy Pipeline Access Road	47.80530, -103.16470	0.3	East	Soil	Hydraulic Fluid	Complete
OXY USA, Inc. – Storage Tank	10050 84th Avenue Lignite, ND 58752	<0.1	North	N/A	N/A	N/A
Balsam, Inc. – Northern Tank Line Terminal	48.401767, -102.91635	<0.1	South	N/A	N/A	N/A

Sources: EPA, 2019b; NDDEQ, 2020
Notes: N/A = Not applicable

WBI Energy would adhere to the SPCC Plan to minimize and mitigate for impacts of spills of hazardous materials during construction. It is possible that additional, unknown sites could be encountered along the pipeline route during construction. If any contaminated soils or groundwater are encountered during construction, WBI Energy would implement the measures specified in its Plan for Unanticipated Discovery of Contaminated Environmental Media, and would notify the landowner and, if required, the appropriate regulatory agency, of the discovery.

5.4 Conservation Reserve Program

The CRP is a voluntary program administered in North Dakota by the Farm Service Agency that allows owners of agricultural tracts to conserve environmentally sensitive lands with financial assistance from the federal government. Based on WBI Energy’s conversations with landowners, there are no CRP lands crossed by the Project and therefore no impacts on CRP lands would occur.

5.5 Agricultural Conservation Easement Program

The ACEP is a program administered in North Dakota by the NRCS that combines the purposes of the former Farmland and Ranch Lands Protection Program, Grassland Reserve Program, and Wetland Reserve Program. The ACEP is a voluntary program that provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. For the agricultural lands, the NRCS provides assistance to tribal, state, and local governments, and non-governmental organizations to protect these lands and reduce non-agricultural uses. For the Wetlands Reserve Easements, the NRCS assists in the restoration, protection, and enhancement of enrolled wetlands (NRCS, 2019).

WBI Energy consulted with the NRCS on a preliminary version of the proposed pipeline routes. Based on this initial consultation, the Project did not cross any ACEP lands. WBI Energy has sent the current pipeline routes to the NRCS for a second round of review and has committed to providing FERC with the results of these consultations once they are available. The Project is not expected to have any impacts on ACEP lands.

5.6 Public Land, Recreation, and Special Interest Areas

The Project would not cross any wild and scenic rivers; national or state scenic byways; wildlife management areas; old growth forests; designated scenic areas; nature/forest preserves; state, county, or local parks; campgrounds; or natural landmarks. The Project would cross Lake Sakakawea and the LMNG and would pass through North Dakota Surface Trust Lands and multiple areas of Private Land Open to Sportsmen (PLOTS) lands. Each of these areas is discussed below.

As discussed in section A.1.2, recreation is one of the congressionally authorized purposes of the USACE Garrison Project. Recreational use of Garrison Project lands is encouraged through the availability of public parks and recreational facilities and the Garrison Project is managed to provide a diverse and high quality outdoor recreation experience. Planning for the development and use of recreation facilities is coordinated with Tribal, state, county, municipal, and local non-government entities, who lease and manage most of the higher use recreation sites on Lake Sakakawea (USACE, 2007). The Project would cross Lake Sakakawea and a small natural pond via the HDD method. Lake Sakakawea is a reservoir on the Missouri River and is about 368,000 acres in size. The land crossed by the proposed Project does not have a public access to the USACE land or the lake; all access is private. Therefore, Project construction would not have a direct impact on recreational opportunities on Lake Sakakawea. The lake crossing would occur approximately 1.3 miles from Tobacco Garden Bay, which has a restaurant, convenience store, bait and tackle shop, as well as 100 campsites, two log cabins, and picnic shelters. This area also provides access to the Birnt Hills Trail and a boat launch located on the north side. Temporary indirect impacts on recreational opportunities on Lake Sakakawea would be limited to noise, visual, and traffic impacts during HDD construction.

The Project would cross about 1.8 miles of the LMNG between MPs 27.3 and 27.6 and MPs 28.2 and 29.7 of the Tioga-Elkhorn Creek pipeline. The LMNG is a USFS-managed area and the largest grassland in the United States. This area is open to the public for mountain biking, backpacking/camping, fishing, horseback riding, and small game hunting. Some of the land within this area is also leased to ranchers for cattle grazing. There are no recreation trails within the portion of the LMNG crossed by the Project, and the area is classified as having a low scenic integrity. The proposed Tioga-Elkhorn Creek pipeline would cross two dirt two-track USFS roads (at MPs 27.2 and 28.6) and one paved/graveled USFS road (MP .29.7), which is 115th Ave NW and primarily managed by McKenzie County. WBI Energy is consulting with the USFS regarding the appropriate permitting and mitigation for these crossings; however, impacts on recreational opportunities within the LMNG are not anticipated. The Hartels provided comments about the Project's potential impacts on the USFS Land and Resource Management Plan. WBI

Energy is working closely with the USFS to minimize any potential impacts on USFS lands. As discussed in section A.1.5, the USFS is a cooperating agency on the Project and has had opportunity to provide comments and feedback to WBI Energy throughout the FERC pre-filing process.

The Project would cross about 1.0 mile of North Dakota Surface Trust Lands along the Line Section 25 Loop. The Surface Division of the North Dakota Department of Trust Lands manages 706,600 acres held in trust for various schools and institutions. The major source of income on these lands comes from agricultural leases, with grazing being the predominant use. WBI Energy has an existing easement with the North Dakota Department of Trust Lands for Line Section 25, which the Line Section 25 Loop would parallel for this stretch across state land. WBI Energy would coordinate with the North Dakota Surface Trust land to make any required updates to their existing easement for this crossing.

PLOTS lands are areas of private land that are open to hunting based on agreements between the NDGFD and the landowner. The PLOTS program also identifies public lands, wildlife management areas, and WPAs open to hunting. These lands provide walk-in public access only, defined as, “an individual traveling by foot with any legal firearm or bow, plus other equipment, accessories and provisions for the purposes of hunting” (NDGFD, 2019b). These lands do not allow activities such as horseback riding, placing bait, driving all-terrain vehicles or snowmobiles, or dog training, among other activities, without written permission from the landowner (NDGFD, 2019b).

The Project would cross one section of PLOTS land near MP 0.3 of the Line Section 30 Loop and would run parallel to one PLOTS parcel near MP 10.8 of the Tioga-Elkhorn Creek pipeline. Additionally, one access road would cross a small portion of a PLOTS parcel. In total, the Project would affect 2.3 acres of PLOTS lands. The PLOTS lands change often and WBI Energy would continue to monitor for any additional/new PLOTS lands that would be crossed prior to the start of construction. Construction of the proposed pipeline facilities is scheduled to begin in spring of 2021 and would overlap with hunting season in the Project area. However, due to the small amount of PLOTS lands crossed, any potential impacts on PLOTS lands would be minor and temporary.

5.7 Grassland Easements

Grassland easements define permanent agreements between the FWS and all present and future landowners to keep the land in native or restored grassland. Most grassland easements are large tracts of open grassland with high wetland densities and native prairie or soils that are likely to be converted to cropland unless protected (FWS, 2019d). Ground-disturbing activities are prohibited in these areas without prior approval of the FWS. Such activities are subject to review by FWS staff to determine if they are appropriate and compatible with the objectives of the easement program and require a special use permit/right-of-way grant if they are found to be compatible. WBI Energy identified a route that would avoid crossing any grassland easements; therefore, impacts on grassland easements are not expected.

5.8 Visual Resources

The Project would affect primarily undeveloped rural, grasslands, or agricultural lands. There are few residences in the vicinity of the Project, and the proposed pipelines would not cross designated scenic areas. Most visual and aesthetic impacts would be limited to the period of active construction as a result of operating equipment, personnel, and disturbed soil. After pipeline construction is complete, the landscape would be re-contoured to as near preconstruction condition as practical and revegetated in accordance with the FERC Plan and Procedures. Areas outside of the permanent pipeline right-of-way would be allowed to revert to preconstruction condition and uses. WBI Energy states that the portions of the route crossing agricultural and most open lands would likely return to preconstruction conditions within one to two growing seasons. The Project would result in the permanent conversion of about 1.1 acres of forest land to

open land within the permanent right-of-way, but these areas primarily consist of wooded upland, hedgerows, or stands of trees near wetlands. Forest lands within temporary construction areas (about 1.0 acre) would be allowed to revegetate and eventually recover to preconstruction conditions.

The Tioga-Elkhorn Creek pipeline would cross Lake Sakakawea and the LMNG. WBI Energy would use the HDD crossing method for the crossing of Lake Sakakawea and the entry points would be offset from the lake. These points may be visible to recreationists and short-term visual impacts could occur; however, WBI Energy would restore these sites to preconstruction conditions so no permanent impacts on Lake Sakakawea would occur. The pipeline would cross the LMNG in an area that has a Low Scenic Integrity Objective, which means that visual disturbances are allowed (USFS, 2019d). The route would not cross forested areas within the LMNG, and WBI Energy would revegetate and restore the right-of-way after construction in accordance with the USFS requirements. WBI Energy is consulting with the USFS on the crossing of any woody draws, which would be completed using the guided bore crossing method to avoid tree clearing. Therefore, the Project would have no permanent visual impacts on USFS land.

Visual impacts from the construction of aboveground facilities are anticipated to be minimal. Table B-15 outlines the proposed new and modified aboveground facilities associated with the Project and the potential visual resource impacts associated with each facility. As shown in section B.7.3, there are currently no historic structures along the Project routes that are recommended as potentially eligible for the National Register of Historic Places (NRHP).

As shown in table B-15, the Tioga Compressor Station, Lignite Plant Receipt Station and Lignite Town Border Station, Robinson Lake Plant Receipt Station, Springbrook Plant Receipt Station, and Tioga Plant Receipt Station are all existing aboveground facilities that would be modified as part of the Project. Given the existing presence of an industrial facility at these locations, no impacts on the current visual character of these locations is expected.

The new Elkhorn Creek Compressor Station would be constructed primarily on agricultural land and land associated with a retired scoria pit. The nearest residence is over 0.6 mile east of the site. While the compressor station would be a new facility, there are two existing industrial facilities less than 0.25 mile east of the proposed compressor station. The compressor station is expected to be visible from the nearest residence; however, the two existing industrial facilities are also visible from the residence (in the same direction but closer in proximity to the residence). Therefore, construction and operation of the new Elkhorn Creek Compressor Station are not anticipated to have significant changes to the overall visual character of the area.

The new Norse Transfer Station would be constructed primarily on open land and the nearest residence is approximately 0.5 mile north of the proposed facility. The Norse Transfer Station would be constructed adjacent to the existing Norse Plant Receipt Station. While the proposed station would be visible from the nearest residence, no significant changes to the overall visual character of the area are expected due to the existing site conditions and because the station would be constructed adjacent to an existing facility.

The new Northern Border Interconnect facility would be constructed primarily on agricultural and open land. The nearest residence is approximately 0.6 mile to the southwest of the facility site with an existing industrial facility located approximately halfway between the residence and the proposed facility. While the interconnect facility is expected to be visible from the nearest residence, no significant changes to the overall visual character of the area are expected given the existing energy development present within the viewshed.

TABLE B-15			
Potential Visual Resource Impacts Associated with the Proposed Aboveground Facilities			
Aboveground Facility	New or Existing Facility	Approximate Distance to Nearest Residence	Description of Existing Conditions and Proposed Mitigation
Tioga Compressor Station	Existing (Proposed Modification)	2,221 feet east	This is an expansion of an existing facility; therefore, no impacts on the existing visual character of the location are anticipated.
Elkhorn Creek Compressor Station	New	3,465 feet east	While this is a new facility, there is an existing energy facility in the area, which has changed the visual appearance of the area. This facility would change the landscape, but overall, no significant changes to the existing visual character of the area are anticipated.
Lignite Plant Receipt Station and Lignite Town Border Station	Existing (Proposed Modification)	2,900 feet northwest	This is an expansion of an existing facility; therefore, no impacts on the existing visual character of the location are anticipated.
Norse Plant Receipt Station	Existing (Proposed Modification)	2,478 feet north	This is an upgrade of an existing facility; therefore, no impacts on the existing visual character of the location are anticipated.
Norse Transfer Station	New	2,478 feet north	This facility would be built adjacent to the existing Norse Plant Receipt Station; therefore, no significant changes to the existing visual character of the area are anticipated.
Northern Border Interconnect	New	3,130 feet southwest	While this is a new facility, there are existing energy facilities in the area, which have changed the visual appearance of the area. This facility would change the landscape, but overall, no significant changes to the existing visual character of the area are anticipated.
Robinson Lake Plant Receipt Station	Existing (Proposed Modification)	892 feet southwest	This is an expansion of an existing facility; therefore, no impacts on the existing visual character of the location are anticipated.
Springbrook Plant Receipt Station	Existing (Proposed Modification)	5,200 feet southwest	This is an expansion of an existing facility; therefore, no impacts on the existing visual character of the location are anticipated.
Tioga Plant Receipt Station	Existing (Proposed Modification)	2,878 feet west	This is an expansion of an existing facility; therefore, no impacts on the existing visual character of the location are anticipated.

6. Socioeconomics

The Project would affect four counties in North Dakota: Williams, Burke, McKenzie, and Mountrail. The proposed pipeline routes primarily cross rural, sparsely populated areas. The routes avoid several of the larger population centers in northwestern North Dakota, such as Bowbells in Burke County, Watford City in McKenzie County, Stanley in Mountrail County, and Williston in Williams County.

In 2018, the combined estimated population for the four counties in the Project area was 61,300 people (U.S. Census Bureau, 2018). The socioeconomic impacts of construction and operation of the Project would be related to the number of construction workers that would work in the Project area and their impacts on population, public services, and employment during construction. Other potential effects include increased local traffic, decreased available housing, and increased tax revenue.

6.1 Population

The Project, as proposed, would avoid major population centers and incorporated communities. The routes primarily cross rural areas with low population densities that are dominated by agricultural lands. Construction and operation of the Project would not be anticipated to result in significant changes to the existing population. WBI Energy estimates that, for pipeline construction, an average of approximately 250 temporary construction workers would be required over the 8-month (192 working days) construction period for the pipeline; approximately 24 of these workers may be hired locally. Construction of the Elkhorn Creek Compressor Station would require an average of approximately 30 construction workers over the same 8-month period; about 10 of these construction workers would be hired locally. Construction at the Tioga Compressor Station would require an average of approximately 50 construction workers over the same 8-month period; about 12 of these construction workers would be hired locally. Construction of the remaining aboveground facilities would require an average of 20 construction workers over approximately a 20-day period, of which about 5 may be hired locally.

WBI Energy anticipates that four additional permanent staff would be required for operation of the pipeline and aboveground facilities. The additional staff would likely be based out of the Tioga and Elkhorn Creek Compressor Stations.

Project construction would result in a temporary influx of non-local construction workers to the Project area for a period of approximately 8 months. However, any increases in population levels are expected to be temporary and minor. Non-local construction workers would likely require temporary housing in the Project area but this would be limited to the relatively short period of construction and is not expected to significantly affect the local population.

6.2 Employment

The unemployment rate in North Dakota was 2.3 percent in 2018, while unemployment rates in Williams, Burke, McKenzie, and Mountrail Counties were 2.0, 1.6, 1.7, and 1.6 percent, respectively (Bureau of Labor Statistics, 2019). WBI Energy estimates that the peak construction workforce would total 450 workers with an average of approximately 350 temporary construction workers. The workforce would consist of local residents, commuters, and workers who would temporarily relocate to the Project area. Construction of the pipeline would be accomplished using three construction spreads with an average temporary workforce of 250 people. Construction of the aboveground facilities would require an average of about 100 people, consisting of a mix of local residents and workers who would temporarily relocate to the Project area. Local workers would likely be residents of the counties in the Project area and/or adjacent counties, and would reside within commuting distance of the Project.

Due to the relatively short duration and transient nature of construction, we anticipate that most non-local workers would not be accompanied by their families. The influx of any non-local workers would be temporary and limited to the construction period (about 8 months). The increase in employment for local workers would result in a temporary and negligible impact on unemployment rates in the Project area and a negligible impact on the population and services of the local municipalities.

As described in section B.6.1, WBI Energy anticipates that four additional permanent employees would be required to assist in operation and maintenance of the new facilities. These positions would represent only a negligible long-term increase in population and employment.

6.3 Transportation

Construction activities associated with the Project would result in additional, short-term impacts on transportation infrastructure such as increased traffic flow due to movement of construction vehicles, personnel, and equipment; construction of the pipeline across roadways; delivery of equipment and materials to the work area; and potential damage to local roadways from heavy construction equipment. The Project would require 2 railroad, 83 public road, and 35 private road crossings (see appendix F). Some roads would be crossed more than once.

WBI Energy would cross 74 paved roads, highways, and railroads by conventional boring and 3 roads by HDD to avoid disruption to traffic. Additionally, WBI energy would cross 43 unpaved farm roads, two-tracks, trails, and driveways, using the open-cut method and would restore these areas to preconstruction conditions. Some roads would be crossed more than once, for a total of 120 road and railroad crossings. The primary impact at road crossings would be associated with equipment crossing the roadway or entering and exiting the construction right-of-way. WBI Energy would implement measures (e.g., detours, plating over the open portion of the trench) to maintain passage for landowners and emergency vehicles, as appropriate.

As part of the proposed HDD crossing of Lake Sakakawea, the pipe pullback would extend across 51st Street NW on the north side of the lake. WBI Energy has proposed a temporary aerial span of this road with the pipe during the pullback, which is anticipated to take between 24 and 36 hours to complete. Should a road closure be necessary, WBI Energy would work with local law enforcement and county agencies to ensure that impacts on local traffic are minimized. Construction vehicles and equipment would comply with all federal, state, and county regulations as well as local load weight restrictions. To maintain safe roadway conditions at road crossings, WBI Energy would use personnel and signage to safely slow or direct traffic as appropriate.

The Hartels provided comments about construction traffic and flaggers. Impacts from construction-related traffic would be short term at any location because construction personnel and equipment would be geographically dispersed during the construction period, and personnel would travel to and from the Project area primarily during early morning and late evening hours. Additionally, construction contractors would comply with local weight limitations and restrictions on area roadways and would remove any soil that falls onto roadway surfaces.

Existing local county and township roads would be used to transport construction equipment to the Project area. Estimates for the number of vehicles that WBI Energy anticipates would be required during construction are provided in table B-16. Vehicles would include stringing trucks, welding rigs, water trucks, fuel trucks, mechanic trucks, front-end loaders, hydrostatic equipment trucks, backhoes, and construction personnel and EI vehicles.

TABLE B-16					
Estimated Daily Vehicle Traffic					
Project Facility	Construction and Delivery Vehicles	Construction Personnel Vehicles	Estimated Duration of Construction	Estimated Trips Per Day Per Vehicle	Estimated Total Trips Per Day
Pipelines	75	25	192 days over an 8-month period	2	200
Elkhorn Creek Compressor Station	15	5	192 days over an 8-month period	2	40
Tioga Compressor Station	25	10	192 day over an 8-month period	2	70
Measurement Receipt Stations (typical)	5	2	20 days	2	14
Total	120	42	192 days	8	324

WBI Energy anticipates that some workers would carpool to the construction area, thus reducing passenger vehicle load on local roads. During construction, vehicles would be distributed across the Project according to the specific phase of construction and vehicles involved in construction are anticipated to travel between the laydown yards and the construction workspace approximately one to two times per day. While the total duration of construction along the pipeline route is anticipated to last about 192 days over a period of 8 months, construction in any distinct location is anticipated to last about 4 weeks and construction activities would be scheduled to take advantage of daylight hours. As such, construction crews would typically avoid peak commuting periods by traveling to the worksite early in the morning and from the worksite later in the evening. Certain construction-related activities such as hydrostatic testing, HDDs, and tie-ins, amongst others, may occur at unspecified times and outside the normal work day. WBI Energy would attempt to schedule these activities in such a way (e.g., outside of peak traffic hours) that impacts on local commuter traffic would be minimized. The Project may create a minor temporary increase in traffic on county and township roads during active construction, but traffic delays are not anticipated. Construction of the pipeline across public roads would be completed via HDD or guided bore; therefore, no impacts on local traffic are anticipated.

WBI Energy would be required to obtain appropriate permits prior to crossing any roads. Obtaining these permits would require direct consultation between WBI Energy and the appropriate state and local agencies and thus would include specific guidance on detour routes; speed/load limits; and other use limitations, conditions, restrictions, or requirements by the issuing agency. WBI Energy would also coordinate with landowners where local, private roadways would be affected to mitigate impacts on these roads.

With implementation of WBI Energy’s proposed traffic mitigation measures and adherence to applicable permits, impacts on transportation would be temporary, minor, and not significant. The four permanent employees who would be hired for operation and maintenance of the Project facilities would have a negligible long-term effect on traffic patterns.

6.4 Housing

In 2018, the U.S. Census Bureau reported 8,702 vacant housing units available for rent in the four counties that would be crossed by the Project. There are approximately 4,029 hotel/motel rooms in the bigger cities (Tioga, Williston, Watford City) near the proposed Project. Most of the rooms are located in the Williston area in Williams County (2,810 rooms) and in or near Watford City (953 rooms) (North Dakota Tourism Division, 2019). Additionally, there are at least eight modular work camps, located across

McKenzie, Mountrail, and Williams Counties, with a bed capacity of around 2,283 and these areas could provide temporary housing for workers.

As noted above, WBI Energy anticipates that the workforce for the Project would consist of local residents, commuters, and workers who would temporarily relocate to the Project area. The influx of construction workers would temporarily increase the demand for housing in the area; however, WBI Energy is not proposing to construct temporary work camps to accommodate the non-local workers. Due to the short duration of construction (about 8 months) and the sufficient availability of temporary housing options (e.g., housing units, hotel/motel rooms, recreational vehicle and camp sites, man camp openings), the Project would have a temporary, short-term, and localized impact on housing.

The four additional permanent employees who would be hired for operation and maintenance of the Project facilities would have a negligible long-term effect on housing demand.

6.5 Public Services

WBI Energy has identified the existing inventory of public services in the Project area, which includes: 4 hospitals, 20 fire departments, and 24 police departments. These services would be adequate in the Project area to support the temporary addition of construction workers in a civil, criminal, or emergency event. WBI Energy would coordinate with these local public services to verify that they are adequately equipped to respond in the unlikely event of a major accident during Project construction.

There are numerous educational facilities near the Project area, particularly near larger population centers. Due to the relatively short duration and transient nature of construction, however, WBI Energy anticipates that most non-local workers would not be accompanied by their families. Therefore, local schools are not expected to be affected by the temporary, short-term influx of non-local workers.

The public services in the Project area would be sufficient to accommodate the influx of construction workers and their families during construction of the Project. The four additional permanent employees who would be hired for operation and maintenance of the Project facilities would have a negligible long-term effect on public services.

6.6 Property Values, Eminent Domain, and Compensation

While no scoping comments were received specific to property values, the Hartels inquired about eminent domain, compensation for acquisition of a right-of-way, and right-of-way easement terms. WBI Energy does not currently have recourse to eminent domain to obtain an easement for the Project. Under section 7(h) of the NGA, WBI Energy would obtain the right to eminent domain if FERC issues a Certificate for the Project. Regardless, WBI Energy states that it would attempt to negotiate an easement agreement with each landowner along the proposed pipeline route. Regarding compensation, WBI Energy states that it would negotiate with affected landowners in good faith and in a fair and honest manner to obtain an easement to construct, operate, and maintain the proposed pipeline in return for monetary compensation. Compensation for easements would be based on fair market value and would be paid on a one-time, lump-sum basis. With regards to easement terms, WBI Energy would follow the requirements in the North Dakota Century Code T47C05.

With regard to property values, while there is recently published literature indicating that there is no identifiable or consistent link between the presence of natural gas infrastructure and property values (Diskin et al. 2011, Foster 2016), valuation is subjective and is generally not considered in appraisals. The presence of a pipeline and the restrictions associated with a pipeline easement could influence a potential buyer's decision to purchase a property. If a buyer is looking for a property for a specific use that the presence of the pipeline renders infeasible, then the buyer may decide to purchase another property more suitable to their objectives. For example, a buyer wanting to develop the land for a commercial property

with subsurface structures would likely not find the property suitable, however farmers and ranchers looking for land for grazing or agricultural use could find it suitable for their needs. Given the land use in the project area is primarily agricultural and open land and the presence of existing natural gas infrastructure throughout the Project area it is not anticipated that the Project would have a significant impact on property values.

6.7 Economy and Tax Revenue

Construction personnel hired directly or through a third party would have a positive impact on local tax revenues through payroll spending on housing, food, utilities, entertainment, and luxury items. The Project construction payroll is estimated to total approximately \$26,993,000 over the duration of the Project, which may help stimulate regional employment as new workers are hired to meet construction demands. Due to the minimal number (four) of new permanent employees for operation of the Project facilities, there would be insignificant changes to the long-term contribution of payroll to the local economies.

WBI Energy estimates that the cost of construction materials and supplies would be about \$17,296,000. Materials such as concrete, stone, erosion control materials, mulch, seed, and fencing are all items that can be purchased from local vendors. These purchases would result in short-term beneficial impacts on local businesses by generating additional revenues and contributing to the tax base. Based on current state sales tax rates, the Project's estimated state sales tax revenues for material and supplies would be about \$927,800.

In addition, ad valorem, or property taxes, result in long-term benefits to local and regional economies. Ad valorem tax revenues would depend on the length or footprint of Project facilities in each county and would be paid over the life of the Project. Based on estimated property tax rates, WBI Energy estimates that total annual ad valorem tax revenue associated with the Project would be \$788,228.

Project construction would result in positive short-term benefits through increased state and local sales tax revenues associated with increased payroll spending and the purchase of construction materials as well as goods and services purchased from local vendors and businesses by the construction workforce. Positive indirect impacts include increased sales for businesses that specifically service construction activities. WBI Energy would also be required to pay county environmental and construction permit fees as well as property taxes on purchased easements during the development phase of the Project, which would generate a small amount of revenue for the counties. Income and sales tax revenues generated from Project construction would most likely benefit education and school programs, health care programs, and public transportation and infrastructure projects.

6.8 Navigation

As discussed in section A.1.2, navigation is one of the congressionally authorized purposes of the USACE Garrison Project. The Missouri River does not support commercial navigation in the portion of the river that would be crossed by the proposed Project. Gavins Point Dam (at river mile 811.1 in South Dakota) is the northernmost point that commercial vessels can travel on the river. While commercial navigation does not occur in the proposed Project area, the entire mainstem dam system is operated to provide adequate flows to support navigation in the southern reaches (USACE, 2007).

WBI Energy would install the pipeline under the Lake Sakakawea using the HDD method. Project construction would not require the use of any barges or other structures within Lake Sakakawea. During construction of the HDD across Lake Sakakawea, the primary method for monitoring for a potential inadvertent release would be the instrumentation in the drilling rig constantly monitoring annulus mud pressure and flowrates. If these gauges indicate a loss of return, drill activities would be temporarily stopped including a pump shut down. Then either a drone would be used to monitor the water surface for

turbidity or a small boat would be launched from a dedicate boat ramp to view surface conditions. As Lake Sakakawea is actively used for recreation, the addition of one potential motorized boat is not anticipated to cause impacts on navigation. Once the pipeline is in place, it would be installed between 200 and 300 feet below the lakebed, preventing any interference with navigation on Lake Sakakawea. Therefore, construction and operation of the proposed Project would have no impacts on navigation.

6.9 Hydropower

As discussed in section A.1.2, hydropower is one of the congressionally authorized purposes of the USACE Garrison Project. The Garrison power plant is operated to assist meeting peak-load demands for hydropower in the Upper Missouri River basin. The plant contains five turbines and generators with a generating capacity of 517,750 kilowatts, which produces about 2.5 billion kilowatt-hours of energy each year. The power is marketed by the Western Area Power Administration and is integrated with the generation provided from other mainstem projects along with other public and private facilities in the market area (USACE, 2007).

Project construction and operation would not divert or appropriate water from the Lake Sakakawea; therefore, the Project would not affect lake water volumes or the ability to generate hydropower.

6.10 Environmental Justice

EO 12898 on Environmental Justice recognizes the importance of using the NEPA process to identify and address, as appropriate, any disproportionately high and adverse health or environmental effects of its programs, policies, and activities on minority and low-income populations. Consistent with EO 12898, the CEQ called on federal agencies to actively scrutinize the following issues with respect to environmental justice (CEQ, 1997):

- the racial and economic composition of affected communities;
- health-related issues that may amplify project effects on minority or low-income individuals; and
- public participation strategies, including community or tribal participation in the process.

The EPA defines minorities as those groups that include American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic (EPA, 2016). Environmental justice areas are defined as locations with a “meaningful greater” percentage of minorities than the general population (ten percent or greater), locations in which minorities comprise more than 50 percent of the affected area’s population, or locations in which the low-income population is equal to or greater than that of the reference population (EPA, 2016). Based on the review of census data for block groups within 1.0 mile of the proposed Project (displayed in table B-17 below) none of the communities affected by the Project meet the definition of an environmental justice community using the EPA’s meaningfully greater analysis method or low-income analysis. However, as indicated in table B-17, the poverty levels for Burke County and Census Tract 9533, block groups 1 and 2 are both 7.3 percent. This is because the entire population of Burke County is represented by Census Tract 9533, block groups 1 and 2. To provide meaningful analysis, the state of North Dakota (11.0 percent) was used as a reference population for evaluation of low-income populations within Census Tract 9533. The poverty level in Census Tract 9533 is 7.3 percent, which is 3.7 percentage points lower than the poverty level for the state of North Dakota (11.0 percent). Therefore, Census Tract 9533 in Burke County does not meet the definition of an environmental justice community under EPA standards. The average poverty level across all counties affected by the Project is 9.8 percent, which is 1.2 percentage points lower than the state of North Dakota.

TABLE B-17

Environmental Justice Demographic Indicators of Census Blocks in the Vicinity of the Project ^a

State/County	White Alone Not Hispanic or Latino (percent)	African American or Black (percent)	Native American/Alaska Native (percent)	Asian (percent)	Native Hawaiian or Other Pacific Islander (percent)	Some Other Race (percent)	Hispanic or Latino (percent)	Total Minority ^b (percent)	Below Poverty Level ^c (percent)
North Dakota	87.7	2.3	5.3	1.4	>0.1	>0.1	3.3	12.3	11.0
Burke County	94.4	0.4	2.8	>0.1	>0.1	0.6	1.6	5.4	7.3
Census Tract 9533, Block Group 1	99.4	>0.1	>0.1	>0.1	>0.1	0.6	0.6	1.1	7.3 ^d
Census Tract 9533, Block Group 2	89.9	0.8	5.2	0.1	>0.1	0.6	2.5	9.2	7.3 ^d
McKenzie County	82.8	0.6	13.3	0.6	>0.1	0.6	7.0	22.1	11.7
Census Tract 9623, Block Group 1	93.2	>0.1	>0.1	>0.1	>0.1	>0.1	>0.1	>0.1	8.9 ^d
Census Tract 9623, Block Group 2	95.0	>0.1	>0.1	2.4	>0.1	0.3	4.9	7.6	8.9 ^d
Mountrail County	65.9	1.1	26.9	0.4	>0.1	1.9	7.0	37.3	11.2
Census Tract 9552, Block Group 1	85.7	3.2	2.4	1.1	>0.1	2.4	8.1	17.1	7.3 ^d
Census Tract 9552, Block Group 2	97.9	0.1	0.2	0.2	>0.1	>0.1	1.5	1.9	7.3 ^d
Census Tract 9552, Block Group 3	92.3	>0.1	>0.1	>0.1	>0.1	4.9	3.2	8.1	7.3 ^d
Williams County	85.2	3.4	2.8	0.7	>0.1	3.5	6.1	16.5	9.0
Census Tract 9534, Block Group 1	96.9	>0.1	>0.1	>0.1	>0.1	>0.1	2.7	2.7	4.5 ^d
Census Tract 9534, Block Group 2	93.2	0.6	0.3	>0.1	>0.1	0.8	4.1	5.9	4.5 ^d
Census Tract 9536, Block Group 2	93.2	>0.1	4.4	>0.1	0.3	0.1	1.5	6.2	7.1 ^d
Census Tract 9536, Block Group 3	85.7	8.8	3.3	0.0	>0.1	>0.1	6.4	18.5	7.1 ^d

Source: U.S. Census Bureau, 2017

^a Data represents census populations within 1 mile of the Project.^b Minority refers to people who reported their ethnicity and race as something other than non-Hispanic white. Totals may not sum to 100 due to rounding.^c Poverty level is set by the U.S. Census Bureau based on family size and composition; poverty status is determined based on pre-tax income excluding capital gains.^d Value represents the census tract; data for individual block groups is not available.

The Fort Berthold Reservation, which while not crossed by the Project is within the study area of socioeconomics, contains four census block groups that would exceed the EPA thresholds. These are Census Tract 9403, Block Group 1, Mountrail County; Census Tract 9404, Block Group 1, Mountrail County; Census Tract 9404, Block Group 2, Mountrail County; and Census Tract 9401, Block Group 1, McKenzie County. The nearest Project facility to the Fort Berthold Reservation, the Tioga-Elkhorn Creek pipeline, would be about 18 miles from the reservation. WBI Energy completed consultation with the Three Affiliated Tribes of the Fort Berthold Reservation, which is further discussed in section B.7 of this EA.

The Project facilities would not cross any of the environmental justice communities identified above; therefore, the Project is not expected to affect environmental justice areas.

7. Cultural Resources

Section 106 of the NHPA requires that FERC take into account the effects of its undertakings (including issuing Certificates) on historic properties listed, or eligible for listing, on the NRHP,⁹ and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. WBI Energy, as a non-federal party, is assisting the Commission in meeting these obligations under section 106 and the implementing regulations at 36 CFR 800 by preparing the necessary information, analyses, and recommendations, as authorized by 36 CFR Part 800.2(a)(3).

7.1 Area of Potential Effects

The Project area of potential effects (APE) is the “geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist” (36 CFR 800.16(d)). The Project APE encompasses the entirety of the proposed Project area which includes all areas of potential direct and indirect effects from construction, operations, and maintenance for the proposed Project.

For archaeological resources, WBI Energy defined the APE as a 300-foot-wide corridor along the proposed pipeline routes, a 50-foot-wide corridor along access roads, and the construction footprints for other facilities and staging areas. In total, the APE for archaeological resources encompasses 3,603.8 acres.

For historic structures and other aboveground resources, WBI Energy defined the APE as the area of direct Project effects plus a buffer encompassing potential viewshed impacts from the proposed facilities up to a distance of 0.5 mile from the facilities. In total, the APE for historic structures and other aboveground resources encompasses 66,813.7 acres.

7.2 Cultural Resources Investigations

In an effort to identify historic properties within the Project APE and to account for any direct or indirect effects to those properties by the proposed Project, WBI completed cultural resources investigations which included a Class I literature review and Class III archaeological and historic structures surveys. The results of these efforts are summarized in a Class III archaeological report and Class III historic structures report. A standalone report describing the results of the archaeological survey on lands managed by the USFS also was prepared at the request of the USFS.

⁹ In accordance with 36 CFR 800.16(l)(1), a historic property is any prehistoric or historic district, site, building, structure, object, or property of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization, included in, or eligible for inclusion in, the NRHP. This term includes artifacts, records, and remains that are related to and located within such properties.

State Historical Society of North Dakota

WBI Energy sent the SHSND an introductory Project letter on April 15, 2019. WBI Energy submitted a survey work plan to the SHSND for review on May 15, 2019. The SHSND approved this plan in a letter to WBI Energy on June 5, 2019. WBI Energy sent the SHSND proposed modifications to the work plan in an email on June 14, 2019. The SHSND approved the modifications to the work plan in a reply email to WBI Energy on June 19, 2019. On February 14, 2020, WBI Energy sent copies of its Class III archaeological and historic structures survey reports to the SHSND for review.

Federal Land Managing Agencies

The Project crosses federal lands managed by the USACE and USFS. WBI Energy sent introductory Project letters to both agencies on April 15, 2019. WBI Energy discussed survey requirements for federal lands with each agency in a series of emails and phone calls between May 3 and September 13, 2019. WBI Energy submitted applications for survey permits for archaeological surveys on federal lands to the USACE on May 9, 2019 and the USFS on May 21, 2019. The USFS issued a permit on August 15, 2019 and the USACE issued a permit on September 15, 2019. An archaeologist from the USACE participated in a portion of the archaeological field surveys on USACE lands in September 2019. WBI Energy sent copies of its Class III archaeological and historic structures survey reports to the USACE and USFS for review on February 14, 2020.

Indian Tribes

WBI Energy contacted 13 Indian tribes regarding the Project (see table B-18). On April 15, 2019, WBI Energy sent introductory Project letters to 12 tribes to solicit their comments regarding the potential of the Project to impact cultural resource sites. WBI Energy followed up with each tribe by phone and/or email between May 10 and 15, 2019 to confirm each tribe's receipt of the letter. WBI Energy met with two tribes (the Assiniboine and Sioux Tribes of the Fort Peck Reservation and Fort Belknap Indian Community) on June 13, 2019 to discuss the Project and tribal participation in field surveys; neither tribe joined the survey effort for the Project.

WBI Energy invited 12 tribes to attend the public open houses for the Project in letters dated July 17, 2019. WBI Energy sent an invitation to the public open houses to an additional tribe (Fort Belknap Indian Community) on July 29, 2019. One tribe (the Three Affiliated Tribes of the Fort Berthold Reservation) attended an open house. WBI Energy subsequently met with this tribe on August 7, 2019 to discuss Project safety and the proposed crossing of Lake Sakakawea by HDD.

WBI Energy sent Project update letters to 13 tribes on July 30, 2019. The update letters provided information on Project changes; advised the tribes of their opportunity to participate in field surveys; and requested feedback on survey boundaries, methodologies, and sites in the Project area. In a follow-up call on August 29, 2019, the Rosebud Sioux tribe expressed interest in participating in field surveys, and subsequently joined the field survey effort in September and October 2019.

On September 25, 2019, we sent letters to 12 Indian tribes that historically may have occupied or used the Project area, requesting their comments about the Project and their assistance in the identification of traditional cultural properties and other cultural resources that may be affected (see table B-18). **FERC to insert information here on the letters that were received.]**

Tribes Sent FERC's September 13, 2019 NOI and September 25, 2019 Letter	Letters Sent to Tribes by WBI Energy			Responses
	April 15, 2019	July 17, 2019	July 30, 2019	
Standing Rock Sioux Tribe	X	X	X	No response
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation	X	X	X	No response
Turtle Mountain Band of Chippewa Indians	X	X		No comments on the Project
Three Affiliated Tribes of the Fort Berthold Reservation	X	X	X	Met with WBI Energy to discuss Project safety and HDD design
Spirit Lake Sioux Tribe	X	X	X	No response
Yankton Sioux Tribe	X	X	X	No response
Northern Cheyenne Tribe	X	X	X	Requested copies of survey reports and information on tribal participation in field surveys
Cheyenne River Sioux Tribe	X	X	X	Expressed opposition to the Project; requested direct consultation with FERC, preparation of an environmental impact statement, and tribal participation in field surveys
Assiniboine and Sioux Tribes of the Fort Peck Reservation	X	X	X	Met with WBI Energy to discuss the Project and tribal participation in field surveys
Rosebud Sioux Tribe	X	X	X	Expressed interest in the Project and tribal participation in field surveys; participated in field surveys in September and October 2019
Oglala Sioux Tribe	X	X	X	Requested copies of survey reports
Northern Arapaho Tribe of Wind River Indian Reservation	X	X	X	No response
Fort Belknap Indian Community		X	X	Met with WBI Energy to discuss the Project and tribal participation in field surveys

In various communications with FERC staff or WBI Energy, six tribes (Northern Cheyenne Tribe, Three Affiliated Tribes of the Fort Berthold Reservation, Assiniboine and Sioux Tribes of the Fort Peck Reservation, Rosebud Sioux Tribe, Fort Belknap Indian Community, and Oglala Sioux Tribe) expressed interest in field surveys and/or requested survey reports. WBI Energy sent copies of its Class III archaeological and historic structures survey reports, to each of these tribes on February 14, 2020.

7.3 Overview and Inventory Results

Archaeological Resources

To assess the potential of the Project to affect archaeological sites within the APE, WBI Energy surveyed a 300-foot-wide corridor along the proposed pipeline routes, a 50-foot-wide corridor along access roads, and the footprints for aboveground facilities and contractor yards/staging areas.

Prior to survey, WBI Energy conducted a Class I literature review at the SHSND to identify previously recorded sites within and near the survey areas for the Project. The review generally examined

a 2-mile-wide corridor encompassing the proposed Project facilities. Approximately 12.6 percent of the study area for the Class I literature review was previously surveyed. The review identified 370 previously recorded archaeological resources in the search area. These consist of 93 prehistoric sites, 103 historic sites, 168 isolated finds and site leads, and 6 sites for which no information on site type or affiliation is available.¹⁰ Of these, 33 previously recorded resources (14 site leads, 4 prehistoric sites, 13 historic sites, 1 site with prehistoric and historic components, and 1 site with no available information on site type or affiliation) are within the survey area for the Project.

Between June and October 2019, WBI Energy conducted a Class III archaeological survey and inventory in support of the Project. Investigations were completed along 20.4 miles of the Line Section 25 Loop, 0.5 miles of the Tioga Compressor Lateral, 52.4 miles of the Tioga-Elkhorn Creek Pipeline, 0.3 miles of the Elkhorn Creek to Northern Border Pipeline, 7.6 miles of the Line Section 30 Loop, and three uprate sites. In addition, WBI Energy surveyed the Tioga and Elkhorn Creek Compressor Stations, Tioga Plant Receipt Station, Springbrook Plant Receipt Station, Northern Border Interconnect, Norse Plant Receipt Station, Norse Transfer Station, 9 of 10 staging areas, and 89 access roads. In total, 3,208.6 of 3,603.8 acres (89 percent) of the archaeological APE for the Project was surveyed. Sixty-one archaeological sites and 12 isolated finds were recorded within the survey corridors for the pipelines or in other survey areas. Information on these sites is provided in table B-19.

Of the 73 sites and isolated finds that have been identified within the survey corridors or other survey areas for the Project, 34 sites are recommended as not eligible for listing on the NRHP; no further work at these sites is recommended. The NRHP-eligibility of the remaining 39 sites is undetermined. Of these unevaluated sites, 19 sites are located greater than 25 feet from the construction footprint for the Project. Because these sites would not be affected by Project construction activities, no additional work at the sites is recommended. Twelve unevaluated sites are located outside of the construction footprint for the Project, but within 25 feet of construction workspace. While these sites would not be affected by Project construction activities, fencing of the edge of the construction right-of-way in areas adjacent to these sites is recommended to ensure they are adequately protected during construction. Five unevaluated sites are located within the construction footprint of the Project; avoidance or additional testing of these sites is recommended.

Approximately 9.0 miles of the proposed pipeline routes were not examined due to lack of survey permission from the landowners or route variations identified after the conclusion of the 2019 field season. Additionally, survey has not been completed at one uprate site, the Lignite Town Border and Lignite Receipt Station, Robinson Lake Plant Receipt Station, Schmidt Yard, and 4 access roads. WBI Energy anticipates completing archaeological survey of pipeline route revisions adopted after the conclusion of the 2019 survey season in the spring or summer of 2020. Survey of tracts where survey permission was denied will be completed as soon as access is obtained and field conditions permit. None of the remaining areas that require survey are located on federal lands.

WBI Energy has indicated that geomorphological investigations could be required in certain floodplain areas to assess the potential for deeply buried archaeological sites in the Project area. Additional testing has also been recommended for five sites if they cannot be avoided by the Project route. These investigations are planned for the spring or summer of 2020.

¹⁰ Site leads are defined by the state of North Dakota as areas containing cultural resources identified by a landowner or other non-professional; an area with five or less artifacts visible on the surface that may have intact subsurface cultural deposits; or architectural sites that have not been fully recorded due to being located outside of a given project area or where property access has been denied.

TABLE B-19

Archaeological Sites Identified During the Class III Survey

Site No.	Locus No.	Temporal Period	Site Type	WBI Energy Recommended NRHP Evaluation	WBI Energy Recommended Future Action
32BK278	PS-DOP-01	Prehistoric	Lithic scatter	Not eligible	No further work
32BKX1056	IF-DOP-02	Prehistoric	Lithic isolate	Not eligible	No further work
32BK276	HS-WWD-01	Historic	Cultural material scatter	Not eligible	No further work
32BK277	PS-WWD-02	Prehistoric	Stone Circle	Unevaluated	Fence ^a
32BK279	PS-DOP-03	Prehistoric	Stone circles, cairns	Unevaluated	No further work ^b
32BK168	HS-DOP-04	Historic	Historic homestead	Not eligible	No further work
32BK282	PS-DOP-09	Prehistoric	Stone features	Unevaluated	No further work ^b
32BK280	PS-DOP-06	Prehistoric	Stone circles, cairns	Unevaluated	No further work ^b
32MN1305	32MN1305	Historic	Historic well pad and artifacts	Not eligible	No further work
32MNX1038	IF-WE-08	Prehistoric	Lithic isolate	Not eligible	No further work
32WIX808	IF-WE-07	Prehistoric	Lithic isolate	Not eligible	No further work
32WI1497	HS-WE-06	Historic	Homestead	Not eligible	No further work
32WI1630	PS-WWD-05	Prehistoric	Stone circles, cairns	Unevaluated	No further work ^b
32WI2392	PS-WWD-06	Prehistoric	Stone circles, cairns	Unevaluated	No further work ^b
32WI2393	PS-WWD-07	Prehistoric	Stone circles	Unevaluated	No further work ^b
32WI2394	PS-WWD-08	Prehistoric	Stone circles	Unevaluated	Fence ^a
32WI1494	PS-WE-05	Prehistoric	Stone circle	Unevaluated	No further work ^b
32WI1495	HS-WE-04	Historic	Cultural material scatter	Not eligible	No further work
32WI2389	PS-WE-03	Prehistoric	Stone circles, cairns	Unevaluated	No further work ^b
32WI2390	PS-WWD-03	Prehistoric	Lithic scatter	Not eligible	No further work
32WI2391	PS-WWD-04	Prehistoric	Stone circles, cairns	Unevaluated	Fence ^a
32WI2144	PS-WE-01	Prehistoric	Stone circles, cairns	Unevaluated	Fence ^a
32WI1145	32WI1145	Historic	Cultural material scatter	Not eligible	No further work
32WI897	32WI897	Historic	Historic Structures. Demolished	Not eligible	No further work
32WI2410	PS-WWD-14	Prehistoric	Lithic isolate	Unevaluated	Avoid or additional testing
32WIX803	IF-WWD-12	Prehistoric	Lithic Isolate	Not eligible	No further work
32WI2352	PS-DOP-10	Prehistoric	Stone circles, cairns	Unevaluated	Avoid or additional testing
32WI2388	PS-DOP-34	Prehistoric	Stone features	Unevaluated	No further work ^b
32WIX809	IF-WE-11	Prehistoric	Lithic isolate	Not eligible	No further work
32WI2405	PS-WE-10	Prehistoric	Lithic scatter	Not eligible	No further work
32WI2409	PS-WE-09	Prehistoric	Lithic scatter	Not eligible	No further work
32WI2408	PHS-WE-22	P and H	Farmstead and associated cultural material scatter; possible grave; prehistoric lithic scatter	Unevaluated	Avoid or additional testing
32WI2407	HS-WE-23	Historic	Cultural material scatter and features (foundation, depressions).	Unevaluated	Avoid or additional testing
32WI2398	PS-DOP-35	Prehistoric	Cairn	Unevaluated	Fence ^a
32WI2404	PS-WE-21	Prehistoric	Cairn	Unevaluated	Fence ^a
32WI2406	PS-WE-20	Prehistoric	Stone circles, cairns	Unevaluated	Fence ^a
32WI976	PS-KM-01	Prehistoric	Lithic scatter	Not eligible	No further work
32MZ598	PHS-KM-09	Prehistoric and Historic	Homestead; faunal material scatter	Unevaluated	No further work ^b
32MZ3301	PS-WE-39	Prehistoric	Stone circle	Unevaluated	No further work ^b
32MZ2346	HS-WE-40	Historic	Homestead	Not eligible	No further work
32MZ144	HS-WE-38	Historic	Homestead	Not eligible	No further work

TABLE B-19 (cont'd)

Archaeological Sites Identified During the Class III Survey

Site No.	Locus No.	Temporal Period	Site Type	WBI Energy Recommended NRHP Evaluation	WBI Energy Recommended Future Action
32MZ3320	PS-WE-36	Prehistoric	Cairn	Unevaluated	No further work ^b
32MZ3319	PS-WE-35	Prehistoric	Cairn	Unevaluated	Fence ^a
32MZ3324	HS-WE-34	Historic	Historic features, cultural material scatter; foundation; domestic midden	Unevaluated	Fence ^a
32MZ3314	PS-KM-02	Prehistoric	Cairn	Unevaluated	No further work ^b
32MZ3315	PS-KM-03	Prehistoric	Stone circle, cairn	Unevaluated	No further work ^b
32MZ3322	PHS-WE-37	Prehistoric and Historic	Historic features, prehistoric cairn	Unevaluated	No further work ^b
32MZ3321	PHS-WE-33	Prehistoric and Historic	Cultural material scatter; depressions, foundation, privy; prehistoric cairn	Unevaluated	No further work ^b
32MZ3329	PS-WE-19	Prehistoric	Lithic and faunal scatter	Not eligible	No further work
32MZ2939	32MZ2939	Historic	Road cut	Not eligible	No further work
32MZ3328	PS-WE-18	Prehistoric	Lithic and faunal scatter	Not eligible	No further work
32MZ3327	PS-WE-17	Prehistoric	Cairn	Unevaluated	Fence ^a
32MZ3325	PS-WE-12	Prehistoric	Cairn	Unevaluated	No further work ^b
32MZ3331	PHS-WE-14	Prehistoric and Historic	Historic residence; Prehistoric lithic scatter	Not eligible	No further work
32MZX1754	IF-WE-15	Prehistoric	Lithic isolate	Not eligible	No further work
32MZ3326	PS-WE-16	Prehistoric	Lithic scatter	Not eligible	No further work
32MZ3302	PS-DOP-11	Prehistoric	Lithic scatter	Not eligible	No further work
32MZX1745	IF-DOP-12	Prehistoric	Lithic scatter	Not eligible	No further work
32MZ3306	PS-DOP-17	Prehistoric	Lithic scatter	Not eligible	No further work
32MZ3307	PS-DOP-18	Prehistoric	Lithic scatter	Not eligible	No further work
32MZ3318	PS-KM-06	Prehistoric	Lithic scatter	Not eligible	No further work
32MZ3308	PS-DOP-20	Prehistoric	Cairns	Unevaluated	Fence ^a
32MZ3323	HS-DOP-31	Historic	Historic foundations and features with artifact scatter	Not eligible	No further work
32MZX1753	IF-DOP-32	Prehistoric	Lithic isolates	Not eligible	No further work
32MZ3313	PS-DOP-30	Prehistoric	Lithic scatter with feature	Unevaluated	Avoid or additional testing
32MZ3312	PS-DOP-28	Prehistoric	Cairn	Unevaluated	No further work ^b
32MZ3310	PS-DOP-25	Prehistoric	Stone circles, cairns	Unevaluated	No further work ^b
32MZ3311	PS-DOP-27	Prehistoric	Cairn	Unevaluated	Fence ^a
32MZX1750	IF-DOP-26	Prehistoric	Lithic isolate	Not eligible	No further work
32MZ3309	PS-DOP-24	Prehistoric	Stone circle, cairns	Unevaluated	No further work ^b
32MZX1749	IF-DOP-23	Prehistoric	Lithic isolates	Not eligible	No further work
32MZX1748	IF-DOP-22	Prehistoric	Lithic isolates	Not eligible	No further work
32MZX1747	IF-DOP-21	Prehistoric	Lithic isolates	Not eligible	No further work
32MZX1744	IF-WE-41	Prehistoric	Lithic isolate	Not eligible	No further work

^a These sites would not be affected by the Project, but they are within 25 feet of construction workspace. Fencing of the edge of the construction right-of-way where it passes near these sites is recommended.

^b These sites would not be affected by the Project. They are greater than 25 feet from the construction workspace.

Historic Architectural Resources

To assess the potential of the Project to affect historic architectural sites within the APE, WBI Energy documented historic architectural resources within the direct APE plus a buffer encompassing potential viewshed impacts from the proposed facilities up to a distance of 0.5 mile from the facilities. Prior to survey, WBI Energy conducted a Class I literature review at the SHSND to identify previously recorded historic structures within and near the survey areas for the Project. The review generally examined a 1-mile-wide corridor along the proposed Project facilities. The review identified 80 historic architectural sites and sites leads, of which five are within the survey corridor for the Project.

In June and September 2019, WBI Energy conducted a Class III survey of the entire APE for historic resources. During the survey, 16 historic architectural resources were documented, including five previously recorded sites. Information on these sites is provided in table B-20. The five previously recorded structures are not eligible for listing in the NRHP; no further work at these sites is recommended. Of the remainder, one site is recommended not eligible for listing in the NRHP; no further work at this site is recommended. Ten structures have not been evaluated for listing in the NRHP, but the Project would have no adverse effect on these resources; no additional work at these structures is recommended.

Site No.	Locus No.	Temporal Period	Site Type ^a	WBI Energy Recommended NRHP Evaluation	WBI Energy Recommended Future Action
32BK293	MB-1-ND	Historic	C. 1910 Farmstead	Unevaluated	No further work
32BK294	MB-16-ND	Historic	C. 1960 Oil tanks and machinery	Unevaluated	No further work
32BK295	MB-17-ND	Historic	C. 1960 Compressor station	Unevaluated	No further work
32BK296	MB-26-ND	Historic	C. 1930 Vernacular dwelling and farmstead	Unevaluated	No further work
32BK297	MB-36-ND	Historic	C. 1930 Ranch and farmstead	Unevaluated	No further work
32BKX1068	MB-9-ND	Historic	C. 1910 Vernacular dwelling and farmstead	Unevaluated	No further work
32MN1584	MB-7-ND	Historic	C. 1930 Dwelling and farmstead	Unevaluated	No further work
32MN1585	MB-8-ND	Historic	C. 1910 Granary and grain bins	Unevaluated	No further work
32WI2411	MB-12-ND	Historic	C. 1950 Dwellings and farmstead	Not eligible	No further work
32WI1497	32WI1497	Historic	C. 1915-1930 Homestead windmill	Not eligible	No further work
32MZ2405	32MZ2405	Historic	1955 Bridge, replaced 1987	Not eligible	No further work
32MZ2939	32MZ2939	Historic	C. 1915 Animal shelter and corral	Not eligible	No further work
32MZ3151	32MZ3151	Historic	C. 1960-1975 Bridge	Not eligible	No further work
32WI897	32WI897	Historic	C. 1915-1930 Farmstead	Not eligible	No further work
32MZ3336	MB-39-ND	Historic	C. 1930 Outbuilding	Unevaluated	No further work
32MZ3337	MB-27-ND	Historic	C. 1955 Ranch dwelling and cattle ranch	Unevaluated	No further work

^a C. = circa

Traditional Cultural Properties

No traditional cultural properties or properties of religious or cultural importance to Indian tribes have been identified in the APE through the consultations completed to date with the SHSND, USACE, USFS, or any of the tribes contacted for the Project.

7.4 Unanticipated Discovery Plan

WBI Energy developed a Plan for the Unanticipated Discovery of Historic Properties or Human Remains during Construction for the Project. The plan establishes procedures to be implemented in the event that previously unreported historic properties or human remains are found during construction of the Project. Copies of the plan were appended to the Class III archaeological survey reports, which WBI Energy sent on February 14, 2020 to the SHSND, USACE, USFS, and federally recognized Indian tribes who requested copies or expressed interest in survey results.

7.5 Compliance with the National Historic Preservation Act

We have not yet completed the section 106 compliance process. WBI Energy intends to conduct additional Class III archaeological surveys of the remaining portions of the APE, geomorphological assessments, and site testing during the spring of 2020.

If FERC, in consultation with the SHSND (and the USACE or the USFS for federal lands, as applicable), identifies any historic properties that may be adversely affected by the proposed Project, we would notify the ACHP and require WBI Energy to produce site-specific treatment plans that outline measures to resolve adverse effects. Once FERC and the SHSND (and the USACE or the USFS as applicable) accept the treatment plans, a Memorandum of Agreement would be executed.

In order to comply with the NHPA, we recommend that:

- **WBI Energy should not begin construction of facilities and/or use of staging, storage, or temporary work areas and new or to-be-improved access roads until:**
 - a. **WBI Energy files with the Secretary:**
 - i. **remaining cultural resources survey reports;**
 - ii. **site-specific evaluation reports, avoidance plans, and/or treatment plan(s), as required; and**
 - iii. **comments on the cultural resources reports and plans from the SHSND, USACE, USFS, and/or tribes, as applicable;**
 - b. **the ACHP is afforded an opportunity to comment if historic properties would be adversely affected; and**
 - c. **the FERC staff reviews and the Director of the OEP approves the cultural resources reports and plans and notifies WBI Energy in writing that avoidance and/or treatment measures (including archaeological data recovery) may be implemented and/or construction may proceed.**

All materials filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: “CUI/PRIV –DO NOT RELEASE.”

8. Air Quality and Noise

8.1 Air Quality

Air quality would be affected by construction and operation of the Project. This section addresses the construction- and operation-based emissions from the Project as well as applicable regulatory requirements and projected impacts on air quality. The term *air quality* refers to the relative concentrations of pollutants in the ambient air.

Combustion of fossil fuels, such as natural gas, produces criteria air pollutants, such as nitrogen dioxide (NO₂), carbon monoxide (CO), sulfur dioxide (SO₂), and inhalable particulate matter (PM_{2.5} and PM₁₀). PM_{2.5} includes particles with an aerodynamic diameter less than or equal to 2.5 micrometers, and PM₁₀ includes particles with an aerodynamic diameter less than or equal to 10 micrometers. Combustion of fossil fuels also produces volatile organic compounds (VOCs), a large group of organic chemicals that have a high vapor pressure at room temperature; and nitrogen oxides (NO_x). VOCs react with NO_x, typically on warm summer days, to form ozone, which is another criteria air pollutant. Other byproducts of combustion are greenhouse gases (GHG) and hazardous air pollutants (HAP). HAPs are chemicals known to cause cancer and other serious health impacts. GHGs¹¹ occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels. Emissions of GHGs are typically expressed in terms of carbon dioxide equivalents (CO₂e) where the potential of each gas to increase heating in the atmosphere is expressed as a multiple of the heating potential of CO₂e, or its global warming potential (GWP).

Other pollutants, not produced by combustion, are fugitive dust and fugitive emissions. Fugitive dust is a mix of PM_{2.5}, PM₁₀, and larger particles thrown up into the atmosphere by moving vehicles, construction equipment, earth movement, and/or wind erosion. Fugitive emissions, in the context of this EA, would be fugitive emissions of methane (CH₄) and/or VOCs from operational pipelines and aboveground facilities.

The subsections below describe well-established air quality concepts that are applied to characterize air quality and to determine the significance of increases in air pollution. This includes metrics for specific air pollutants known as criteria pollutants, in terms of ambient air quality standards, regional designations to manage air quality known as Air Quality Control Regions (AQCR), and the ongoing monitoring of ambient air pollutant concentrations under state and federal programs.

As described in section A.2, the purpose and need for the Project is to provide a mechanism to transport natural gas captured at the oil production well heads that is currently being flared. Flaring at the well head is wasteful and an inefficient method of combustion. Further, natural gas flared at the wellhead is “rich gas,” which often contains other hydrocarbons and compounds beyond just CH₄. One of the barriers to capturing the flared gas in the region is lack of gas processing and transportation options. Although the natural gas to be captured and transported as part of this Project would likely also eventually be combusted, this ultimate combustion would occur in a more controlled and efficient manner, burning a refined natural gas product with fewer air pollutants, and the resultant energy would be used for a purpose. The end result is lower air emissions from not wasting a resource.

¹¹ GHGs include carbon dioxide (CO₂), methane (CH₄), nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers.

Existing Air Quality

The Project area for this air analysis includes Williams and McKenzie Counties, which are the counties where the two Project compressor stations would be located. The climate of the Project area is characterized as continental with cold, dry, and windy winters and warm to hot windy summers. North Dakota is far from major sources of moisture and is in the transition zone between the moist eastern United States and the semi-arid western states, as precipitation and humidity decrease from east to west. Annual average precipitation for Williams County is 14.9 inches and 15.8 inches in McKenzie County (National Centers for Environmental Information, 2019). Temperatures peak in July at about 86 degrees Fahrenheit (°F) and plummet to an average low of 4°F in January.

Ambient air quality is protected by the Clean Air Act (CAA) of 1970, which established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare (referred to as primary standards), and to protect plant and animal life, buildings, and other features in the public interest (referred to as secondary standards) (EPA, 2015). The EPA oversees the implementation of the CAA and establishes NAAQS to protect human health and welfare. States have the authority to adopt more stringent Ambient Air Quality Standards for other pollutants. North Dakota has adopted the federal primary and secondary NAAQS for the six principal pollutants described below. In addition, North Dakota has established Ambient Air Quality Standards for hydrogen sulfide.

Standards have been set for six principal pollutants, called “criteria pollutants”: ground-level ozone, CO, NO₂, SO₂, respirable and fine particulate matter (inhalable PM₁₀ and PM_{2.5}), and airborne lead.

Ozone develops as a result of a chemical reaction between NO_x and VOCs in the presence of sunlight. Accordingly, NO_x and VOCs are often referred to as ozone precursors. PM_{2.5} may be directly emitted and can also be secondarily formed in the atmosphere as a result of SO₂ and NO_x emissions. SO₂ and NO_x are also referred to as PM_{2.5} precursors. Table B-21 lists NAAQS for the criteria pollutants described above.

AQCRs are areas established for air quality planning purposes in which State Implementation Plans (SIP) describe how ambient air quality standards would be achieved and maintained. AQCRs were established by the EPA and local agencies, in accordance with section 107 of the CAA and its amendments, as a means to implement the CAA and comply with the NAAQS through SIPs. The AQCRs are intrastate and interstate regions such as large metropolitan areas where the improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. The entire Project site would be within the 172 AQCR. The EPA maintains a list of attainment/nonattainment designations for criteria pollutants. No counties in North Dakota are currently listed as nonattainment areas for any criteria pollutants (EPA, 2020).

An AQCR, or portion thereof, is designated based on compliance with the NAAQS. AQCR designations fall under three general categories as follows: attainment (areas in compliance with the NAAQS); nonattainment (areas not in compliance with the NAAQS); or unclassifiable. AQCRs that were previously designated nonattainment but have since met the requirements to be classified as attainment are classified as maintenance areas. The 172 AQCR is designated as unclassifiable and/or attainment for all criteria pollutants per 40 CFR 81 and has no areas that have maintenance status.

TABLE B-21

U.S. Environmental Protection Agency National Ambient Air Quality Standards

Criteria Pollutant	Primary/ Secondary	Averaging Time	Level	Form of Air Quality Standard
CO	Primary	8 hours	9 ppm	Not to be exceeded more than once per year
	Primary	1 hour	35 ppm	Not to be exceeded more than once per year
Airborne Lead	Primary and Secondary	Rolling 3-month average	0.15 µg/m ^{3a}	Not to be exceeded
NO ₂	Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary	1 year	53 ppb ^b	Annual mean
Ozone	Primary and Secondary	8 hours	0.070 ppm ^c	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution				
PM _{2.5}	Primary	1 year	12 µg/m ³	Annual mean, averaged over 3 years
	Secondary	1 year	15 µg/m ³	Annual mean, averaged over 3 years
	Primary and Secondary	24 hours	35 µg/m ³	98th percentile, averaged over 3 years
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
SO ₂	Primary	1 hour	75 ppb ^d	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years

Source: EPA, 2015

µg/m³ = micrograms per cubic meter; ppb = parts per billion; ppm = parts per million

^a In areas designated nonattainment for the airborne lead 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/m³ as a calendar quarter average) also remain in effect.

^b The annual NO₂ standard is 0.053 ppm. It is shown here in terms of parts per billion (ppb) for the purposes of clearer comparison to the 1-hour standard level.

^c Final rule published October 1, 2015, and effective December 28, 2015. The previous (2008) ozone standards additionally remain in effect in some areas. Revocation of the previous (2008) ozone standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

^d The two prior primary standards of 140 ppb evaluated over 24 hours and 30 ppb evaluated over 1 year, codified at 40 CFR 50.4, remain applicable. However, the EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO₂, set at 500 ppb evaluated over 3 hours has not been revised, and the EPA is also not currently designating areas on the basis of the secondary standard.

Note: Title 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area 1 year after its designation under the 2010 NAAQS, except that for areas designated nonattainment under the prior NAAQS as of August 22, 2010, and areas not meeting the requirements of a SIP Call under the prior NAAQS, the prior NAAQS will apply until that area submits and EPA approves a SIP providing for attainment of the 2010 NAAQS. North Dakota contains no such areas.

The Air Quality Dispersion Modeling Analysis Guide, issued by the NDDEQ, Division of Air Quality, on June 21, 2013, provides fixed background concentrations for CO, NO₂, SO₂, PM₁₀, and PM_{2.5} that reflect default values which are representative for the entire State of North Dakota. Table B-22 provides the ambient air quality default concentrations for the entire state of North Dakota.

TABLE B-22		
North Dakota Ambient Air Concentrations		
Criteria Pollutant	Averaging Time	Concentration
CO	8 hours	1,149 µg/m ³
	1 hour	1,149 µg/m ³
NO ₂	1 hour	35 µg/m ³
	1 year	5 µg/m ³
Particle Pollution		
PM _{2.5}	24 hour	13.7 µg/m ³
	1 year	4.75 µg/m ³
PM ₁₀	24 hours	30 µg/m ³
SO ₂	1 hour	13 µg/m ³

µg/m³ = micrograms per cubic meter;

Greenhouse Gases

The EPA has defined air pollution to include the mix of six long-lived and directly emitted GHGs (carbon dioxide [CO₂], CH₄, nitrous oxide [N₂O], hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride). The EPA found that the current and projected concentrations of these six GHGs in the atmosphere threaten the public health and welfare of current and future generations through climate change. GHGs are naturally occurring pollutants in the atmosphere and products of human activities, including burning fossil fuels. These gases are the integral components of the atmosphere’s greenhouse effect that warms the earth’s surface and moderate day/night temperature variation. In general, the most abundant GHGs are water vapor, CO₂, CH₄, N₂O, and ozone. GHGs produced by fossil-fuel combustion are CO₂, CH₄, and N₂O. GHGs are non-toxic and non-hazardous at normal ambient concentrations.

As with any fossil fuel-fired project or activity, the Project would contribute to GHG emissions. The principle GHGs that would be produced by the project are CO₂, CH₄, and N₂O. Emissions of GHGs are quantified and regulated in units of CO₂e. The CO₂e unit of measure takes into account the GWP of each GHG over a specified timeframe. The GWP is a ratio relative to CO₂ that is based on the particular GHG’s ability to absorb solar radiation as well as its residence time within the atmosphere. Thus, CO₂ has a GWP of 1, CH₄ has a GWP of 25, and N₂O has a GWP of 298 on a 100-year timescale (EPA, 2017). To obtain the CO₂e quantity, the mass of the particular compound is multiplied by the corresponding GWP and the product is the CO₂e for that compound. The CO₂e value for each of the GHG compounds is summed to obtain the total CO₂e GHG emissions.

Federal Air Quality Requirements

The provisions of the CAA that are applicable to the Project are discussed below. The estimated potential operational emissions for the Tioga and the Elkhorn Creek Compressor Stations are presented in table B-24 in the General Impacts and Mitigation section below.

Prevention of Significant Deterioration/Nonattainment New Source Review

Proposed new or modified air pollutant emission sources must undergo a New Source Review (NSR) prior to construction or operation. Through the NSR permitting process, state and federal regulatory

agencies review and approve project emission increases or changes, emissions controls, and various other details to ensure air quality does not deteriorate as a result of new or modified existing emission sources. The three basic categories of NSR permitting are Prevention of Significant Deterioration (PSD), Nonattainment New Source Review, and minor source NSR. PSD, Nonattainment New Source Review, and minor source NSR are applicable to projects depending on the size of the proposed project, the projected emission, and if the project is proposed in an attainment area or nonattainment/maintenance area. The NDDEQ administers the NSR and PSD programs in North Dakota.

PSD regulation defines a major source as any source type belonging to a list of named source categories that have potential to emit 100 tons per year (tpy) or more of any regulated pollutant or 250 tpy for sources not among the listed source categories. These are referred to as the PSD major source thresholds. Based on the estimated operating emissions presented in table B-24 in the General Impacts and Mitigation section below, major source NSR permits would not be required for the Project. Both the Tioga and Elkhorn Creek Compressor Stations would be classified as new minor sources.

The EPA's May 13, 2010 GHG Tailoring Rule is intended to limit the number of affected sources that account for an estimated 70 percent of GHG emissions from stationary sources while shielding smaller sources such as apartment buildings and schools. As of July 1, 2011, a new industrial facility that is a major source for at least one non-GHG pollutant and will emit or has the potential to emit at least 75,000 tpy of CO₂e is subject to PSD. Alternatively, a new industrial facility that has the potential to emit 100,000 tpy of CO₂e and will exceed the applicable major source regulation on a mass basis for GHGs will be subject to PSD. In addition, PSD for CO₂e would only be triggered if the compressor stations were "anyway sources," which means triggering PSD for one of the other regulated PSD pollutants. Even if the compressor stations were above the PSD threshold for CO₂e (100,000 tpy), PSD would not be triggered if none of the other pollutants exceed the PSD threshold.

Title V Permitting

Title V is an operating air permit program run by each state for each facility that is considered a "major source." The major source threshold for an air emission source is 100 tpy for criteria pollutants, 10 tpy for any single HAP and 25 tpy for total HAPs. Based on the potential emission rates for each stationary sources, Tioga Compressor Station meets the definition of a major source and would be required to obtain a Title V major source permit. The Elkhorn Creek Compressor Station does not meet the definition of a major source and would not be subject to Title V permitting but would require a permit to construct and a minor source permit to operate.

New Source Performance Standards

The New Source Performance Standards (NSPS), codified in 40 CFR 60, establish pollutant emission limits and monitoring, reporting, and recordkeeping requirements for specific emission source categories. The NSPS apply to new, modified, or reconstructed sources. The applicable NSPS are described below, subparts that do not apply to the Project are not listed below.

NSPS subpart JJJJ applies to all new stationary spark ignition internal combustion engines, including auxiliary power units. At the Tioga Compressor Station, WBI Energy would install six 3,750 hp spark ignition internal combustion engines to drive compressors and one 1,380 hp backup engine. At the Elkhorn Creek Compressor Station, WBI Energy would install one 3,750 hp spark ignition internal combustion engine to drive a compressor. The new spark ignition natural gas-fired engines would meet emission standards for NO_x, CO, and VOCs. The engines to be purchased by WBI Energy would be certified to meet the requirements of this NSPS.

NSPS Subpart OOOOa sets fugitive leak monitoring and repair requirements for compressor stations. Subpart OOOOa would apply to the Tioga and Elkhorn Creek Compressor stations. WBI Energy would meet the requirements of Subpart OOOOa for the Project.

Federal Class I Area Protection

The U.S. Congress designated certain lands as Mandatory Federal Class I areas in 1977. Class I areas were designated because the air quality was considered a special feature of the area (e.g., in national parks or wilderness areas). These Class I areas, as well as any other areas that have been re-designated Class I since 1977, are given special protection under the PSD program. This program establishes air pollution increment increases that are allowed by new or modified air emission sources. If the new source is a major PSD source and is near (within 100 kilometers [km] of) a Class I area, the source is required to determine its impacts on the Class I area. The source also is required to notify the appropriate federal land manager for the nearby Class I area. There are three Class I areas within 100 km of the proposed compressor stations: Theodore Roosevelt National Park, the Lostwood Wilderness Area, and the Medicine Lake Wildlife Refuge (located approximately 4.3 miles to the southwest, 21 miles to the northeast, and 59 miles to the west, respectively, of the nearest proposed compressor station). Neither of the compressor stations associated with the Project would be considered major PSD sources that would trigger an impact analysis for Class I areas by the EPA. Based on consultations with the NDDEQ, due to the proximity of the Tioga Compressor Station to the Lostwood Wilderness Area, WBI Energy completed an assessment of the station's annual NO₂ impact on the wilderness area. The results of this assessment show that maximum annual NO₂ impacts from the Tioga Compressor Station are below the Class 1 NO₂ Annual Significant Impact Level threshold.

National Emission Standards for Hazardous Air Pollutants

The 1990 CAA amendments established a list of 189 HAPs, resulting in the promulgation of National Emission Standards for Hazardous Air Pollutants (NESHAP). The NESHAPs regulate HAP emission from specific source types located at major or area sources of HAPs by setting emission limits, monitoring, testing, record keeping, and notification requirements.

The Elkhorn Creek and the Tioga Compressor Stations would not be major sources of HAPs. The Tioga Compressor Station would include the addition of new compressor engines and a generator engine, which would require compliance with NESHAP Subpart ZZZZ. Elkhorn Creek Compressor Station would also have compressor engines but not any generator engines. The compressor engines at Elkhorn Creek would require compliance with NESHAP Subpart ZZZZ. Compliance with Subpart ZZZZ is demonstrated by meeting the requirements of NSPS JJJJ.

Conformity of General Federal Actions

The General Conformity Rule was developed to ensure that federal actions in nonattainment and maintenance areas do not impede states' attainment of the NAAQS. The lead federal agency must conduct a conformity analysis if a federal action would result in the generation of direct and indirect emissions that would exceed the general conformity applicability threshold levels of the pollutant(s) for which a count is designated nonattainment or maintenance. As stated previously, the entire Project area is designated as attainment for the NAAQS and a general conformity determination is not required.

Greenhouse Gas Mandatory Reporting Rule

The EPA's Mandatory Reporting of Greenhouse Gases Rule requires reporting from applicable sources of GHG emissions if they emit greater than or equal to 25,000 metric tons of GHGs (as CO₂e) in

one year. The Mandatory Reporting Rule does not require emission control devices and is strictly a reporting requirement for stationary sources based on actual emission. Although the rule does not apply to construction source emissions, we have provided GHG construction emission estimates as CO₂e for accounting and disclosure purposes (see table B-24 below). Based on the emission estimates presented, actual GHG emissions from operation of the Compressor Stations would likely exceed the 25,000-tpy reporting threshold; therefore, reporting requirements for the Mandatory Reporting Rule would be applicable to the Project.

State Regulations

This section discusses the potentially applicable state air regulations for the Project. Emissions resulting from the Project are subject to North Dakota air quality standards, codified in the NDAC. North Dakota air emissions are regulated by the NDDEQ Division of Air Quality under NDAC 33-15, which requires WBI Energy to obtain a construction permit for the proposed compressor stations. WBI Energy submitted the state permit to construct applications on February 14, 2020. The permit to construct applications address the applicable regulations.

Applicable North Dakota Air Quality Regulations

North Dakota air emissions are regulated by the NDDEQ Division of Air Quality under NDAC 33-15, which requires WBI Energy to obtain a construction permit for the proposed compressor stations. NDAC 33-15-02 establishes ambient air quality standards that are identical to the NAAQS promulgated by the EPA, with the exception of a state standard for hydrogen sulfide. Emissions of hydrogen sulfide associated with the Project would be extremely small and would only occur during infrequent blowdown of pipeline sections for maintenance. NDAC 33.1-15-03 restricts emission of visible air contaminants. This regulation applies to both point sources and fugitive sources of visible emissions. WBI Energy would maintain equipment to not exceed opacity standards and perform construction to minimize dust as outlined in their Fugitive Dust Control Plan.

NDAC 33.1-15-04 establishes restrictions on open burning. No open burning is planned; however, if the need arises, WBI Energy would follow all requirements stipulated in 33.1-15-04 for permissible open burning. NDAC 33.1-15-05 addresses emission requirements of particulate matter from industrial processes. Emissions of particulate matter during operation of the Project would not exceed any of the emission limitations set forth in NDAC 33.1-15-05 table 3.

NDAC 33.1-15-07-01 and 33.1-15-07-02 address emission requirements for VOCs. Per 33.1-15.07-02, no person is allowed to emit organic compound gases and vapors, except from an emergency vapor blowdown system or emergency relief system, unless these gases and vapors are burned by flares or an equally effective control device as approved by the NDDEQ Division of Air Quality. Minor sources, as determined by the NDDEQ Division of Air Quality and not subject to NSPS, may be granted exemptions to this subsection. Each flare is required to be equipped and operated with an automatic igniter or a continuous burning pilot.

NDAC 33.1-15-08 addresses operation and control of internal combustion engines. WBI Energy would comply with the requirements of NDAC 33-15-08-01 and 33-15-08-02 by operating internal combustion engines and exhaust emission control devices in a reasonable and appropriate manner according to manufacturer specifications.

NDAC 33.1-15-17 restricts fugitive emissions from any source, including emissions of particulate (dust) and various gaseous emissions including those subject to an ambient air quality standard or PSD

increment, an odorous substance, or those subject to the restrictions of a visible air contaminant. WBI Energy would comply with the applicable requirements of this regulation during construction and operation of the Project. Information regarding specific techniques for the control of fugitive dust during construction is included in the Project's Fugitive Dust Control Plan.

NDAC 33.1-15-22 addresses emission standards for HAPs. Emission standards for this chapter are the federal NESHAPs incorporated by reference. WBI Energy would comply with NDAC 33.1-15-22 by complying with the federal NESHAPs, which were previously addressed in the federal air quality requirements section above.

North Dakota Dispersion Modeling and Air Toxics Review

In North Dakota, air dispersion modeling is required to obtain a permit to construct for compressor engines pursuant to a NDDEQ Division of Air Quality January 23, 2015 memorandum unless all of the following certain conditions are met.

No air dispersion modeling is required per NDDEQ Division of Air Quality guidelines because both the Tioga and Elkhorn Creek Compressor Stations meet the specified requirements. However, WBI Energy completed air dispersion modeling and provided it as part of the FERC review process. Both compressor stations would be in compliance with the NAAQS.

The Elkhorn Creek Compressor Station would not exceed the NDDEQ modeling thresholds; however, the Tioga Compressor Station would exceed the NDDEQ modeling thresholds. Based on consultation with the NDDEQ regarding the Tioga Compressor Station, it was determined that only 1-hour NO₂ would require criteria pollutant air dispersion modeling. According to the NDDEQ *Criteria Pollutant Modeling Requirements for a Permit to Construct* memo published on October 6, 2014, the potential emissions from the facility for CO, PM₁₀, PM_{2.5}, and SO₂ were below the significant levels for projects not subject to PSD; therefore, no modeling would be required for these pollutants.

North Dakota requires an air toxics review to be completed for any source that is required to submit a permit to construct that has the potential to emit HAPs. The air toxics review is a stepped approach of comparing HAP concentrations to acceptable values by reviewing the maximum individual carcinogenic risk. The analysis allows the NDDEQ Division of Air Quality to determine if the emission sources require additional review. The air toxics review is part of the permit to construct applications WBI Energy submitted to the NDDEQ for each of the compressor stations.

General Impacts and Mitigation

Construction

Project construction would result in temporary, localized emissions that would last the duration of construction activities (i.e., up to 8 months). Exhaust emissions would be generated by the use of diesel- or gasoline-powered heavy equipment and trucks used by construction workers commuting to and from work areas. Construction activities would also result in the temporary generation of fugitive dust due to vegetation clearing and grading, ground excavation, and driving on unpaved roads. The amount of dust generated would be a function of construction activity, soil type, soil moisture content, wind speed, precipitation, vehicle traffic and types, and fine-textured soils subject to surface activity.

Construction emissions were estimated based on the fuel type and anticipated frequency, duration, capacity, and levels of use of various types of construction equipment. Construction emissions were

calculated using emission factors provided in EPA AP-42 data, 40 CFR 98 Table C-2, and the EPA's NONROAD 2008 and MOVES 2014a models.

Estimated construction emissions for the Project are shown in table B-23. These construction emissions would occur over the duration of construction activity and would be emitted at different times and locations along the length of the Project between March and October 2021. As such, impacts from construction equipment would be temporary and should not result in a significant impact on air quality. The construction emissions listed in table B-23 do not include any venting of the pipeline segments under construction or the equipment at the compressor stations. Blowdowns that would occur as part of startup and commissioning of the compressor stations were estimated as part of the operation emissions for those facilities but identified as part of the commissioning process. Appendix J provides a detailed breakdown of Project construction emissions.

TABLE B-23								
Construction Emissions (tpy)								
Construction Activity	CO	NOx	PM ₁₀	PM _{2.5}	SO ₂	VOC	HAP	CO ₂ e
Tioga Compressor Station	1.54	1.37	1.14	0.25	0.0	0.23	0.05	41.36
Elkhorn Creek Compressor Station	1.57	1.22	1.38	0.28	0.0	0.21	0.05	55.45
Tioga-Elkhorn Creek Pipeline	14.23	18.18	143.38	20.18	0.06	1.94	1.01	490.86
Line Section 25 Loop	4.0	5.06	37.10	5.21	0.02	0.51	0.17	181.76
Line Section 30 Loop	2.27	3.48	15.80	2.35	0.01	0.30	0.17	56.04
Tioga Lateral Pipeline	1.12	1.09	0.86	0.18	0.0	0.14	0.06	16.70
Lake Sakakawea HDD	0.93	3.49	1.08	0.28	0.01	0.16	0.15	19.58
Total Project Emissions	25.66	33.89	200.75	28.73	0.11	3.48	1.67	861.74

WBI Energy would minimize construction emissions by operating equipment on an as-needed basis, following equipment manufacturer operating recommendations to maximize fuel efficiency, and contractually requiring the construction contractor to minimize emissions by limiting idling of equipment and following state and federal emission standards for air quality regulations. WBI Energy would take measures in its Fugitive Dust Control Plan to reduce fugitive emissions including:

- utilizing existing highways, frontage roads, and secondary roads for access to the project's construction right-of-way;
- reducing vehicle speeds on unpaved roads;
- cleaning construction entrance/exit access locations onto paved roads at a minimum of once every 48 hours, or as needed, if materials are observed to be accumulating on the road surface; and
- applying dust suppressants to disturbed work areas and unpaved access roads.

Construction emissions would occur over the duration of construction and would be emitted at different times and locations throughout the Project area. Construction emissions would be minor and would result in temporary, short-term, localized impacts in the immediate vicinity of Project construction. With implementation WBI Energy's proposed mitigation measures, it is anticipated that Project construction would not significantly affect regional air quality.

Operations

Project operation would result in air emissions due to combustion at the Tioga and Elkhorn Creek Compressor Stations, as well as fugitive and vented emissions at the compressor stations and delivery, receipt, and transfer stations.

The expansion of the Tioga Compressor Station would involve the installation of the following equipment:

- six Caterpillar 3612 natural gas-fired engines (3,750 hp each) coupled to a KBZ-4 compressor unit;
- one gas cooler and one auxiliary cooler for each compressor unit;
- one gas-fired Waukesha generator (1,380 hp) with an 980-kilowatt backup power generator;
- comfort heating: two Weil-McLain LGB-10 (2.47 MMBtu/hr) and one unit heater (0.25 MMBtu/hr);
- four pig launchers/receivers;
- one underground 3,000 gallon pipeline liquids storage tank;
- one underground 3,000 gallon waste oil storage tank; and
- one underground 3,000 gallon floor drain tank to collect wastewater.

The proposed new Elkhorn Creek Compressor Station would involve the installation of the following equipment:

- one Caterpillar 3612 natural gas-fired engine (3,750 hp) coupled to a KBZ-4 compressor unit;
- one gas cooler and one auxiliary cooler;
- comfort heating: one Weil-McLain LGB-12 gas boiler (1.69 MMBtu/hr), one water heater (2.08 MMBtu/hr), and one building unit heater (0.25 MMBtu/hr);
- pig launcher/receiver, valve setting, and septic system;
- one underground 2,000 gallon pipeline liquids storage tank;
- one underground 2,000 gallon waste oil storage tank; and
- one underground 2,000 gallon floor drain tank to collect wastewater.

Other operational emissions would be from pipeline fugitive emissions. Pipeline maintenance venting emissions from pig launchers/receivers are located at the compressor stations and are permitted with those sources. Pigging along the pipeline for maintenance would occur every 10 years depending on the location. Emissions associated with pig launching and receiving facilities not located at aboveground

facilities are included with the pipeline operational emission calculations. Pigging emissions are reported as annual as if all pigging occurs in the same year. Table B-24 provides a summary of annual operation emissions for the Project.

TABLE B-24							
Project Operating Emissions Summary (tpy)							
Emission Unit	NO _x (tpy)	CO (tpy)	VOCs (tpy)	PM ₁₀ /PM _{2.5} (tpy)	SO ₂ (tpy)	CO ₂ e (tpy)	Total HAPs (tpy)
Tioga Compressor Station ^a	232.82	137.15	150.22	8.55/8.55	0.48	117,143	23.97
Elkhorn Creek Compressor Station ^a	37.94	19.56	82.17	1.36/1.36	0.08	34,654	4.17
Aboveground Facilities (fugitive leaks)	N/A	N/A	8.83	N/A	N/A	2,159	0.002
Tioga-Elkhorn Creek, 104 th Avenue NW (MP 6.1)	N/A	N/A	60.96	N/A	N/A	14,896	0.014
Line Section 25 Loop, Norse Transfer Station (MP 20.4)	N/A	N/A	5.21	N/A	N/A	1,274	0.001
Line Section 30 Loop, Nesson Valve Setting (MP 0.0)	N/A	N/A	3.53	N/A	N/A	862	0.001
Tioga Compressor Lateral, Tioga Plant Receipt Station (MP 0.0)	N/A	N/A	0.24	N/A	N/A	59	0.000
Uprate Line Section 25, Norse Transfer Station	N/A	N/A	2.25	N/A	N/A	549	0.001
Uprate Line Section 25, Lignite Border Station	N/A	N/A	2.25	N/A	N/A	549	0.001
Uprate Line Section 25, Norse Transfer Station	N/A	N/A	1.44	N/A	N/A	353	0.000
Pipeline Length (fugitive leaks)	N/A	N/A	N/A	N/A	N/A	106	N/A
TOTAL	270.74	156.71	317.10	9.91/9.91	0.56	172,604	28.16

^a This includes emissions from commissioning of the station prior to commercial operation. The commission blowdown would not be part of annual ongoing emissions.

N/A = not applicable

The estimated emissions are based on manufacturers' data and assumptions that the compressor station engines operate at full load for an entire year (8,760 hours). It is unlikely that the compressor stations would operate at capacity (i.e., full load) every day; therefore, table B-24 provides conservative, worst-case estimates of emissions. Fugitive emissions are minor leaks that would occur at valves. The emissions reported for the compressor stations include blowdown emissions associated with commission/startup and would not be part of the ongoing operation of the compressor stations.

WBI would implement measures to reduce fugitive emissions, including operation and preventative maintenance practices consistent with manufacturer recommendations. In addition, WBI Energy would be required to comply with the EPA's 40 CFR 98, Subpart W and with 40 CFR 60, Subpart OOOOa standards, which both require leak detection and repair programs. However, certain provisions from 40 CFR 60, Subpart OOOOa are formally being reconsidered by the EPA, including the leak detection and repair programs. WBI Energy would comply with all provisions from Subpart OOOOa that apply at the time the Project is completed. Fugitive CH₄ emissions are a source of GHG emissions from the proposed Project.

Air Quality Modeling

Air dispersion modeling was performed for the proposed expansion of the Tioga Compressor Station (including the existing facilities and proposed equipment) and the proposed Elkhorn Compressor Station using version 18081 of AERMOD, EPA’s preferred and recommended air dispersion modeling system. The meteorological data was processed through the AERMOD meteorological preprocessor (AERMET), the purpose of which is to compute boundary layer parameters used to estimate profiles of wind, turbulence, and temperature. AERMINUTE is a program within AERMET used to process 1-minute Automated Surface Observing Systems wind data available from the National Climatic Data Center to generate hourly-averaged wind speed and wind direction observations or values to supplement the standard hourly observations; AERMINUTE was used to process the meteorological data used with AERMOD for each compressor station.

The results of WBI Energy’s modeling analysis indicate that the combined total of background and Project-related emissions would not exceed the NAAQS, which are established to be protective of human health, including sensitive populations such as children, the elderly, and asthmatics. Based on the estimated emissions from operation of the proposed Project facilities and review of the modeling analyses, the Project would not cause or contribute to a violation of the NAAQS. While the Project would have minor impacts on local air quality during operation, the Project would not result in significant impacts on air quality.

Results of the modeling analysis, including the existing and proposed equipment at the Tioga Compressor Station, are provided in table B-25. Results of the Elkhorn Creek Compressor Station modeling analysis are provided in table B-26.

Pollutant	Averaging Period	Project Impact (µg/m ³)	Background ^a (µg/m ³)	Total (µg/m ³)	NAAQS (µg/m ³)	Percent of NAAQS
NO ₂ ^b	1-hour	115.14	35	150.14	188	79.9%
	Annual	8.31	5	13.31	100	13.3%
CO	1-hour	183.68	1,149	1,332.68	40,000	3.3%
	8-hour	115.09	1,149	1,264.09	10,000	12.6%
PM ₁₀	24-hour	3.68	30	33.68	150	22.5%
PM _{2.5}	24-hour	2.19	13.7	15.89	35	45.4%
	Annual	0.32	4.75	4.75	12	39.6%
SO ₂	1-hour	0.27	13	13.27	196	6.8%

µg/m³ = micrograms per cubic meter

^a Background data

^b The modeled NO₂ impact represents the EPA Tier 2 method, assuming an 80% NO₂/NO_x ratio.

TABLE B-26						
Elkhorn Creek Compressor Station AERMOD Results and National Ambient Air Quality Standards Compliance Summary						
Pollutant	Averaging Period	Project Impact ($\mu\text{g}/\text{m}^3$)	Background ^a ($\mu\text{g}/\text{m}^3$)	Total ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)	Percent of NAAQS
NO ₂ ^b	1-hour	52.35	35	87.35	188	46.5%
	Annual	0.90	5	5.90	100	5.9%
CO	1-hour	27.03	1,149	1,176.03	40,000	2.9%
	8-hour	20.21	1,149	1,169.21	10,000	11.7%
PM ₁₀	24-hour	0.60	30	30.60	150	20.4%
PM _{2.5}	24-hour	0.26	13.7	13.96	35	39.9%
	Annual	0.026	4.75	4.78	12	39.8%
SO ₂	1-hour	0.086	13	13.09	196	6.7%

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

^a Background data

^b The modeled NO₂ impact represents the EPA Tier 2 method, assuming an 80% NO₂/NO_x ratio.

Greenhouse Gases

GHGs occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels. GHGs are gases that absorb infrared radiation in the atmosphere, and an increase in emissions of these gasses has been determined by the EPA to endanger public health and welfare by contributing to global climate change. Emissions of GHGs are typically expressed in terms of CO₂e, where the potential of each gas to increase heating in the atmosphere is expressed as a multiple of the heating potential of CO₂ over a specific timeframe, or its GWP.¹² During construction and operation of the Project, these GHGs would be emitted from non-electrical construction and operational equipment, as well as from fugitive CH₄ leaks from the aboveground facilities.

On November 8, 2010, the EPA signed a rule that finalizes reporting requirements for the petroleum and natural gas industry under 40 CFR 98. Subpart W of 40 CFR 98 requires petroleum and natural gas facilities that emit 25,000 metric tons or more of CO₂e per year to report annual emissions of specified GHGs from various processes within the facility. Construction emissions are not covered under the GHG Reporting Rule, but those related to the proposed Project are expected to be well below the 25,000 metric tons reporting threshold. Operational emissions from the proposed facilities are likewise not expected to exceed this threshold and be reported to the EPA. The EPA has expanded its regulations to include the emission of GHGs from major stationary sources under the PSD program. The EPA’s current rules require that a stationary source that is major for a non-GHG-regulated NSR pollutant must also obtain a PSD permit prior to beginning construction of a new or modified major source with mass-based GHG emissions equal to or greater than 100,000 tpy and significant net emission increases in units of CO₂e equal to or greater than 75,000 tpy. There are no NAAQS or other significance thresholds for GHGs.

Through implementation of the proposed work practices, the short duration of construction activities, and a review of the estimated emissions from construction and operation of the proposed Project, it is not anticipated that there would be regionally significant impacts on air quality.

¹² These GWPs are based on a 100-year time period. We have selected their use over other published GWPs for other timeframes because these are the GWPs the EPA has established for reporting of GHG emissions and air permitting requirements. This allows for a consistent comparison with these regulatory requirements.

8.2 Noise

Noise is generally defined as sound with intensity greater than the ambient or background sound pressure level. Noise quality can be affected both during construction and operation of pipeline projects. The magnitude and frequency of environmental noise may vary considerably over the course of the day, throughout the week, and across seasons, in part due to changing weather conditions and the effects of seasonal vegetation cover. Two measures to relate the time-varying quality of environmental noise to its known effect on people are the 24-hour equivalent sound level (L_{eq}) and the average day-night sound level (L_{dn}). The L_{eq} is the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a 24-hour period. The L_{dn} is the L_{eq} plus 10 decibels on the A-weighted scale (dBA) added to account for people’s greater sensitivity to nighttime sound levels (between the hours of 10 p.m. and 7 a.m.). The A-weighted scale is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies. The human ear’s threshold of perception for noise change is considered to be 3 dBA; 6 dBA is clearly noticeable to the human ear; and 10 dBA is perceived as a doubling of noise.

Regulatory Noise and Vibration Requirements

In 1974, the EPA published its Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA, 1974). This document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has determined that an L_{dn} of 55 dBA protects the public from indoor and outdoor activity noise interference. The Commission’s regulations require that a new compressor station not exceed this level at noise sensitive areas (NSA) such as schools, hospitals, and residences. An L_{dn} of 55 dBA is equivalent to a continuous noise level of 48.6 dBA. For comparison, normal speech at a distance of 3 feet averages 60 to 70 dBA L_{eq} . In addition to noise requirements, the Commission, under 18 CFR 380.12(k)(v)(B) requires that operation of the compressor station not result in any perceptible increase in vibration.

North Dakota regulates noise using public nuisance laws, but does not impose property-line noise limits for new facilities. McKenzie and Burke Counties do not regulate noise. Williams County maintains noise regulations with maximum noise standards by district, which are listed in table B-27 (Williams County, 2015).

Zone of Property Receiving Noise	Maximum Noise Level dB, L_{eq}
Residential Districts: Urban Residential, Rural Residential	60
Commercial Districts: Urban Commercial, Rural Commercial	65
Industrial Districts: Light Industrial, Heavy Industrial	70
Planned Development	Planned unit development in accordance with base district

Additionally, Williams County Code states, “The noise standards above shall be modified as follows to account for the effects of time and duration on the impact of noise levels:

- in the [Urban Residential] and [Rural Residential] districts, the noise standards shall be 5 dB lower between 10:00 p.m. and 7:00 a.m.; and
- noise that is produced for no more than a cumulative period of five minutes in any hour may exceed the standards above by 10 dB.” (Williams County, 2015)

Zoning designations are not available for the NSAs located in Williams County. However, because the identified NSAs are houses, it is assumed that the “Residential Districts” regulation of a 60 dB maximum noise level applies. Williams County’s noise regulations are less strict than FERC’s requirements for operational noise and FERC’s guidance for nighttime construction noise; therefore, meeting FERC’s 55 dBA L_{dn} criteria would be sufficient to meet Williams County’s noise regulations.

Ambient Noise Conditions

Generally, land use in the Project area is primarily agricultural/open land. An ambient noise survey was performed the week of July 22 to 26, 2019, at NSAs within a 1-mile radius of the Tioga Compressor Station and the proposed Elkhorn Creek Compressor Station. Ambient noise surveys were also completed within a 0.5-mile radius of the Lake Sakakawea north and south HDD entry locations.¹³ Receipt and transfer station locations had not yet been finalized at the time of the ambient noise survey; therefore, an ambient noise survey was not conducted at the proposed station locations. However, only the Norse Plant Receipt and Transfer Stations and the Robinson Lake Plant Receipt Station have NSAs within 0.5 mile. Ambient sound levels for these stations were estimated using noise measurements of similar land use in the Project area. The Pre-Construction Noise Survey and Acoustical Analysis is included in appendix K.

General Impacts and Mitigation

Construction

Noise would be generated during construction of the Project. Construction of aboveground facilities would require a longer construction timeframe at a single location than other facilities planned for the Project. Construction noise is highly variable as construction equipment operates intermittently, and the type of equipment in use at a given location at any point in time changes with the phase of construction. The sound level impacts on NSAs along the pipeline right-of-way due to construction activities would depend on the type of equipment used, the duration of use for each piece of equipment, the number of construction vehicles and machines used simultaneously, and the distance between the sound source and receptor. Nighttime noise due to construction would be limited because construction generally occurs during daylight hours, Monday through Saturday. While individuals in the immediate vicinity of construction activities would experience an increase in noise, the impact would be temporary and local. Because of the temporary nature of construction activities, no long-term noise effects are anticipated from construction of the Project.

An exception to the typical daytime construction hours would be certain HDD activities, which would continue into nighttime hours and would operate 24 hours per day for several days (excluding days for mobilization and demobilization of construction equipment). Because of the nighttime activity and the fact that the equipment used for the HDDs would be stationary for an extended period of time, there is a greater potential for a prolonged noise impact. Because WBI Energy proposes to cross Lake Sakakawea using the HDD intersect method as described in section A.7.2, both ends were considered HDD entry sites for the purposes of the noise impact analysis. HDD construction could occur 24 hours a day and would have the potential to have nighttime impacts on residents near the HDD site. Three NSAs were identified within 0.5 mile of the proposed HDD entry sites (see appendix L).

¹³ WBI Energy proposes to cross Lake Sakakawea via the HDD intersect method, in which drilling will occur from both ends of the crossing and intersect near the middle of the lake. Due to this proposed method, both ends will be considered entry sites (i.e., the north and south HDD entry sites).

Table B-28 summarizes the results of the noise assessments, including the distance and direction of the nearest NSAs from the HDD entry sites and the predicted noise resulting from each HDD operation, including noise mitigation measures.

HDD Location and Closest NSA(s)	Distance and Direction of NSA	Calculated Ambient L_{dn} (dBA)	Unmitigated HDD Operations L_{dn} Plus Ambient L_{dn} (dBA)	Mitigated HDD Operations L_{dn} Plus Ambient L_{dn} (dBA)	Potential Increase Above Ambient (dB) with Mitigation
NSA 1 – South Side	2,240 feet southwest	54.7	70.4	64.4	9.7
NSA 1 – North Side	492 feet southeast	44.7	84.8	78.3	33.6
NSA 2 – North Side	2,597 feet southeast	48.7	69.1	62.8	14.1

Note: Estimated mitigated noise levels assume equipment is positioned optimally to shield noise, and that noise barriers are placed within line-of-sight between noise-producing equipment and NSAs.

In an effort to mitigate impacts at nearby NSAs, WBI Energy would require the HDD contractor to install at least a 16-foot Sound Transmission Class 32 barrier within the line of sight of each NSA and all major noise-producing equipment. Noise reduction associated with a barrier is shown in table B-28 above. Due to the high sound power level of the HDD equipment and proximity to NSAs, noise barriers alone would likely not reduce the HDD L_{dn} at NSAs to below 55 dBA. WBI Energy would also require the HDD contractor to install at least residential-grade silencers or mufflers on all engines, which typically reduce exhaust noise by 15 to 20 dB. To ensure compliance with FERC limits, WBI Energy would perform on-site acoustical monitoring during HDD startup to evaluate the actual noise impact on the nearby NSAs and evaluate potential additional noise mitigation measures to reduce the noise impact to below 55 dBA L_{dn} , or 10 dBA over ambient, at the NSAs.

WBI Energy would submit an HDD noise mitigation plan prior to construction to further address procedures and specific mitigation measures to be used in the event that the on-site monitoring determines that the noise impact exceeds the FERC limit criterion. If 24-hour HDD activity is required for more than 1 week, and reducing noise impacts at NSAs to below 55 dBA L_{dn} or 10 dBA over ambient is not feasible, WBI Energy plans to establish a supervised hotline to address landowner complaints regarding increased noise levels, including offers to compensate landowners for temporary relocation if necessary. If nighttime HDD activity would only occur during the pullback operation, which is estimated to last less than 1 week, temporary relocation, or compensation for relocation, of residents may be a viable option in place of physical mitigation measures.

While blasting is not anticipated to be necessary for the Project, WBI Energy has stated that it would mitigate against potential noise impacts by using controlled blasting techniques (e.g., notification, blasting mats). WBI Energy would also comply with state and federal regulations governing the use of explosives to assist in the removal of rock from the pipeline trench. WBI Energy would procure the required state permits prior to conducting blasting activities.

Operation

The modified Tioga Compressor Station and proposed Elkhorn Creek Compressor Station would generate sound on a continuous basis (i.e., up to 24 hours per day) when operating. Some sound would also

be generated by the operation of the new and existing delivery, receipt, and transfer stations. Noise impacts associated with the operation of these aboveground facilities would be limited to the vicinity of the facilities.

WBI Energy’s consultant performed an ambient noise survey and acoustical analysis to quantify the sound level contribution at nearby NSAs that would result from the operation of the proposed compressor stations. These analyses were also used to determine noise control measures to meet applicable sound level criteria. The ambient noise survey was performed to confirm the location of nearby NSAs and to quantify the current noise environment at these NSAs (see appendix K).

Blowdown events of varying duration would occur at compressor stations during startup and commissioning, annual operation, and emergencies. The sound levels associated with high-pressure gas venting are a function of initial blowdown pressure, the diameter and type of blowdown valve, and the diameter and arrangement of the downstream vent piping. Blowdown sound levels are loudest at the beginning of the blowdown event and they decrease as the blowdown pressure decreases. The specific operational noise sources associated with these facilities and their estimated impact at the nearest NSAs are described below. Figures depicting the NSAs near aboveground facilities are included in appendix L.

Tioga Compressor Station

WBI Energy proposes to install an additional 22,500 hp of compression and new equipment/facilities to meet design specifications at the Tioga Compressor Station in Williams County. The following sound sources would be expected to be significant contributors:

- six reciprocating compressor units;
- six 3,750-hp gas-fired engines;
- six gas coolers; and
- six auxiliary coolers.

Predicted noise levels due to compressor station operation were estimated at the nearest NSAs based on the proposed equipment, noise mitigation measures, and the baseline sound level measurements using hemispherical attenuation calculations. The results of this analysis are summarized in table B-29.

TABLE B-29					
Noise Analysis for Operation of Tioga Compressor Station					
NSA	Distance and Direction of NSA	Surveyed Ambient Noise Level (L _{dn}) dBA	Estimated L _{dn} of the Station at Full Load (dBA)	L _{dn} of Station Plus Ambient L _{dn} (dBA)	Estimated Noise Increase (dB)
NSA 1 (residential)	3,974 feet north	57.2	49.5	58.0	0.8
NSA 2 (residential)	4,076 feet northeast	58.2	49.3	58.8	0.6
NSA 3 (residential)	4,920 feet east	54.0	47.7	55.0	1.0
NSA 4 (residential)	2,221 feet east	55.6	54.6	58.2	2.8
NSA 5 (residential)	4,940 feet southeast	54.0	47.6	55.0	1.0
NSA 6 (residential)	5,229 feet west	61.3	47.2	61.4	0.1
NSA 7 (residential)	4,862 feet northwest	61.3	47.8	61.4	0.1

The noise from operation of the modified Tioga Compressor Station would not result in perceptible impacts on the local ambient sound environment because the noise level would not increase by more than 3 dB at NSAs or contribute a sound level of 55 dBA L_{dn} at any NSAs. To confirm that noise from the compressor station does not contribute to significant impacts at the nearest NSA, **we recommend that:**

- WBI Energy should file a noise survey with the Secretary no later than 60 days after placing the authorized unit(s) at the Tioga Compressor Station in service. If a full-load condition noise survey is not possible, WBI Energy should provide an interim survey at the maximum possible horsepower load and provide the full-load survey within 6 months. If the noise attributable to the operation of all the equipment at the Tioga Compressor Station at interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, WBI Energy should file a report on what changes are needed and should install additional noise controls to meet the level within 1 year of the in-service date. WBI Energy should confirm compliance with the above requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

Twelve to 32 blowdown events would occur at the Tioga Compressor Station during startup and commissioning: two full station blowdowns and 10 to 30 compressor unit blowdowns. Blowdowns would not occur simultaneously. During annual operation of the compressor station, there would be approximately 36 total scheduled preventative maintenance compressor unit blowdowns and 1 scheduled emergency shutdown test full-station blowdown. Scheduled blowdowns would take place during daytime hours, and nearby residents would be notified prior to the blowdown occurring. Additional unscheduled compressor unit blowdowns would occur approximately 108 times per year in total (between the 6 compressor units). Additional emergency shutdown blowdowns could occur as a result of a real emergency, but their frequency is unpredictable.

Table B-30 provides an evaluation of the noise associated with blowdown events at the Tioga Compressor Station. Mitigation measures for blowdown events would not be necessary because blowdown noise would be less than 55 dBA at NSAs with the exception of NSA 4, where ambient noise levels are greater than 55 dBA and blowdown noise would not contribute greater than a 10 dBA increase in noise.

NSA	Distance and Direction of NSA	Surveyed Ambient Noise Level (L _{dn}) dBA	Estimated L _{dn} of Station (dBA)	L _{dn} of Station Plus Ambient L _{dn} (dBA)	Potential Noise Increase (dB)
NSA 1 (residential)	3,974 feet north	57.2	54.0	58.9	1.7
NSA 2 (residential)	4,076 feet northeast	58.2	53.7	59.5	1.3
NSA 3 (residential)	4,920 feet east	54.0	52.1	56.2	2.2
NSA 4 (residential)	2,221 feet east	55.6	59.0	60.6	5.0
NSA 5 (residential)	4,940 feet southeast	54.0	52.1	56.2	2.2
NSA 6 (residential)	5,229 feet west	61.3	51.6	61.7	0.4
NSA 7 (residential)	4,862 feet northwest	61.3	52.2	61.8	0.5

Elkhorn Creek Compressor Station

WBI Energy proposes to construct the new 3,750-hp greenfield Elkhorn Creek Compressor Station on an approximately 10.9-acre site near MP 61.9 in McKenzie County. The following sound sources would be expected to be significant contributors:

- one reciprocating compressor unit;
- one 3,750-hp gas-fired engine;
- one gas cooler; and
- one auxiliary cooler.

Predicted noise levels due to compressor station operation were estimated at the nearest NSAs based on the proposed equipment, noise mitigation measures, and the baseline sound level measurements using hemispherical attenuation calculations. The results of this analysis are summarized in table B-31.

NSA	Distance and Direction of NSA	Calculated Ambient Noise Level (L_{dn}) dBA	Estimated L_{dn} of the Station at Full Load (dBA)	L_{dn} of Station Plus Ambient L_{dn} (dBA)	Estimated Noise Increase (dB)
NSA 1 (residential)	4,253 feet southwest	55.6	41.1	55.7	0.1
NSA 2 (residential)	3,465 feet east	41.0	42.9	45.1	4.1
NSA 3 (residential)	3,895 feet northeast	41.0	41.9	44.5	3.5

The noise from operation of the proposed compressor station would result in an impact on the local ambient sound environment at NSAs 2 and 3 because the noise level would increase by more than 3 dB; however, sound levels are not expected to exceed the 55 dBA L_{dn} threshold at any NSAs. To confirm that noise from the proposed Elkhorn Creek Compressor Station does not contribute to significant impacts at the nearest NSA, **we recommend that:**

- **WBI Energy should file a noise survey with the Secretary no later than 60 days after placing the Elkhorn Creek Compressor Station in service. If a full-load condition noise survey is not possible, WBI Energy should provide an interim survey at the maximum possible horsepower load and provide the full load survey within 6 months. If the noise attributable to the operation of all of the equipment at the Elkhorn Creek Compressor Station under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, WBI Energy should file a report on what changes are needed and should install additional noise controls to meet the level within 1 year of the in-service date. WBI Energy should confirm compliance with the above requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

Four to seven blowdown events would occur at the Elkhorn Creek Compressor Station during startup and commissioning, consisting of two full station blowdowns and two to five compressor unit blowdowns. During annual operation of the compressor station, there would be approximately six scheduled preventative maintenance compressor unit blowdowns and one scheduled emergency shutdown test full-station blowdown. Scheduled blowdowns would take place during daytime hours, and nearby residents would be notified prior to the blowdown occurring. Additional unscheduled compressor unit

operations would occur approximately 18 times per year, and additional emergency shutdown blowdowns could occur as a result of a real emergency, but their frequency is unpredictable.

An evaluation of the noise associated with blowdown events at the Elkhorn Creek Compressor Station is provided in table B-32. Potential mitigation measures for blowdown events are still under consideration and will be provided to FERC prior to construction.

NSA	Distance and Direction of NSA	Surveyed Ambient Noise Level (L_{dn}) dBA	Estimated L_{dn} of Station (dBA)	L_{dn} of Station Plus Ambient L_{dn} (dBA)	Potential Noise Increase (dB)
NSA 1 (residential)	4,338 feet southwest	55.6	53.2	57.6	2.0
NSA 2 (residential)	3,538 feet east	41.0	55.0	55.1	14.1
NSA 3 (residential)	4,386 feet northeast	41.0	53.9	54.1	13.1

Delivery, Receipt, and Transfer Stations

Three of the proposed delivery, receipt, and transfer stations have NSAs within 0.5 mile of the facility, including the Norse Transfer Station, the Norse Plant Receipt Station, and the Robinson Lake Plant Receipt Station.

WBI Energy proposes to upgrade meter, station piping, and associated facilities at the exiting Norse Plant Receipt Station at about MP 20.4 of the proposed Line Section 25 Loop to accommodate incremental volumes associated with the Project. However, there would be no new potential sound sources associated with the upgrades to the Norse Plant Receipt Station.

WBI Energy also proposes to construct, own, and operate the Norse Transfer Station on a new tract of land adjacent to and south of the existing Norse Plant Receipt Station at about MP 20.4 of the proposed Line Section 25 Loop. The new station would provide protection to the plant's MAOP of 700 psig from the 1,098 psig MAOP of the Line Section 25 Loop. Up to four regulation control valves would be installed at the station, which would serve as potential sound sources from this facility. The regulation control valves would be installed within a single building. The valves would be designed such that the interior sound level would not exceed 100 dBA. The analysis was developed utilizing this interior sound level and a building constructed of 24-gauge sheet steel with acoustically absorptive interior walls and ceiling. The calculated noise impact associated with operation of the proposed Norse Plant Receipt and Transfer Stations at the nearby NSA is provided in table B-33.

Nearest NSA Name (type)	Distance and Direction of NSA	Estimated Ambient Noise Level ^a (L_{dn}) dBA	Estimated L_{dn} of the Transfer Station (dBA)	L_{dn} of Station Plus Ambient L_{dn} (dBA)	Estimated Noise Increase (dB)
NSA 1 (residential)	2,478	48.7	38.5	49.1	0.4

^a Receipt/transfer station locations had not been determined at the time of the ambient noise survey. Ambient L_{dn} was estimated to be similar to the L_{dn} at NSA 2 at the Lake Sakakawea north HDD site due to similar land use in the surrounding area.

Operational noise contributed by the proposed receipt and transfer station is not expected to exceed the 55 dBA L_{dn} requirement at the NSA.

WBI Energy proposes to upgrade the meter, station piping, and associated facilities at the existing Robinson Lake Plant Receipt Station at its current location along Line Section 7 about 1.5 miles southeast of Stanley, North Dakota. The upgrades would be required to accommodate incremental volumes associated with the Project. No new sound sources at the Robinson Lake Receipt Station are expected to be significant. Therefore, no noise impacts at the nearby NSAs are anticipated.

Vibration

Operation of the compressor stations and construction equipment can cause ground vibrations that spread through the ground and diminish in strength with distance. Due to (1) the presence of unconsolidated soil conditions, (2) no work being completed on competent bedrock, and (3) mitigation measures to minimize vibration built into the compressor stations' design, it is not anticipated that construction or operation of the compressor stations would cause measureable vibrations at NSAs. WBI Energy would comply with the FERC requirement that new compressor stations or modifications of existing stations shall not result in a perceptible increase in vibration at any NSA (18 CFR 380.12(k)(4)(v)).

Impacts

With the implementation of the measures proposed by WBI Energy, impacts related to noise during construction of the Project would be minor and temporary to short term. During operation, noise would be negligible along the proposed pipeline route except at the proposed compressor stations, which would constitute a moderate long-term noise impact.

9. Reliability and Safety

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for an accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

The Project would transport natural gas that contains primarily CH_4 , as well as smaller amounts of ethane, propane, and higher hydrocarbon gases such as butane. This product is a colorless, practically odorless gas. If natural gas is breathed in high concentrations, oxygen deficiency can occur, resulting in serious injury or suffocation.

Natural gas has an auto-ignition temperature of 1,000 °F and is flammable at CH_4 concentrations between 5 and 15 percent in air. These concentrations can be reached when natural gas is present in a confined space and could result in a hazard in the presence of an ignition source. Unconfined mixtures of natural gas and air become highly diluted and are not usually explosive. Lighter components of natural gas, such as CH_4 , are buoyant at atmospheric temperatures, and if released, rise and disperse rapidly in air. Higher hydrocarbon components of natural gas, such as propane, are heavier than air, and although unlikely, may form a potentially flammable cloud near the ground until sufficiently dispersed in air.

The Hartels provided comments about pipeline safety. These concerns are addressed throughout this section of the EA.

9.1 Safety Standards

The USDOT is mandated to provide pipeline safety under 49 USC 601. The USDOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety.

The PHMSA endeavors to ensure that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level. Section 5(a) of the Natural Gas Pipeline Safety Act provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards, while section 5(b) permits a state agency that does not qualify under section 5(a) to perform certain inspection and monitoring functions. A state may also act as the USDOT's agent to inspect interstate facilities within its boundaries; however, the USDOT is responsible for enforcement actions. The majority of the states have either a 5(a) certification or a 5(b) agreement, and nine states act as interstate agents. North Dakota has a 5(a) certification, but does not act as an interstate agent.

The USDOT pipeline standards are published in Parts 190-199 of CFR Title 49. Part 192 specifically addresses natural gas pipeline safety issues.

Under a MOU on Natural Gas Transportation Facilities dated January 15, 1993, between the USDOT and the FERC, the USDOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the FERC's regulations require that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or shall certify that it has been granted a waiver of the requirements of the safety standards by the USDOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. The FERC accepts this certification and does not impose additional pipeline safety standards other than the USDOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the MOU to promptly alert the USDOT. The MOU also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

The FERC also participates as a member of the USDOT's Technical Pipeline Safety Standards Committee which determines if proposed safety regulations are reasonable, feasible, and practicable.

9.2 Project Design Requirements

The pipeline and aboveground facilities associated with the Project must be designed, constructed, operated, and maintained in accordance with the USDOT Minimum Federal Safety Standards in 49 CFR Part 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The USDOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

Safety guidelines for the design and construction of compressor stations are established in 49 CFR 192 in addition to pipeline safety standards. Part 192.163 requires the location of each main compressor building of a compressor station be on a property under the control of the operator. The station must also be far enough away from adjacent property, not under control of the operator, to minimize the possibility of fire spreading to the compressor building from structures on adjacent properties. Part 92.163 also

requires each building on a compressor station site be made of specific building materials and to have at least two separate and unobstructed exits. The station must be in an enclosed fenced area and must have at least two gates to provide a safe exit during an emergency.

The compressor station safety systems would be engineered with automated control systems to ensure the station and pipeline pressures are maintained within safe limits, and would include several additional over-pressure protection systems that provide an additional layer of safety to back-up the primary controls. The station would also have an automated emergency system that would shut down the station to prevent an incident should an abnormal operation condition occur, and, if appropriate, would evacuate the gas from the station piping at a safe location.

9.3 Pipeline Safety

The USDOT also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1 mile length of pipeline.

- | | |
|---------|--|
| Class 1 | Location with 10 or fewer buildings intended for human occupancy. |
| Class 2 | Location with more than 10 but less than 46 buildings intended for human occupancy. |
| Class 3 | Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period. |
| Class 4 | Location where buildings with four or more stories aboveground are prevalent. |

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (e.g., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; MAOP; inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas.

The Project would fall under a Class 1 designation for its entire length. Over the life of the new pipeline system, WBI Energy would monitor population changes in the vicinity of the pipeline. If an increase in population density adjacent to the right-of-way is detected, WBI Energy would evaluate whether a change in class location is required and would respond accordingly to meet the USDOT requirements for the new class location.

The Pipeline Safety Improvement Act of 2002 requires operators to develop and follow a written integrity management program that contains all the elements described in 49 CFR 192.911 and addresses the risks on each transmission pipeline segment. Specifically, the law establishes an integrity management program which applies to all high consequence areas (HCA).

The USDOT has published rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for USDOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius¹⁴ is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle;¹⁵ or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An identified site is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

In the second method (which WBI Energy uses on their projects), an HCA includes any area within a potential impact circle which contains:

- 20 or more buildings intended for human occupancy; or
- an identified site.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its integrity management program to those segments of the pipeline within HCAs. The USDOT regulations specify the requirements for the integrity management plan at section 192.911.

No HCAs have been identified along the proposed route for the Project. WBI Energy would incorporate the Project into its existing integrity management program, however, and would use criteria specified by the USDOT to identify HCAs if conditions change along the pipeline system.

On October 1, 2019, PHMSA issued a final rule amending the Federal Pipeline Safety Regulations in 49 CFR 191 and 192 to address integrity management requirements and improve the safety of onshore gas transmission lines (84 FR 52180). The amendments, which will become effective July 1, 2020, focus on reconfirmation of MAOP for existing pipelines and the expansion of assessment requirements for pipelines in areas not designated as HCAs. The criteria for a moderate consequence area (MCA) as defined in the new amendments is an area that is within the potential impact circle of the pipeline that contains five or more buildings intended for human occupancy, or any portion of the paved surface including shoulders of a designated interstate, freeway, expressway, or any other principal arterial roadway with four or more lanes that lies within the potential impact circle. WBI Energy has identified one MCA that would exist where the new Tioga-Elkhorn Creek pipeline would cross 64th Street NW/Highway 2. WBI Energy would

¹⁴ The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in pounds per square inch gauge multiplied by the square of the pipeline diameter in inches.

¹⁵ The potential impact circle is a circle of radius equal to the potential impact radius.

install additional launching and receiving facilities on both sides of the MCA to facilitate the required pipeline assessments in accordance with 84 FR 52180.

9.4 Project Operations

Parts 192.731 through 192.736 of 49 CFR establish safety guidelines for inspection, testing, and monitoring at compressor stations. WBI Energy personnel would operate and maintain the proposed compressor stations and other aboveground facilities in accordance with all USDOT requirements. Operational testing would be performed on safety equipment to ensure that it performs as intended, and corrective actions would be taken as necessary. The proposed compressor station would be equipped with gas and fire detection monitoring systems that have the ability to alert Gas Control through a supervisory control and data acquisition system or automatically shut down the compressor station, close the valves isolating the station from the pipeline, and safely vent the gas inside the compressor station to a location that would not create a hazard. Individual pieces of equipment, such as the compressors, would be equipped with sensors and control systems that would shut down the equipment if operating improperly. Station piping would be equipped with overpressure protection devices or relief valves so that the maximum pressure is not exceeded.

9.5 Emergencies

The USDOT prescribes the minimum standards for operating and maintaining pipeline facilities including a requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first, then property, and making them safe from actual or potential hazards.

The USDOT requires that each operator establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. WBI Energy currently has an Emergency Response Plan for its existing pipeline system in accordance with USDOT regulations. WBI Energy would update its plan, as necessary, to incorporate the proposed Project.

9.6 Pipeline Accident Data

The USDOT requires operators of natural gas transmission pipelines to notify the National Response Center at the earliest practicable moment following discovery of a reportable incident. The National Response Center in turn notifies all appropriate response agencies including, but not limited to, PHMSA.

Reportable incidents relevant to a natural gas transmission pipeline include:

- an event involving a release of gas from a pipeline that results in death or personal injury necessitating in-patient hospitalization;
- estimated property damage of \$50,000 or more, including loss to the operator and others, or both, but excluding cost of gas lost;
- unintentional estimated gas loss of 3 million cubic feet or more;
- an event that is significant in the judgment of the operator; or
- an event that results in an emergency shutdown of liquefied natural gas facility or underground natural storage facility.

Each operator must submit a written report to PHMSA as soon as practicable but not more than 30 days after detection of a reportable incident. As an operator, WBI Energy is subject to the USDOT's incident reporting requirements.

The PHMSA maintains various data sets to look at trends related to pipeline incidents, including a data set of significant incidents. Significant incidents are defined as any leaks that:

- cause a death or personal injury requiring hospitalization; or
- involve property damage of more than \$50,000, in 1984 dollars (about \$124,000 in 2019 dollars).

During the 10-year period from 2009 to 2018, a total of 1,042 significant incidents were reported on the more than 300,000 total miles of natural gas transmission pipelines nationwide.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table B-34 provides a distribution of the causal factors as well as the number of each incident by cause.

Cause of Incident	Number of Incidents	Percent of Total	Fatalities	Injuries
Corrosion	236	22.65	1	5
Excavation Damage ^b	127	12.19	11	29
Incorrect Operation	50	4.80	5	9
Material/Weld/Equipment Failure	339	32.53	11	62
Natural Force Damage ^c	132	12.67	0	0
Other Outside Force Damage ^d	77	7.39	1	16
All Other Causes ^e	81	7.77	0	11
TOTALS	1,042	100.00	29	132

^a Source: PHMSA, 2019; Significant Pipeline Incidents By Cause
^b Includes third-party damage.
^c Includes earth movement, heavy rain/floods, and lightning.
^d Includes vehicle damage, fire, explosion, previous damage, and intentional damage.
^e Miscellaneous or unknown causes.

As shown in the table, the dominant incident causes for significant incidents are corrosion and material/weld/equipment failure, accounting for a combined 55.2 percent of all significant incidents. It should be noted, however, that the pipelines included in the significant incident data set in table B-34 vary widely in terms of age, pipe diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents, since corrosion is a time-dependent process. The use of both an external protective coating and a cathodic protection system¹⁶, required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected systems.

Outside forces (including excavation damage, natural force damage, and other outside force damage) are the dominant causes in a combined 32.3 percent of significant pipeline incidents. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geologic hazards; weather effects such as winds, storms, and thermal strains; and willful damage.

Older pipelines have a higher frequency of outside forces incidents partly because their location may be less well known and less well marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller diameter pipelines, which have a greater rate of outside forces incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movements. Data for significant incidents attributed to outside forces is presented in table B-35. The data includes pipeline failures of all magnitudes with widely varying consequences.

¹⁶ Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline that includes the use of an induced current or a sacrificial anode (like zinc) that corrodes at faster rate to reduce corrosion.

TABLE B-35		
Outside Forces Incidents by Cause (2009 to 2018) ^a		
Cause	No. of Incidents	Percent of All Incidents
Operator excavation damage	22	2.1
Unspecified equipment damage/Previous damage	11	1.1
Third-party excavation damage	94	9.0
Earth Movement	22	2.1
Heavy Rain/Floods	71	6.8
Lightning/Temperature/High Winds	30	2.9
Unspecified Natural Force/Other Natural Force	9	0.9
Fire/Explosion	9	0.9
Other outside force (includes fishing, maritime activity and electrical arcing)	22	2.1
Previous mechanical damage	5	0.5
Vehicle (not engaged with excavation)	41	3.9
Total	336	32.3

^a Excavation, Outside Force, and Natural Force from table B-34.

Since 1982, operators have been required to participate in "One Call" public utility programs to minimize unauthorized excavation activities in the vicinity of pipelines. The "One Call" program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the location of underground pipes, cables, and culverts.

9.7 Impact on Public Safety

As stated above, WBI Energy would comply with the USDOT pipeline safety standards as well as regular monitoring and testing of the pipeline. While pipeline failures are rare the potential for pipeline systems to rupture and the risk to nearby residents is discussed below. Table B-36 presents the average annual injuries and fatalities that occurred on natural gas transmission lines in the 5-year period between 2014 and 2018.

TABLE B-36		
Annual Average Fatalities – Natural Gas Transmission Lines ^a		
Year	Injuries ^b	Fatalities ^b
2014	1	1
2015	16	6
2016	3	3
2017	3	3
2018	8	1

^a Source: PHMSA, 2019
^b Includes public and industry injuries and fatalities.

The majority of fatalities from pipelines are due to local distribution pipelines. These pipelines, which are not regulated by the FERC, distribute natural gas to homes and businesses after transportation through interstate natural gas transmission pipelines. In general, these distribution lines are smaller diameter pipes, plastic pipes, and older pipelines which are more susceptible to damage. In addition, distribution systems do not have large rights-of-way and pipeline markers common to the FERC regulated natural gas transmission pipelines.

The nationwide totals of accidental fatalities from various manmade and natural hazards are listed in table B-37 to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. The data nonetheless indicate a low risk of death due to incidents involving natural gas transmission pipelines compared to the other categories. For example, the fatality rate is more than 25 times lower than the rate from natural hazards such as lightning, tornados, and floods.

TABLE B-37	
Accidental Deaths by Cause	
Type of Accident	Number of Fatalities ^a
All injuries (unintentional) ^a	169,936
Motor vehicle accident ^a	40,231
Poisoning/exposure to noxious chemicals (unintentional) ^a	64,795
Falls (unintentional) ^a	36,338
Suffocation (unintentional) ^a	6,946
Drowning (unintentional) ^a	3,709
Fire/flame (unintentional) ^a	2,812
Floods ^b	85
Tornado ^b	69
Lightning ^b	44
Natural gas transmission pipelines ^c	7

Sources:

^a U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2019

^b National Oceanic and Atmospheric Administration, National Weather Service, 2019; 30-Year Average (1988 to 2017)

^c PHMSA, 2019; Serious Pipeline Incidents By Cause

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 2009 to 2018, there was an average of 104 significant incidents and 3 fatalities per year. The number of significant incidents over the more than 300,000 miles of natural gas transmission lines indicates that the risk is low for an incident at any given location. The operation of the Project would represent a slight increase in risk to the nearby public.

The Hartels provided comments on WBI Energy’s use of pipeline markers and general public safety comments. Pipeline markers are a requirement under USDOT regulations to warn where a transmission pipeline is located, specifically at street, highway, and railway crossings along with waterbody crossings and other prominent points along a route. WBI Energy would comply with the USDOT pipeline safety standards as well as regular monitoring and testing of the pipeline.

10. Cumulative Impacts

The proposed Project would be within the Williston Basin of northwestern North Dakota in Burke, Mountrail, Williams, and McKenzie Counties. As described in section B.3.1, the Project area is within the Missouri Coteau and Missouri Slope geographic regions of North Dakota. Characteristics of these regions include numerous wetlands, particularly on the eastern edge, decreasing toward the Missouri River and irregular topography comprised of layers such as sandstone and shale. Land use in these regions is dominated with agricultural farming and livestock ranching (NDGFD, 2016a). The Project would cross primarily sparsely populated rural areas primarily consisting of agricultural and open land. However, the Project would cross USACE and USFS federal land surrounding Lake Sakakawea near the border of Williams and McKenzie Counties.

In accordance with NEPA and FERC policy, we considered the cumulative impacts of the Project and other projects or actions in the Project area. The Hartels provided comments about cumulative impacts which are addressed in this section. As defined by CEQ, a cumulative effect is the impact on the environment that results from the incremental impact of the proposed action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (CEQ, 1997). Although the individual impact of each separate project may be minor, the additive or synergistic effects of multiple projects could be significant. This cumulative impacts analysis includes other actions meeting the following three criteria:

- the action affects a resource that is also potentially affected by the Project;
- the action causes the impact(s) within all or part of the timespan encompassed by the proposed or reasonably expected construction or operations schedule of the Project; and
- the action causes the impact(s) within all or part of the same geographical area affected by the Project.

These actions include (but are not limited to) actions that are being implemented, have been funded, are under review by a regulatory agency, or are being considered by state and local planners. Actions that have not progressed beyond planning and feasibility stages of development are not included in the analysis due to the uncertainty of whether the projects will be implemented. While recent past actions that continue to contribute to discernable impacts on a resource are included (e.g., a project that is operational, but restoration/revegetation is not complete), the impacts of completed/past actions are considered part of the baseline environmental conditions and are not included in the cumulative impact analysis.

10.1 Geographic and Temporal Scope of Cumulative Impacts

For the purpose of this analysis, we are including the following resources:

- geological resources;
- soils;
- water resources and wetlands;
- fish, wildlife, and vegetation;
- special status species;
- land use, recreation, and special interest areas;
- visual resources;
- socioeconomics;
- cultural resources;
- air quality and noise; and
- climate change.

The geographic scope for each resource is unique and is generally more localized for somewhat stationary resources (e.g., geological resources and soils) and more expansive for resources with a large geographic area (e.g., air quality). Table B-38 summarizes the resource-specific geographic boundaries considered in this cumulative impacts analysis and the justification for each. Actions occurring outside these boundaries were generally not evaluated because their potential to contribute to a cumulative impact diminishes with increasing distance from the Project.

Environmental Resource	Geographic Scope for Cumulative Impacts	Justification for Geographic Scope
Soils and Surficial Geology	Construction workspaces	Impacts on soils and surficial geology would be highly localized and would not be expected to extend beyond the area of direct disturbance associated with the Project.
Groundwater, Surface Water, and Wetlands	HUC-12 subwatershed	Impacts on groundwater and surface water resources could reasonably extend throughout a HUC-12 subwatershed (i.e., a detailed hydrologic unit that can accept surface water directly from upstream drainage areas, and indirectly from associated surface areas such as remnant, noncontributing, and diversions to form a drainage area with single or multiple outlet points), as could the related impacts on aquatic resources and fisheries.
Fish, Wildlife, and Vegetation	HUC-12 subwatershed	Consideration of impacts within a HUC-12 sub-watershed sufficiently accounts for impacts on vegetation and wildlife that would be directly affected by construction activities and for indirect impacts such as changes in habitat availability and displacement of transient species.
Socioeconomics	Affected counties	Affected counties would experience the greatest impacts associated with employment, housing, public services, transportation, traffic, property values, economy and taxes, and environmental justice.
Land Use, Recreation, and Special Interest Areas	1.0 mile from the Project	Impacts on general land uses would be restricted to the construction workspaces and the immediate surrounding vicinity; therefore, the geographic scope for land use and recreation is 1.0 mile from the Project.
Visual Resources	Viewshed	Assessing the impact based on the viewshed (i.e., the distance that the tallest feature at the planned facility would be visible from neighboring communities) allows for the impact to be considered with any other feature that could have an effect on visual resources.
Cultural Resources	Overlapping impacts within the APE	The APE for direct effects (physical) includes areas subject to ground disturbance, while the APE for indirect effects (visual or audible) includes aboveground ancillary facilities or other Project elements that are visible from historic properties in which the setting contributes to their NRHP eligibility.
Air Quality – Construction	0.25 mile of construction footprint	Air emissions during construction would be limited to vehicle and construction equipment emissions and dust, and would be localized to the Project construction sites.
Air Quality - Operation	31.1 miles (50 km) of Project facilities with operational emissions such as gas-fired compressor stations	Impacts on air quality beyond 31.1 miles (50 km) would be <i>de minimis</i> .
Noise – Construction	0.25 mile – daytime only construction 0.5 mile – nighttime and 24-hour construction	Areas in the immediate proximity of construction activities (within 0.25 mile during daytime construction and 0.5 mile during nighttime and 24-hour construction) would have the potential to be affected by construction noise.
Noise – Operation	1 mile – permanent aboveground facilities	Noise from the Project's permanent aboveground facilities is not anticipated to have an impact beyond 1.0 mile.

In addition to the geographic relationship between the Project and other projects in the area, we also considered temporal relationships. If the Commission authorizes the Project, construction would be anticipated to begin as early as spring of 2021 and to be completed no earlier than October 2021 with at least 2 years of restoration monitoring to follow. Therefore, this cumulative impact analysis considers current and other reasonably foreseeable future projects that may be constructed within the geographic scope of analysis up through about 2023 for some effects/resources. Table B-39 summarizes the resource-specific temporal boundaries considered in this cumulative impacts analysis and the justification for each. Actions occurring outside these temporal boundaries were not evaluated because of their diminished potential to contribute to a cumulative impact.

TABLE B-39		
Resource-Specific Temporal Scope for the Cumulative Impacts Analysis		
Environmental Resource	Temporal Scope for Cumulative Impacts	Justification for Temporal Scope
Geology	Construction	Impacts on geologic resources and hazards would be limited to the time of active construction.
Water Resources, Wetlands, and Soils	Construction and restoration	Impacts on water and wetlands would be limited to the time of active construction until restoration has been achieved through successful revegetation. Impacts on soils would be limited to the time of active construction until soil stabilization has been achieved.
Fish, Wildlife	Construction and restoration, operation for aquatic species in Lake Sakakawea	Impacts on wildlife and aquatic resources would primarily be temporary and limited to the period of construction through successful revegetation/restoration. Operational impacts may also occur to species in the vicinity of permanent aboveground facilities.
Vegetation	Construction and restoration, operation for forest vegetation	Impacts on herbaceous vegetation would be temporary and limited to the period of construction through successful revegetation. Vegetation impacts along the pipelines would continue through operation of the Project as the permanent right-of-way would need to be maintained.
Socioeconomics	Construction and operation	Impacts on housing, public services, traffic and transportation, and employment/workforce would primarily be limited to the time of active construction. Some impacts (e.g., property tax revenues) would extend throughout operation.
Land Use	Construction and operation	Impacts to land use would occur during construction and, where a permanent conversion from one land use type to another would occur, the temporal scope is expanded to include operation.
Recreation and Special Interest Areas	Construction and operation	Impacts on recreation would primarily occur during active construction extending through operation for some permanent Project features (e.g., along the maintained right-of-way).
Visual Resources	Construction and operation	Impacts on visual resources would be limited to construction for some areas along the pipelines, and operation for areas with permanent aboveground facilities (e.g., compressor station).
Cultural Resources	Construction; operation for aboveground facilities within viewshed of historic properties/districts	Impacts on cultural resources would be limited to the time of active construction. Potential impacts on historic properties or historic districts within the Project viewshed may also extend into operations through the physical presence of the facilities.
Air Quality and Noise	Construction and operation	Impacts on ambient air quality are dependent on the nature of the activities (e.g., emissions from earthmoving equipment during construction and combustion emissions from gas-fired compressor engines during operation). Except at the aboveground facilities, which would have noise impacts during operation, noise impacts associated with construction of the Project would be limited to the period of active construction.

10.2 Other Projects Considered

Appendix M identifies the other past, present, and reasonably foreseeable future actions within the geographic scope of the Project that are considered in this cumulative impacts analysis, including detailed project descriptions, estimated construction timeframes, distance to the proposed Project, and acres of potential overlap (if applicable). We identified these projects through information provided by WBI Energy, publicly available data, internet searches, and consultation with various agencies. Figure 3 shows the approximate location of these actions in relation to the proposed Project.

10.3 Potential Cumulative Impacts by Resource

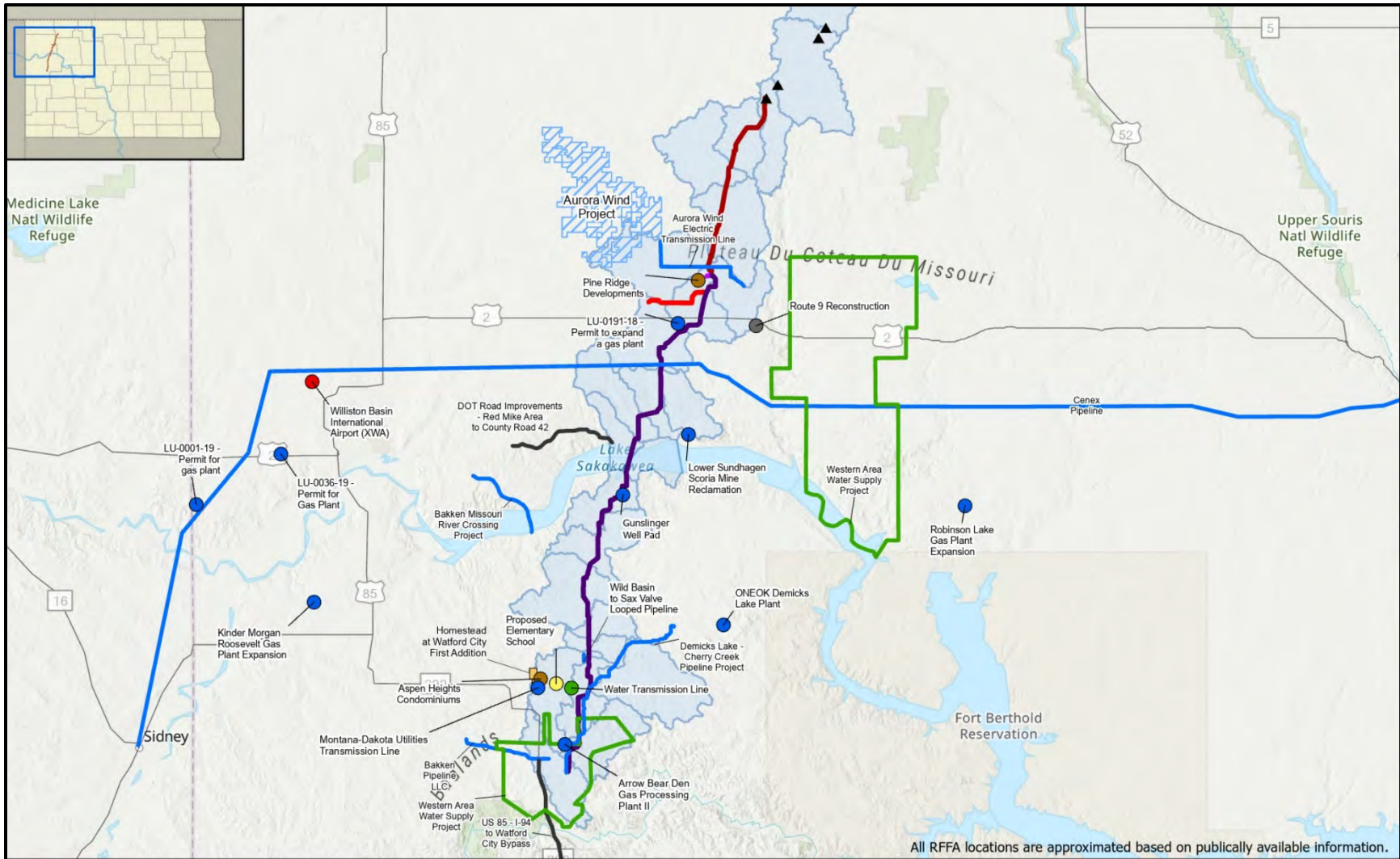
This section describes the potential cumulative impacts associated with the proposed Project in conjunction with the other past, present, and reasonably foreseeable future actions identified in appendix M.

Geological Resources

The Project's impacts on geologic resources would be highly localized (i.e., not expected to extend beyond the Project's area of direct disturbance) and limited to the time of active construction. Primary impacts during construction would include temporary disturbance of slopes within the Project's right-of-way resulting from grading and trenching operations. WBI Energy would implement mitigation measures to avoid or mitigate the Project's impact on geological resources, which would include but not be limited to implementing best management practices, returning contours to preconstruction condition, and revegetating disturbed areas to minimize soil erosion. With implementation of these measures, the Project would generate limited temporary impacts on geological resources.

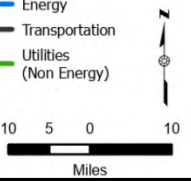
The Aurora Wind electric transmission line, two pipeline transmission projects (the Bakken natural gas pipeline and Cenex refined fuels pipeline), and two water supply projects (a water transmission line in Watford City and the Western Area Water Supply Project [WAWSP]) would fall within the Project's geographic and temporal scope for geological resources (see appendix M). All of these projects could result in short-term impacts on geological resources that would be similar to those described for the proposed Project. However, it is anticipated that these projects would implement erosion and sediment control measures and other best management practices to minimize impacts on geologic resources during construction. Therefore, any impacts associated with these projects would be short term and localized.

While both the Project and the other actions could contribute to impacts on geological resources within the overlapping construction areas during construction and restoration, these impacts would be temporary and highly localized. As a result, the Project, when combined with the other actions, would not be expected to have a significant cumulative impact on geological resources.



All RFFA locations are approximated based on publicly available information.

Figure 3
North Bakken Expansion Project
Past, Present, and Reasonably Foreseeable Future
Actions Evaluated for Potential Cumulative Impacts



Soils

The Project's impacts on soils would be limited to the period of active construction until the soils have been restored. Therefore, this cumulative impact assessment focuses on impacts from other actions that could reasonably extend into the area of direct soil disturbance during the period of active construction and prior to final restoration. The Project would disturb topsoil and subsoil during topsoil removal, grading, and trenching activities, which could result in soil erosion, reduction in topsoil quality, compaction, or potential soil contamination. Additionally, construction of new aboveground facilities and new permanent access roads would permanently convert approximately 15.3 acres of land (including approximately 2.9 acres of prime farmland or farmland of statewide importance) to commercial/industrial use. WBI Energy would implement mitigation measures in accordance with the FERC Plan and Procedures and its Fugitive Dust Control Plan to prevent or minimize the Project's impacts on soil resources. As detailed in section B.1.2, these measures include topsoil segregation installation of erosion control measures, soil stabilization measures to reduce the potential for erosion by wind (e.g., application of water or mulch), and soil decompaction. With implementation of these measures, the Project's impacts on soil resources would be temporary except at the permanent aboveground facilities where minor permanent impacts would occur.

The Aurora Wind Electric Transmission Line, Gunslinger Federal and Gladstone Oil and Gas Well Pads, the Cenex refined fuels pipeline, and the WAWSP would fall within the Project's geographic and temporal scope for soil resources (see appendix M). All of these projects would result in short-term impacts on soil resources during soil-disturbing activities that could be similar to those described for the proposed Project. However, it is anticipated that these projects would implement erosion and sediment control measures and other best management practices to minimize impacts on soil resources during construction. Therefore, these projects would be expected to have primarily short-term and localized impacts on soil resources.

While both the Project and the other actions could contribute to impacts on soil resources within the overlapping construction areas during construction and restoration, these impacts would be temporary and highly localized. Permanent impacts would be limited to permanent aboveground facilities. As a result, the Project, when combined with other actions, would not be expected to have a significant cumulative impact on soils due to the localized nature of soil impacts.

Water Resources and Wetlands

The Project's impacts on water resources (groundwater and surface water) and wetlands would primarily be limited to the period of active construction until successful revegetation is established. Therefore, the cumulative impact assessment for water resources and wetlands focuses on impacts from other reasonably foreseeable future actions that could reasonably occur in the same HUC-12 subwatershed as the proposed Project during that same time period.

Groundwater Resources

The Project could affect groundwater by causing localized changes to existing groundwater flow paths. Additionally, development of impervious surfaces and structures at the proposed aboveground facility sites could result in permanent impacts on groundwater recharge. WBI Energy would implement best management practices to reduce erosion from trench dewatering, install trench breakers to reduce erosion within the trench, and minimize compaction during construction. In addition, WBI Energy would implement its SPCC Plan to minimize the potential for discharge of hazardous materials that could affect groundwater. In the event that a private well or water supply system is damaged beyond repair due to construction-related activities, WBI Energy would provide for a temporary water source, replace the well as necessary, and, within 1 year of the completion of construction, file a report with FERC identifying all

potable water supply systems damaged by construction and how they were repaired. Due to the relatively small footprint of impervious surfaces in relation to the total potential groundwater recharge area and with implementation of the above measures, the overall effect of the Project on groundwater resources would be temporary and not significant.

The Bakken natural gas pipeline, Cenex refined fuels pipeline, a water transmission line in Watford City, and the WAWSP would occur within the same HUC-12 subwatersheds crossed by the Project facilities and within the same temporal scope (time of active construction until successful revegetation of disturbed areas). Impacts on groundwater resulting from construction and operation of these actions are expected to be similar to the impacts described above for the proposed Project. Additionally, the footprint of each of these actions would be relatively small compared to the size of the subwatershed. As a result, the Project, when combined with these other reasonably foreseeable future actions, would not be expected to have a significant cumulative impact on groundwater resources.

Surface Water Resources

The Project would result in small-scale, short-term impacts on waterbodies as a result of construction activities in stream channels and on their adjacent banks. Clearing and grading of stream banks, blasting (if required), in-stream trenching, trench dewatering, and backfilling could each result in temporary local modifications of aquatic habitat involving sedimentation, increased turbidity, and decreased dissolved oxygen concentrations. In addition, there would be potential for drilling fluid loss during HDD operations. In most cases, these impacts would be limited to the period of in-stream construction, and conditions would return to normal shortly after stream restoration activities were completed. Operation of the new pipeline and aboveground facilities would not be expected to result in any impacts on surface water use or quality. WBI would implement several mitigation measures to minimize potential impacts on surface water resources. The measures include but would not be limited to using equipment bridges, mats, and pads at stream crossings to minimize stormwater runoff; installing erosion and sediment controls around spoil piles at least 10 feet from the top of the bank where topography allows; and implementing the HDD Plan.

The following reasonably foreseeable future actions would fall within the same HUC-12 subwatershed as the proposed Project during the same temporal scope and have potential to contribute to cumulative impacts on surface water resources:

- the Montana-Dakota Utilities and Aurora Wind electric transmission line projects;
- a natural gas processing facility laydown space expansion (LU-0191-18);
- the Bakken natural gas pipeline;
- the Cenex refined fuels pipeline;
- the Gunslinger Federal and Gladstone well pads;
- a water transmission line in Watford City;
- the WAWSP;
- oil and gas exploration and development in the region (including wells and well pads, directional drilling, and access roads); and

- two road construction projects (the Red Mike Area to County Road 42 road project and the proposed expansion of U.S. Highway 85 from the Interstate 94 interchange to the Watford City Bypass).

All these actions have the potential to affect surface water resources during construction. The magnitude of these impacts would depend largely on the specific activity, season, proximity to waterbodies, location in the watershed, density of development, effectiveness of mitigation, time until reclamation success, and characteristics of any hydrologically connected aquifers. Direct and indirect impacts on surface water quality and hydrology from ground-disturbing activities could result in increased runoff from reduced infiltration capacity, erosion of soils to downstream drainages, altered hydrology, and surface water contamination. However, it is expected that all of these actions would be required to comply with applicable federal, state, and local water quality requirements, which would include mitigation measures to limit runoff, sediment discharge, and potential contamination to surface waters. Additionally, the majority of the proposed Project's impacts would be limited to the relatively brief period of in-stream construction and stream restoration, which would not be expected to coincide with the known construction schedules for these reasonably foreseeable future actions described above. As a result, the Project, when combined with these other reasonably foreseeable future actions, would not be expected to have a significant cumulative impact on surface waters.

Wetlands

Project construction would result in approximately 5.2 acres of temporary wetland impacts, primarily involving vegetation removal, soil disturbance and potential for soil compaction, and potential spills during construction activities.

The following reasonably foreseeable future actions fall within the two HUC-12 subwatersheds crossed by the Project and the Project's temporal scope for wetland resources.

- Several electric transmission line projects (Montana-Dakota Utilities and Aurora Wind) could result in permanent impacts on wetlands associated with monopole structures, monopole structure foundations, and guy wires. Each of these structures are assumed to affect less than 0.1 acre at each location. For the Aurora Wind Project, all permanent impacts on wetland basins under FWS easements would be avoided.
- Several pipeline transmission projects could result in short-term construction impacts similar to the impacts described for the Project. The proposed Bakken natural gas pipeline would temporarily affect 0.9 acre of wetlands. The Cenex pipeline could cross 120.2 acres of FWS wetland easements. Large impacts would be avoided using the HDD crossing method based on the requirements of the USACE Nationwide Permit 12. Wetlands impacts associated with the water transmission line in Watford City, and the WAWSP are not publically available; however, these pipelines are likely to be collocated with existing roads.
- Two road construction projects fall within the geographic scope for wetland impacts. The Red Mike Area to County Road 42 project would permanently affect 1.1 acres of wetlands and temporarily affect 0.2 acre of wetlands, which would be mitigated through compensatory mitigation, removal of temporary fill material, and restoration of preconstruction contours. The proposed expansion of U.S. Highway 85 from the Interstate 94 interchange to the Watford City Bypass would permanently affect 19.0 to 26.8 acres of wetlands.

- It is assumed that local developments, notably the Pine Ridge Development in Tioga and the new elementary school in Watford City, would be sited to avoid wetlands for constructability purposes.

It is assumed that reasonably foreseeable future actions would comply with federal wetlands regulations, which require mitigation measures for impacts on USACE-jurisdictional wetlands. Stormwater pollution prevention regulations require the use of BMPs to prevent runoff from the construction corridor from entering waters of the United States. Additionally, the footprint of each reasonably foreseeable future action that falls within the geographic scope for impacts on wetlands is relatively small compared to the size of the subwatershed. As a result, Project impacts when combined with the reasonably foreseeable future actions are not expected to have a significant cumulative impact on wetlands.

Fisheries

For perennial waterbodies or those with flow at the time of construction, temporary impacts associated with construction of the proposed Project may include increased sedimentation and turbidity, temperature changes due to removal of vegetation cover over streams, introduction of water pollutants, or entrainment of fish. Impacts on fisheries and other aquatic life are expected to be minor, localized, and limited to the construction period.

The following reasonably foreseeable future actions fall within the Project's geographic and temporal scope for fisheries.

- Several transmission pipeline projects that intersect the proposed Project could result in impacts on fish. These include the Bakken Pipeline, and the Cenex pipeline projects. Limited information is available regarding these projects' potential impacts on fish; however, it is assumed that the impacts would be similar to those described above for the proposed Project.
- The NDDOT's expansion of U.S. Highway 85 from the Interstate 94 interchange to the Watford City Bypass. To minimize impacts on fish habitat in Spring Creek, construction would occur outside of the fish spawning period (April 15 to June 1) (NDDOT, 2019b).
- Impacts on state species of concern from the Aurora Wind Project could include degradation of aquatic habitat due to spills or sediment loading. Coordination with the FWS is ongoing regarding potential mitigation measures.

Due to the proposed timing for construction of the projects listed above, it is unlikely that construction impacts would occur simultaneous with construction of the Project; however, restoration activities for the reasonably foreseeable future actions could be ongoing during Project construction. WBI Energy would implement the proposed mitigation measures described in section B.3.2 to minimize impacts of the proposed Project on fish. It is anticipated that the reasonably foreseeable future actions listed above would also implement similar measures. As a result, significant cumulative impacts on fish are not expected.

Wildlife

Construction and operation of the Project may result in short-term impacts on wildlife species and their habitat along the proposed pipeline routes and long-term impacts at aboveground facility sites. Until vegetation has become re-established, construction activities would temporarily reduce feeding, nesting,

and cover options for wildlife and migratory birds in the immediate Project area. Additionally, wildlife and migratory birds could be temporarily displaced due to construction noise and increased human activity.

The following reasonably foreseeable future actions fall within the Project's geographic and temporal scope for wildlife.

- Construction of the Aurora Wind electric transmission line would temporarily affect potential habitat for ground-dwelling mammals and could potentially result in direct mortality or injury from collisions with construction equipment. Operation of the transmission line may increase the potential for bird or bat strikes with transmission line structures, conductors, or associated infrastructure. Aurora Wind would develop a Bird and Bat Conservation Strategy that would propose specific mitigation measures to minimize potential impacts on birds and bats. Anticipated impacts from a third project, the Montana-Dakota Utilities Transmission Line, are not currently available but could be similar to those described for the two electric transmission lines depending on the wildlife habitat present in the project area.
- The Aurora Wind Project would affect potential habitat for ground-dwelling mammals and avian species and would increase the potential for bird and bat strikes with turbine rotors. The project has been sited primarily within tilled and agricultural land to avoid impacts on habitat. Existing access roads would be used to the extent practical. Turbines and access roads have been sited to avoid wooded draws and shelterbelts and minimal tree removal is expected. Tree impacts would be mitigated on a 2:1 basis, as approved by the landowner and consistent with the NDPSA's specifications. All collector lines would be buried to avoid potential for bird strikes. Temporarily disturbed areas would be revegetated, as appropriate, with vegetation consistent with the surrounding vegetation types. A bird and bat conservation plan would be prepared prior to operation. Coordination with the FWS is ongoing regarding potential mitigation measures for the project.
- The Cenex pipeline would result in short-term, adverse impacts on mammals during construction as well as long-term impacts on avian species due to wetland loss.
- Little information is publically available regarding the potential impacts of the WAWSP and the 12-inch-diameter water transmission lines proposed to furnish water to "The Crossings at Watford City." It is possible that these projects could have similar impacts on wildlife as the proposed pipeline projects described above.
- Operation of roadways such as the proposed expansion of U.S. Highway 85 from the Interstate 94 interchange to the Watford City Bypass can result in habitat loss, degradation, and fragmentation; barriers to wildlife movement; and mortality from wildlife-vehicle collisions. To offset project impacts on wildlife mobility and habitat connectivity, three wildlife crossings (i.e., structures along roadways that provide wildlife habitat connections) have been incorporated into the project design. Proposed construction and operation activities would have the potential to contribute sound and visual stimuli at levels that could result in the temporary avoidance of habitat and behavioral effects (NDDOT, 2019b).
- Construction and operation of the Gunslinger Federal and Gladstone oil and gas well pads would not impact species or their habitat in such a way that would affect the long-term viability or continued existence of the species. No migratory birds or resident wildlife species in the area would be impacted in such a way that would cause their populations to be listed or adversely affected. The project has been designed to minimize the acreage of

disturbance to native habitat by having multi-well pads versus single-well pads and reduce habitat fragmentation by siting project features along existing roads and within previously disturbed areas. Approximately 40 acres of undisturbed habitat (e.g., grasslands, shrublands, wetlands, woodlands) would be affected during construction. Construction and operation of well pads and access roads would result in localized temporary disturbances as well as permanent conversion of potentially suitable habitat. Short-term, indirect impacts on wildlife, including noise and visual disturbances are anticipated. Some species of wildlife would relocate to adjacent habitat, while others would be temporarily displaced during construction and drilling operations.

The proposed utility line associated with the Gunslinger Federal and Gladstone project is collocated or overlapping with the proposed Project along Highway 1806 for approximately 0.9 mile between MPs 28.1 and 29.0 of the Tioga-Elkhorn Creek pipeline. While the schedule for the Gunslinger Federal and Gladstone Project is unknown, it is unlikely that construction of the utility corridor would occur simultaneous to construction of the collocated or overlapping segments of the proposed project. Cumulative impacts would occur if construction of the Gunslinger Federal and Gladstone project occurs during or after construction of the Tioga-Elkhorn Creek pipeline, and prior to final restoration of wildlife habitat. The time during which impacts on wildlife habitat would occur in this area would be extended; however, due to the temporary and localized nature of impacts of these two utility corridors, significant cumulative impacts are not expected.

Additionally, there is potential for cumulative habitat loss within the Tioga Dam HUC-12 watershed resulting from temporary right-of-way clearing combined with permanent impacts from transmission structures, the Aurora Wind Project, and road projects. Impacts from construction of the proposed Project right-of-way within the Tioga Dam HUC 12 watershed would be limited to 0.6 acre of herbaceous land cover and 2.9 acres of agricultural lands. For the remainder of the projects listed above, it is unlikely that habitat disturbance would occur simultaneously with the proposed Project; however, restoration activities could be ongoing at the time of Project construction. With implementation of the mitigation measures described in section B.3.3, significant cumulative impacts on wildlife are not expected.

Vegetation

Construction and operation of the Project may result in short- and long-term impacts on vegetation associated with clearing and grading of the temporary right-of-way and routine clearing of permanent right-of-ways throughout operation. In the permanent right-of-way, a 10-foot-wide area over the pipelines may be maintained in an herbaceous state to facilitate pipeline inspection. Vegetation maintenance activities on the rest of the permanent right-of-way would be conducted no more than every 3 years. The remaining temporary workspace along the construction right-of-way and any ATWS areas would be allowed to revert to preconstruction conditions.

The following reasonably foreseeable future actions fall within the Project's geographic and temporal scope for vegetation.

- Several electric transmission lines could result in temporary impacts on vegetation within the construction corridor and minor permanent impacts associated with monopoles and guy wires. These include the Montana-Dakota Utilities Transmission Line and the Aurora Wind Electric transmission line. Following construction of the Aurora Wind electric transmission line, temporarily disturbed areas would be reclaimed with vegetation consistent with the surrounding vegetation types and in accordance with NRCS recommendations, unless otherwise specified by and approved by the landowner and jurisdictional agency. Seed mixtures would be free of noxious weeds.

- Areas that have been temporarily disturbed during construction of the Aurora Wind Project would be reclaimed following construction. Revegetation would be consistent with the surrounding vegetation types and in accordance with NRCS recommendations, unless otherwise specified by the landowner and approved by the jurisdictional agency. Seed mixtures would be free of noxious weeds.
- Arrow Bear Den Gas Processing Plant II comprises 51 acres of land currently classified as herbaceous upland/rangeland and cropland. A weed management plan for the Project would be required as part of the county's Conditional Use Permit.
- Future oil and gas exploration and development of a lease parcel could result in removal of vegetation and soil compaction. The magnitude of these impacts would depend largely on the specific activity. For new exploratory and development gas wells, the BLM estimates that each well pad could result in approximately 1.1 acres (0.6 acre for access roads and 0.5 acre for the well pad) of short-term surface disturbance. For new producing gas wells, each well pad could result in approximately 0.6 acre (0.3 acre for access roads and 0.3 acre for the well pad) of long-term surface disturbance.
- Construction and operation of the proposed Gunslinger Federal and Gladstone oil and gas well pads would disturb approximately 50.4 acres on USFS lands within the LMNG, of which approximately 9.7 acres would be within previously disturbed areas (developed and cultivated lands) and 40.7 acres would be within undisturbed areas (grassland, shrubland, wetlands, or woodlands land use classes). Interim reclamation of the road ditches and edges of the well pads would occur after drilling and completion of the wells (i.e., within a 1-year timeframe); however, well pads would affect vegetation until final reclamation (20 to 40 years). Grading and permanent modification within areas of gravel fill (e.g., well pads and access road running surfaces) may result in temporary modification of potential suitable habitat or undiscovered individuals for 5 of the 14 LMNG-listed sensitive plant species including blue lips, Missouri foxtail cactus, sand lily, Easter daisy, and Hooker's townsendia. Minimizing soil and vegetation disturbance during construction to the maximum extent practicable reduces impacts on potential habitat for these species. Disturbance of vegetation in areas of noxious weed infestations may result in redistribution of invasive species to the Project area through equipment and vehicle use. Applicable Grassland-wide Standards and Guidelines would be applied to all resources potentially affected by the project. Mitigation measures include minimizing areas and widths of disturbance, cleaning vehicles and equipment to remove seeds and plant propagules prior to entering USFS lands, and controlling noxious weeds according to the 2007 *Noxious Weeds Management Environmental Impact Statement* (USFS, 2007). During construction, indirect impacts would be expected from a temporary increase in fugitive dust. Fugitive dust impacts would be greatest during initial site-preparation and would vary from day to day, depending on the construction phase, level of activity, and prevailing weather conditions. Operators may reduce airborne dust during construction by using water on existing gravel roads in the Project area during dry periods; materials other than water would require approval from the USFS.
- Several transmission pipeline projects could result in impacts on vegetation. Construction of the Bakken Pipeline and the Cenex pipeline projects would require clearing and grading of the temporary right-of-way. Mitigation measures would include cleaning of vehicles and equipment, topsoil segregation and revegetation of disturbed non-agricultural upland areas. Vegetation along the pipeline rights-of-way may be cleared periodically.

- Water transmission projects include the WAWSP, a proposed water transmission line in Watford City. These projects would likely temporarily affect roadside vegetation.
- Two road construction projects fall within the geographic scope for vegetation impacts. The proposed expansion of U.S. Highway 85 from the Interstate 94 interchange to the Watford City Bypass would permanently convert vegetated areas into a transportation corridor, and construction activities would have the potential to spread or introduce noxious weeds. Upon completion of construction activities, vehicles travelling along U.S. Highway 85 would have the potential to spread or introduce noxious weeds along the project corridor. Disturbed, non-roadway areas would be re-seeded and a noxious weed management plan would be implemented during construction. The project would have no impact on ESA-listed plant species, as no such resources occur within the project corridor. With prompt reseeded throughout the corridor and cleaning of equipment prior to entering USACE lands, the NDDOT road improvements from Red Mike Area to County Road 42 are unlikely to introduce new or additional noxious weeds.
- Additionally, existing vegetation is likely to be permanently removed within the footprints of several proposed residential developments in Tioga and Watford City, as well as a new elementary school in Watford City.

WBI Energy would implement the mitigation measures described in section B.3.1 to minimize impacts on vegetation during construction and operation of the Project. Timely restoration of the construction right-of-way, reseeded with the appropriate seed mixes, and the use of effective erosion control measures would minimize vegetation disturbance. The utility line associated with the Gunslinger Federal and Gladstone project would be collocated or overlapping with the proposed Project along Highway 1806 at two locations as described above. While the schedule for the Gunslinger Federal and Gladstone project is unknown, it is unlikely that construction of the utility corridor would occur simultaneous to construction of the collocated or overlapping segments of the proposed project. Cumulative impacts would occur if construction of the Gunslinger Federal and Gladstone project occurs during or after construction of the Tioga-Elkhorn Creek pipeline, and prior to final restoration. The time during which impacts on vegetation would occur in this area would be extended; however, due to the temporary and localized nature of impacts of these two utility corridors, significant cumulative impacts on vegetation are not expected. Due to the proposed timing for construction of the remainder of the projects listed above, it is unlikely that vegetation disturbance would occur simultaneously with the proposed Project; however, restoration may be ongoing. Permanent impacts on vegetation from routine clearing within the permanent right-of-way and aboveground facilities are expected to be localized within the permanent project footprint and significant cumulative impacts on vegetation are not expected.

Special Status Species

As described in section B.4.1, the Project would be *not likely to adversely affect* NLEB, least terns, piping plovers, whooping cranes, DASK, pallid sturgeon, or their habitat. Because the Project would have *no effect* on the gray wolf and red knot, potential cumulative impacts on these species are not further evaluated. Mitigation measures that WBI Energy would implement to avoid or minimize potential impacts on federally threatened and endangered species and state species of concern are described in section B.4.

Two electric transmission line projects (the Montana-Dakota Utilities Transmission Line and the Aurora Wind Electric transmission line), the Aurora Wind Project, several pipeline projects (the Bakken Pipeline Project, the Watford City water transmission line, and the WAWSP), and two road construction projects (the Route 9 reconstruction and the U.S. Highway 85 from the Interstate 94 interchange to the Watford City Bypass) fall within the Project's geographic and temporal scope for threatened and

endangered species. Anticipated impacts on threatened and endangered species associated with the Montana-Dakota Utilities Transmission Line, the Watford City water transmission line, and the WAWSP are not currently available and would be dependent on whether the projects are sited within threatened and endangered species habitat.

The Aurora Wind Electric transmission line could potentially affect wetlands or waterbodies visited by piping plovers, is located within the whooping crane migration corridor, and is sited within potentially suitable habitat areas for the DASK. Although there is potential for piping plovers to utilize wetlands and waterbodies near the project corridor, the potential for habitat loss is unlikely as impacts on wetlands would be expected to be minimal (Burns and McDonnell, 2018). Because the transmission line is within the whooping crane migration corridor, collision and mortality risk exists associated with overhead transmission lines. However, all transmission lines within 1 mile of modeled suitable whooping crane habitat would be marked with bird flight diverters per Avian Power Line Interaction Committee recommendations and FWS guidance. Construction activities would not occur within identified potentially suitable habitat areas during the DASK active flight period, any temporary impacts occurring outside of the DASK's brief flight period are unlikely to affect the species' population, and affected areas would be reseeded with the appropriate native seed mix. Therefore, it is anticipated that any cumulative impacts associated with the construction and operation of the proposed Project in conjunction with the Aurora Wind Electric transmission line would be minor and temporary.

The NLEB, the piping plover, and the whooping crane can occur within the proposed project area for the Aurora Wind Project. Coordination with the FWS is currently ongoing for the project. However, impacts on threatened and endangered species associated with this project could include habitat fragmentation and increased likelihood of bird strikes with the turbine rotors. Impacts on state species of concern could include habitat loss and fragmentation, direct mortality or injury due to collisions with vehicles, equipment, and turbines, and degradation of aquatic habitat due to spills or sediment loading. The project has been sited primarily within tilled and agricultural land to avoid impacts on habitat, turbines and access roads have been sited to avoid wooded draws and shelterbelts, and minimal tree removal is expected. Tree impacts would be mitigated on a 2:1 basis, as approved by the landowner and consistent with the NDPSA's specifications. All collector lines would be buried to avoid potential for bird strikes. Temporarily disturbed areas would be revegetated, as appropriate, with vegetation species consistent with the surrounding area. In addition, a bird and bat conservation plan would be prepared prior to operation. The geographic scope for cumulative impacts from the Aurora Wind Project includes the area within the Tioga Dam HUC-12 watershed. However, direct impacts from construction of the proposed Project's right-of-way within the Tioga Dam HUC-12 watershed would be limited to 0.6 acre of herbaceous land cover and 2.9 acres of agricultural lands. Additionally, suitable wetlands exist directly adjacent to the proposed right-of-way in this area. For these reasons and with implementation of the proposed Project's mitigation measures described in section B.4, the proposed Project is not anticipated to have significant cumulative impacts on these species when considered in conjunction with Aurora Wind Project.

The Bakken Pipeline Project has the potential to affect DASK; however, it would avoid or bore under DASK habitat or restrict construction during the DASK flight period. Therefore, significant cumulative impacts on DASK associated with the proposed Project and the Bakken Pipeline Project are not anticipated.

The Route 9 reconstruction road project has the potential to affect federally listed endangered or threatened species or their critical habitat. However, the USACE would initiate consultation with the FWS, pursuant to section 7 of the ESA, as appropriate. The proposed expansion of U.S. Highway 85 from the Interstate 94 interchange to the Watford City Bypass may affect, but is not likely to adversely affect DASK due to suitable habitat occurring adjacent to the project corridor. For these reasons, significant cumulative

impacts associated with the construction of these road projects and the proposed Project would not be anticipated.

With implementation of the mitigation measures described above and the federally required protections for these species, significant cumulative impacts on threatened and endangered species or state species of concern are not anticipated from construction and operation of the proposed Project and the known reasonably foreseeable future actions.

Land Use, Recreation, and Special Interest Areas

The geographic scope of impacts on land use, recreation, and visual resources includes impacts from reasonably foreseeable future actions that could reasonably extend within a 1.0-mile radius of the Project during construction. Impacts on land use, recreation, and visual resources would be restricted to the construction workspaces and the immediate surrounding vicinity. Where a permanent conversion from one land use type to another would occur, the temporal scope is expanded to include operation.

Land Use

Development of the pipeline construction rights-of-way, ATWS, staging areas, and temporary access roads, would result in temporary land disturbance. Permanent access roads, aboveground facility sites, and the permanent pipeline easements would result in permanent land disturbance. Acreages are provided in section B.5.1.

The following reasonably foreseeable future actions fall within the Project's geographic and temporal scope for land use impacts.

- Two proposed electric transmission lines exist within the geographic scope for land use impacts. The Aurora Wind transmission line is not expected to result in a significant change in land use. The Montana-Dakota Utilities overhead electric transmission line project is in the early permitting phases and the specific location is currently unknown. If the Montana-Dakota Utilities overhead electric transmission line project does fall within the geographic scope for the Project, it is not likely to permanently affect land use due to the nature of the project and its location within Watford City.
- The Arrow Bear Den Gas Processing Plant II site would permanently affect about 51.0 acres of a 73.0-acre parcel currently classified as herbaceous upland/rangeland and cropland. Twenty acres of the parcel were recently developed as Arrow's Bear Den Gas Plant.
- Gunslinger Federal and Gladstone Oil and Gas Well Pads would disturb approximately 50.4 acres on USFS lands within the LMNG. Of the 50.4 acres, approximately 9.7 acres would be within previously disturbed areas (developed and cultivated lands) and 40.7 acres would be within undisturbed areas (grassland, shrubland, wetlands, or woodlands land use classes).
- Several pipeline projects would affect land use. The proposed Cenex pipeline project would temporarily disturb approximately 1,360 acres of land associated with the construction corridor. Permanent impacts are not anticipated. Little information is publically available regarding potential impacts of the WAWSP; however, it is likely that the impacts associated with the pipeline construction would be temporary and that utilities would be collocated with existing roads.

The proposed utility line associated with the Gunslinger Federal and Gladstone Oil and Gas Well Pads project is collocated or overlapping with the Tioga-Elkhorn Creek pipeline along Highway 1806 for approximately 0.9 total mile within the LMNG. The time during which impacts on vegetation would occur in this area would be extended; however, due to the temporary and localized nature of impacts of these two utility corridors, significant cumulative impacts on land use are not expected. Due to the proposed timing for construction of the projects listed above, it is unlikely that construction impacts would occur simultaneously; however, restoration activities from the proposed Project could be ongoing. Ongoing maintenance of the permanent right-of-way is not anticipated to affect current land use and permanent impacts from aboveground facilities would be highly localized. WBI Energy would reduce impacts on land use by implementing the mitigation measures described in section B.5. As a result, significant cumulative impacts on land use are not expected.

Recreation and Special Interest Areas

The proposed Tioga-Elkhorn Creek pipeline would cross Lake Sakakawea, a reservoir on the Missouri River, near Tobacco Garden Bay. Impacts of the lake crossing on recreation would be mitigated by using the HDD crossing method. WBI Energy is consulting with the USFS regarding the appropriate permitting and mitigation for the 1.8-mile-long crossing of the LMNG. As discussed above, the Gunslinger Federal and Gladstone Oil and Gas Well Pads project is collocated and/or overlapping with the proposed Project across the LMNG. There are no designated recreation areas within this portion of the LMNG; therefore, cumulative impacts on recreation are not expected.

The proposed Cenex pipeline project would temporarily disturb approximately 22.0 acres of NDGFD PLOTS land and 120 acres of FWS wetland easements. Permanent impacts are not anticipated. With implementation of the proposed mitigation measures described above, significant cumulative impacts of the Project when combined with the Cenex pipeline project are not anticipated.

Visual Resources

Permanent visual impacts associated with the Project would be limited to the areas of proposed aboveground facilities. The majority of aboveground facilities associated with the proposed Project would consist of modifications to existing structures. Modifications to the Tioga Compressor Station would be conducted within or adjacent to WBI Energy's existing station building in an area that has many oil and gas plants. Two existing receipt stations and a town border station (Tioga Plant Receipt Station, Lignite Plant Receipt Station, and Lignite Town Border Station) would be rebuilt as part of the Project. Visual impacts associated with these facilities are expected to be of the same magnitude of those for the current existing facilities.

Construction of the new Elkhorn Creek Compressor Station, Northern Border Interconnect, and Norse Transfer Station are not anticipated to result in significant visual impacts on the surrounding area given the surrounding oil and gas development and implementation of any site-specific mitigation measures such as maintaining vegetation buffers where possible.

Temporary minor cumulative impacts on visual resources would occur for those reasonably foreseeable future actions within the same geographic and temporal scope for visual resources. Permanent cumulative visual impacts would occur only if a reasonably foreseeable future action that also includes a permanent aboveground facility were to occur in the same viewshed as a new aboveground facility for the proposed Project. No reasonably foreseeable future actions with permanent aboveground facilities have been identified within the 1-mile geographic scope for visual resources; therefore, no permanent cumulative visual impacts are anticipated from the proposed Project.

Socioeconomics

Socioeconomic impacts of the Project include increased traffic for workers who commute to and from Project activities, population increases in the areas workers are located, economic migration and increased burden on local businesses and temporary accommodations, increased population especially in smaller communities, and increased tourism revenue. Significant impacts are possible but unlikely for local utilities, public services, property values, and health.

The reasonably foreseeable future actions that could fall within the geographic and temporal scope for socioeconomics are listed in appendix M. This section focuses on reasonably foreseeable future actions that could impact socioeconomics on a county-wide scale within Williams, Mountrail, McKenzie, or Burke Counties.

- Construction of the Aurora energy facilities (including electric transmission lines) are expected to result in short- and long-term economic benefits in Williams and Mountrail Counties. Benefits include employment, an increased tax base due to property taxes, increased spending during construction, and long-term income for landowners receiving lease payments. Although impacts are expected to be primarily positive, adverse impacts could include increased demand on the existing labor force and demand for local housing during construction. Construction is expected to temporarily increase traffic on haul roads and may affect electric, telephone, and fiber optic lines.
- Several natural gas plant facilities are planned. These include Demicks Lake Plant II, two Nesson gathering facilities, the Roosevelt Gas Plant Expansion, the Arrow Bear Den Gas Processing Plant II, and the Robinson Lake Gas Plant. It is likely that these facilities would contribute long-term employment opportunities at the county level for gas plant operators and technicians as well as an indirect and direct contribution to tax base at the state and local levels. Construction of new facilities is expected to temporarily increase traffic on haul roads.
- Several transmission pipeline projects could result in county-wide impacts on socioeconomics similar to those described for the Project. These projects include: the Bakken natural gas pipeline, the Cenex refined fuels pipeline, and the Missouri River Crossing Project. The WAWSP could potentially improve property values for properties with access to the water system.
- Oil and gas exploration and development in the region (including wells and well pads, directional drilling, and access roads) generate federal revenue and annual rents through leasing. These revenues are collected by the federal government, which then distributes a portion of the revenues collected to the state and counties (BLM, 2019).
- Operation of the Williston Basin International Airport may encourage business and economic activity by making the region more accessible via an improved air transportation facility. Overall, the airport is not anticipated to cause a substantial social impact on the community.
- Following the temporary impacts due to construction, Red Mike Area to County Road 42 improvements would have overall beneficial impact because traffic flow, traffic safety, and highway accessibility would be improved throughout the corridor. The improvements would provide efficient and reliable means of transport for goods, services, and people facilitating economic growth and stability within the region. Following temporary impacts

on transportation due to construction, road improvements would have an overall beneficial impact improving traffic flow, traffic safety, and highway accessibility.

- The U.S. Highway 85 to I-94 to Watford City Bypass Project would improve the reliability and capacity of U.S. Highway 85 for industries dependent upon the project corridor. Although construction of the project could result in an expenditure of local funds, the regional economy would experience a temporary increase in construction employment opportunities and subsequent increase in payroll taxes, sales receipts, and indirect purchases of goods and services as result of construction activities. During construction, two lanes of traffic would be maintained and reasonable construction access to properties and roadways would be maintained. Speed limits within construction zones would be reduced, which would temporarily increase travel times, and accessing properties may require minor detours. Expanding U.S. Highway 85 to four lanes would provide a safer and more reliable highway corridor for the traveling public. Overall, reliability would be improved by reducing over-height restrictions, providing additional driving lanes and expanding roadway shoulders (NDDOT, 2019b).
- Residential developments including the Pine Ridge Development, Homestead at Watford City First Addition, and Aspen Heights Condominiums would improve housing availability.

Construction-related impacts on socioeconomics and transportation are not expected to result in significant cumulative impacts as no known construction schedules for the reasonably foreseeable future actions coincide with Project construction. Cumulative impacts on employment and workforce would largely depend on how much of the temporary construction workforce is sourced locally for the projects described above and the number of permanent positions that would be needed to operate the other facilities listed above. There are likely to be long-term positive cumulative impacts on the economy from property, sales, and income tax collections associated with the Project and the reasonably foreseeable future actions listed above.

Cultural Resources

Cumulative impacts on cultural resources would only occur if reasonably foreseeable future actions were to affect the same historic properties as the Project. WBI Energy defined the APE for archaeological sites as the construction footprint for the Project facilities, staging areas, and access roads. For historic structures and other architectural resources, FERC defined the APE to include these areas as well as viewsheds from historic sites along or near the Project facilities. The expanded APE for historic structures takes into account potential changes in the viewsheds of historic properties, which could persist beyond the construction phase of the Project (e.g., viewshed impacts due to the installation and operation of aboveground facilities).

Reasonably foreseeable future actions that could affect archaeological sites or historic structures within the APEs for the Project include the Aurora Wind electric transmission line; Gunslinger Federal and Gladstone Oil and Gas Well Pad Project; Cenex refined fuels pipeline; and WAWSP. Each of these projects would overlap with the Project APEs for archaeological sites and historic structures. There are no archaeological sites or historic structures within the areas of overlap for the APEs for the proposed Project and the Aurora Wind electric transmission line, Cenex refined fuels pipeline, and WAWSP; therefore, there is no potential for cumulative impacts for these projects.

Two previously recorded archaeological sites appear to be in the areas of overlap for the APEs for the proposed Project and the Gunslinger Federal and Gladstone Oil and Gas Well Pad Project, which occurs

on USFS lands. These two sites were previously assessed as not eligible for listing in the NRHP. Three newly recorded archaeological sites were identified within or immediately adjacent to the area of overlap between the Project and the archaeological APE for the proposed Project; data analysis for these sites is ongoing. If the USFS, in consultation with the SHSND, determines that any of these sites are eligible for the NRHP and would be adversely affected by the Project, avoidance or mitigation measures would be developed and implemented, which would reduce the potential for cumulative impacts. No historic structures are located within the area of overlap between this project and the proposed Project's APE for historic architectural resources. Therefore, no cumulative impacts on cultural resources are anticipated.

Air Quality and Noise

Air

As shown in table B-38, the geographic scope for cumulative air quality analysis is 0.25 mile for construction because air emissions during construction would be limited to vehicle and construction equipment emissions and dust, and would be localized to the project construction sites; and 50 km (31.1 miles) for operation because impacts on air quality beyond 50 km would be *de minimis*.

The Project would result in new permanent but minor impacts on air quality due to the expansion of the Tioga Compressor Station and the operation of the proposed Elkhorn Creek Compressor Station. There would also be temporary air quality impacts at all construction locations due to fugitive dust, elevated levels of ambient pollutants, and air emissions from mobile sources and construction equipment during the construction period.

Construction emissions associated with the WAWSP could potentially fall within or reasonably extend to within 0.25 mile of the Project construction footprint. Although the timing of construction of the WAWSP is unknown, if the construction occurs at the same time as the proposed Project, impacts would include emissions from construction equipment, operation, and fugitive dust. Similar to the proposed Project construction, construction of the water transmission line would result in air impacts that are temporary and transient in nature and are not expected to cause or contribute to any significant degradation of air quality. WBI Energy would operate equipment properly and minimize potential fugitive dust impacts by adhering to the NDDEQ's Division of Air Quality requirements to monitor dust emissions and provide water trucks. Construction emissions would not extend significantly beyond the Project site and no significant cumulative impacts would be anticipated with other nearby construction activities.

The following operational facilities may cumulatively contribute to the operational air quality impacts in the region. These facilities are expected to operate within compliance of all state and federal air quality regulations.

- Oil and gas developments including well pads, directional drill (horizontal) wells, and access roads are planned throughout McKenzie County. Oil and gas development can result in emissions that affect ambient concentrations of particulate matter, ozone, and NO_x from construction and production activities and in some fields, concentrations of SO₂ can be affected. HAPs may also be emitted from oil and gas operations, including well drilling, well completion, and venting. However, no ambient standards have been established for HAPs associated with oil and gas development in this area and ambient monitoring data is not available. Oil and gas production sources have the potential to release air pollutant emissions that contribute to ozone formation, regional haze, atmospheric deposition, or contribute to increased global concentration of GHGs.

- Six natural gas processing plant developments or expansions are planned within 50 km of the Project. Operational emissions of equipment such as gas-driven compressors, heaters, storage tanks, flares, and other ancillary equipment would be subject to state and federal air quality regulations.
- Emissions from the Williston Basin International Airport are expected to be below *de minimus* thresholds for NAAQS. The proposed action would increase GHG emissions by 2,666 tpy of CO₂ over the baseline conditions, an increase of 26 percent.
- Emissions of criteria pollutants from vehicles using the proposed U.S. Route 85/Interstate 94 to Watford City Bypass may be attenuated by eliminating the need for passing maneuvers and reducing roadway congestion. The addition of passing lanes along North Dakota Highway 1804 from Red Mike Area to County Road 42 (Epping Road) is expected to increase vehicle use and associated emissions. With the federal requirements for on- and off-road engines and continued fugitive dust management practices, fugitive dust and criteria pollutant emissions from vehicles traveling on the existing roadway are anticipated to be minor and are not expected to adversely impact North Dakota's reasonable progress goals for 2018. Traffic along the roadway would also contribute toward U.S. and North Dakota GHG inventories.

Although permanent minor operational impacts may contribute cumulatively to air emissions, all sources are expected to comply with state and federal air quality standards. Therefore, the Project and other actions would have a permanent but minor cumulative impact on the existing air quality.

Noise

The geographic scope for cumulative noise analysis is 0.25 mile for daytime construction and 0.5 mile for nighttime or 24-hour construction because areas in the immediate proximity of aboveground facility construction activities have the potential to be affected by construction noise. The geographic scope for cumulative operational noise impacts is areas within 1 mile of an aboveground facility because noise from the Project's permanent facilities is not anticipated to have an impact beyond 1 mile.

It is expected that the Project would have new permanent impacts on noise quality due to the installation and operation of the compressor stations. There would also be temporary noise impacts due to sound emissions from mobile sources and construction equipment during the construction period. These impacts would be minimized to the extent possible by complying with federal, state, and local noise standards.

There are five reasonably foreseeable future actions within the geographic and temporal scope of the Project that may cumulatively affect noise during construction: Aurora Wind Electric Transmission Line, Cenex Pipeline, WAWSP, Pine Ridge Development, and a new elementary school in Watford City. While increases over existing ambient sound levels may occur at nearby NSAs, noise generated by pipeline construction would be short term and transient, lasting for short durations at any nearby NSAs. Additionally, it is unlikely that simultaneous construction of all pipeline projects would occur. Therefore, no significant or long-term cumulative construction noise impacts are expected to occur.

No reasonably foreseeable future actions were identified within 1 mile of the Project site that may cumulatively affect noise during operation. Noise generated by past and present actions is part of the measured ambient noise levels, and have therefore already been taken into account.

Climate Change

The U.S. Global Change Research Program (USGCRP¹⁷), which is the leading U.S. scientific body on climate change, and the Intergovernmental Panel on Climate Change have recognized that:

- globally, GHG has been accumulating in the atmosphere since the beginning of the industrial era (circa 1750);
- combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture and clearing of forests, is primarily responsible for the accumulation of GHG;
- anthropogenic GHG emissions are the primary contributing factor to climate change; and
- impacts extend beyond atmospheric climate change alone and include changes to water resources, transportation, agriculture, ecosystems, and human health.

In May 2014, the USGCRP issued a report summarizing the impacts that climate change has already had on the United States and what projected impacts climate change may have in the future (USGCRP, 2014). In 2017 and 2018, the USGCRP issued its *Climate Science Special Report: Fourth National Climate Assessment, Volumes I and II* (Fourth Assessment Report) (USGCRP, 2017 and 2018, respectively). The Fourth Assessment Report states that climate change has resulted in a wide range of impacts across every region of the country. Those impacts extend beyond atmospheric climate change alone and include changes to water resources, transportation, agriculture, ecosystems, and human health. The United States and the world are warming; global sea level is rising and acidifying; and certain weather events are becoming more frequent and more severe. These changes are driven by accumulation of GHGs in the atmosphere through combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture, clearing of forests, and other natural sources. These impacts have accelerated throughout the end of the 20th and into the 21st century (USGCRP, 2018).

Observations of environmental impacts attributed to climate change for the Northern Great Plains region include (USGCRP, 2017):

- an increase in average annual temperatures in the region by 1.7°F from 1986 to 2016, with greater changes occurring during the winter season;
- a decrease in the severity of cold extremes, with the coldest daily temperature increasing by 4.4°F, and a decrease in the number of cold extreme days;
- increases in precipitation throughout the year, with the greatest increase seen in the fall (15 percent) and the smallest increase seen in the winter (2 percent);
- decreases in snowfall alongside earlier seasonal snowmelt; and
- an increase in the length of the growing season and the frost-free period (11 days).

¹⁷ The following departments comprise the USGCRP: EPA, U.S. Department of Energy, U.S. Department of Commerce, U.S. Department of Defense, U.S. Department of Agriculture, U.S. Department of the Interior; U.S. Department of State, Pipeline and Hazardous Materials Safety Administration, Department of Health and Human Services, National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, and Agency for International Development.

Additionally, the following climate change impacts in the project region are presented with a high or very high level of confidence (USGCRP, 2017 and 2018):

- warming rates in this region are likely to be higher than for those at lower latitudes (approximately 9.7°F for the late century [2071 to 2100] under a high-emissions scenario);
- extreme precipitation events are likely to increase in frequency and intensity;
- surface soil moisture deficits (especially related to evapotranspiration increases due to increased temperatures);
- risk to existing infrastructure (including transportation and energy) from climate change effects and the risk of cascading infrastructure failures;
- risk to agriculture due to increased temperature extremes, changing precipitation patterns, and changing distribution and incidence of pests and diseases for crops and livestock; and
- risks to human health and wellbeing due to increased heat events, water excess or shortage, and other extreme weather events.

The GHG emissions associated with construction and operation of the Project are described in section B.8.1. The construction and operation of the Project would increase the atmospheric concentration of GHGs, in combination with past, current, and future emissions from all other sources globally, and contribute incrementally to future climate change impacts. However, burning natural gas emits less CO₂ compared to other fuel sources (e.g., coal, oil). Currently, there is no scientifically accepted methodology to determine how a project's relatively small incremental contribution to GHGs would translate into physical effects on the global environment. GHGs would be emitted during construction of the Project through the use of diesel and gasoline-fired construction equipment and worker vehicles. There would be sources of combustion emissions associated with the operation of the Project, and there would be emissions of CH₄ and CO₂ as a result of component leaks and occasional blowdown events or pigging operations. Emissions of GHGs during construction and operation of the Project would cause an incremental increase to the existing inventory of GHG emissions; however, the significance of the incremental increase is unknown.

In addition, the downstream end use of transported natural gas would result in GHG emissions. The Project would help to satisfy natural gas demand in the midcontinent region of the United States, but the ultimate end use is not known as the gas would be directed to other pipeline systems. The gas could be used to replace existing gas sources, replace higher carbon sources such as oil and coal, be used as an industrial feedstock, or be directed to a liquefied natural gas facility and shipped overseas. Accordingly, it is not given that the Project's increase in transportation capacity would result in a proportional increase in end-use GHG emissions. As the ultimate end use of the gas transmitted is not known and is not causally related to the proposed action, no downstream emissions are considered as part of this assessment.

10.4 Conclusions on Cumulative Impacts

Impacts associated with the proposed Project would be relatively minor, and we have included recommendations in this EA to further reduce the environmental impacts associated with the Project. The environmental impacts associated with the Project would be minimized by pipeline routing, construction methods, and implementation of appropriate mitigation and restoration measures. Consequently, the Project may contribute to negligible or minor cumulative impacts when added to the other identified actions within the geographic and temporal scope.

C. ALTERNATIVES

In accordance with NEPA and Commission policy, we considered and evaluated alternatives to the proposed Project to determine whether any would be technically and economically feasible and environmentally preferable to the proposed action. The range of alternatives analyzed includes the no-action alternative, system alternatives, route alternatives, route variations, and aboveground facility site alternatives. The evaluation criteria applied to each alternative include a determination whether the alternative:

- meets the objectives of the proposed action;
- is technically and economically feasible and practical; and
- offers a significant environmental advantage over the proposed action.

Our analysis of alternatives is based on Project-specific information provided by the applicant, affected landowners, and other concerned parties; comments received during Project scoping; publicly available information; our consultations with federal and state agencies; and our own research regarding the siting, construction, and operation of natural gas transmission facilities and their impacts on the environment (i.e., our alternatives analysis is comment and resource driven). Unless otherwise noted, we used the same desktop sources of information to standardize comparisons between the Project and each alternative. As a result, some of the information presented in this section relative to the Project may differ from information presented in section B, which is based on Project-specific data derived from field surveys and engineered drawings.

1. Evaluation Process

Through environmental comparison and application of our professional judgment, each alternative is considered to a point where it becomes clear if the alternative could or could not meet the three evaluation criteria. To ensure a consistent environmental comparison and to normalize the comparison factors, we generally use desktop sources of information (e.g., publicly available data, GIS data, aerial imagery). Where appropriate, we also use site-specific information (e.g., field surveys or detailed designs). Our environmental analysis and this evaluation consider quantitative data (e.g., acreage) and use common comparative factors such as site availability, existing land use, and land requirements. In recognition of the competing interests and the different nature of impacts resulting from an alternative that sometimes exists (i.e., impacts on the natural environment versus impacts on the human environment), we also consider other factors that are relevant to a particular alternative and discount or eliminate factors that are not relevant or may have less weight or significance.

The alternatives were reviewed against the evaluation criteria in the sequence presented above. The first consideration for including an alternative in our analysis is whether or not it could satisfy the stated purpose of the Project. An alternative that cannot meet the Project's objective would not be brought forward to the next level because it cannot be considered as an acceptable replacement for the Project.

The second evaluation criteria are feasibility and practicality. An alternative that would require the use of new, unique, or experimental construction methods may be feasible but not technically practical because the required technology is unproven and/or not yet available. Economically practical alternatives would result in an action that generally maintains the price competitive nature of the proposed action. Generally, we do not consider the cost of an alternative as a critical factor unless the added cost to design, permit, and construct the alternative would render the project economically impractical. An alternative that is not feasible or practical was not brought forward to the next level of review (i.e., the third evaluation criterion).

Lastly, determining if an alternative provides a significant environmental advantage requires a comparison of the impacts on each resource as well as an analysis of impacts on resources that are not common to the alternatives being considered. The determination must then balance the overall impacts and all other relevant considerations. In comparing the impact between resources, we also considered the degree of impact anticipated on each resource. Ultimately, an alternative that results in equal or minor advantages in terms of environmental impact would not compel us to shift the impacts from the current set of landowners to a new set of landowners.

2. No-Action Alternative

If the Commission denies or postpones WBI Energy's application, the Project would not be built, and the environmental impacts associated with construction and operation of the proposed facilities would not occur. As a result, the objectives of the Project would not be met, and the benefits would not be realized. Under this alternative, WBI Energy would not provide the additional transportation capacity needed to accommodate the growing natural gas production in the Williston Basin or to allow natural gas to be brought to the Midwestern markets of the United States to meet the country's energy needs. In particular, WBI Energy would be unable to transport incremental volumes of processed natural gas, which would leave the processed natural gas stranded, possibly flared, and unable to reach markets. As described in section A.2, about 0.5 billion cubic feet per day, or about 17 percent, of the natural gas production from the Bakken and Three Forks Formations was flared due to limited or insufficient field gathering facilities, inadequate natural gas processing capacity, and/or insufficient pipeline infrastructure (NDDMR, 2020). Additionally, North Dakota has established state-mandated natural gas capture targets, which require producers to capture a certain percentage of natural gas production on an annual basis (North Dakota Industrial Commission, 2014). The current state-mandated target is 12 percent flared. Under the no-action alternative, other natural gas transmission companies might propose to construct similar, new facilities to meet the demand for transportation of processed natural gas from the Williston Basin area. Such actions could result in impacts similar to or greater than the proposed Project and might not meet the Project's objectives within the proposed timeframes. Therefore, we have concluded that the no-action alternative is not practical and provides no advantage over the Project.

3. System Alternatives

System alternatives would make use of other existing, modified, or proposed pipeline systems to meet the objectives of the Project. Implementation of a system alternative would make it unnecessary to construct all or part of the Project, although some modifications or additions to existing or proposed pipeline systems may be required. These modifications or additions could result in environmental impacts that are less than, similar to, or greater than those associated with construction and operation of the Project. The purpose of identifying and evaluating system alternatives is to determine whether the environmental impacts associated with construction and operation of the Project could be avoided or reduced by using another pipeline system, while still meeting the objectives of the Project.

North Dakota has a broad network of high-pressure, high-volume, natural gas pipelines operating throughout the state. Based on information provided by WBI Energy, we identified and evaluated two existing pipeline systems in northwestern North Dakota that potentially could meet the objectives of the Project: the Alliance pipeline system and the Northern Border pipeline system. These system alternatives are shown in figure 4 and described below. We are not aware of any proposed pipeline systems in northwestern North Dakota that could meet the objectives of the Project.

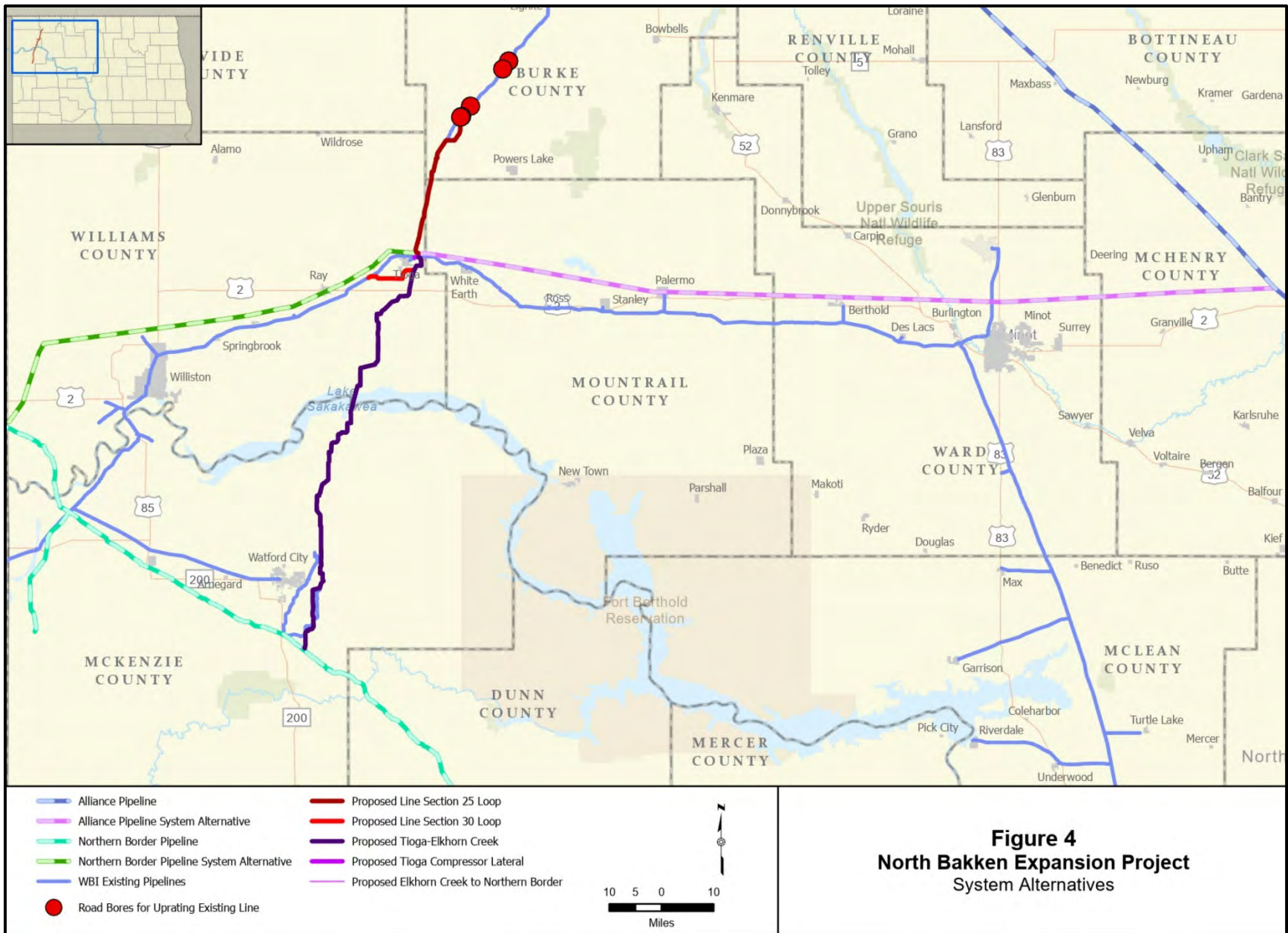


Figure 4
North Bakken Expansion Project
System Alternatives

Alliance Pipeline System Alternative

The Alliance pipeline system consists of 2,391 miles of integrated Canadian and U.S. natural gas transmission pipelines that provide transportation of rich natural gas from the Western Canadian Sedimentary Basin and the Williston Basin in North Dakota to the Chicago market hub. The U.S. portion of the system comprises about 887 miles of 36-inch-diameter pipeline with a maximum operating pressure of 1,935 psig. The system has been in commercial service since December 2000 and delivers an average of 1.6 billion standard cubic feet of natural gas per day to the Chicago market.

This system alternative would require construction of about 124 miles of new 24-inch-diameter pipeline from WBI Energy's Tioga Compressor Station to an interconnect with the Alliance pipeline system near Towner, North Dakota, and construction of a new compressor station near the interconnect. Construction of the proposed Line Section 25 and 30 pipeline looping, the Tioga Compressor Lateral, and the required additional compression at the Tioga Compressor Station would be the same as the proposed Project. The new compressor station near the Alliance interconnect would be much larger than the proposed Elkhorn Creek Compressor Station (estimated at 6,300 hp or higher) due to the higher operating pressure of the Alliance pipeline and the additional distance to the Alliance interconnect. The longer pipeline and larger compressor station would result in increased construction costs, increased fuel and operating costs, and additional environmental impacts during both construction and operation. For all these reasons, the Project is preferable to this alternative.

Northern Border Pipeline System Alternative

According to its website, the Northern Border pipeline system, owned by TC Pipelines, LP and ONEOK Partners, is a major natural gas transportation system that links the Midwestern United States with reserves in the Western Canadian Sedimentary Basin and transports natural gas produced in the Williston and Powder River Basins in the United States to the Chicago area (Northern Border, 2019). WBI Energy currently has five interconnects with Northern Border in northwestern and central North Dakota. The system has a total design capacity of about 2.4 billion cubic feet per day.

The system alternative would require construction of a 24-inch-diameter pipeline from the Tioga Compressor Station to an interconnection with Northern Border west of Williston, North Dakota that would be about 3 miles longer than the proposed Tioga-Elkhorn Creek pipeline. The pipeline would be routed around the north side of Williston and would traverse southwest towards WBI Energy's Stateline interconnect with Northern Border. Construction of the proposed Line Section 25 and 30 pipeline looping, the Tioga Compressor Lateral, and the required additional compression at the Tioga Compressor Station would be the same as the proposed Project. This alternative has the advantage of avoiding the crossing of Lake Sakakawea; however, the route is slightly longer than the Tioga-Elkhorn Creek pipeline, reduces pipeline collocation opportunities, and increases the length of pipeline that would be constructed through less heavily oil- and gas-developed areas. Furthermore, the interconnect location is further upstream on Northern Border's system; therefore, customers on Northern Border would incur additional fuel and transportation costs on its system when compared to the Project's proposed tie-in to Northern Border's existing mainline near the proposed Elkhorn Creek Compressor Station. In addition, the town of Williston is considered a hub city within the region. The town's population has tripled over the last 10 years and expanded to provide new housing and infrastructure to meet the demands of a growing city (City of Williston, 2019). This alternative route would be in close proximity to Williston and would increase the likelihood of encroachment. For these reasons, the Project is preferable to this alternative.

4. Route Alternatives and Variations

WBI Energy states that its proposed route selection process was to identify a Project alignment that meets the Project needs and represents a minimal and acceptable level of environmental impact. The objective of the process was to identify feasible routes taking into account engineering constraints, crossings of public lands, stakeholder concerns, and the potential for impacts on sensitive environmental resources.

During its initial review, WBI Energy attempted to identify routes or route segments that parallel existing linear corridor infrastructure. WBI Energy reviewed topographic maps, recent aerial photography, and GIS datasets for pipelines, other utilities, and transportation infrastructure in an effort to identify existing rights-of-way. Following the initial identification of potential routes, WBI Energy conducted a desktop review exercise to refine each route in an effort to minimize crossings of public lands and environmental resources as well as engineering constraints such as steep side slopes. Each route was reviewed and compared with a variety of digital datasets and map resources to identify potential environmental constraints. Each route was adjusted to avoid or minimize crossings of significant resources to the extent practicable.

4.1 Major Route Alternatives

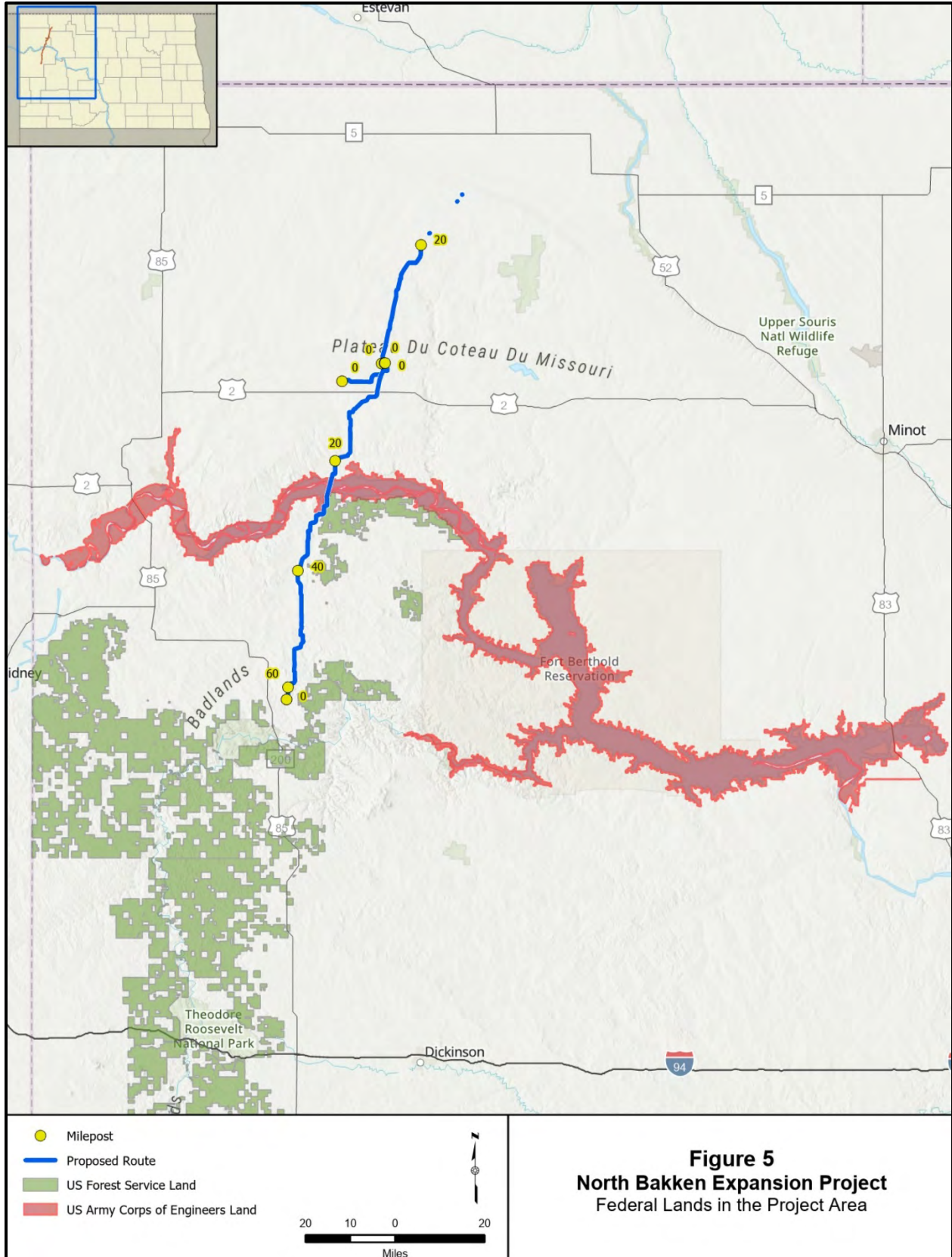
Major route alternatives include those that deviate from the proposed route for a significant distance and provide a substantially different pathway from the source area to the delivery area. Major route alternatives would involve a new pipeline route that would still interconnect with the same existing pipeline systems, potentially at different locations, but would ultimately provide natural gas to the same proposed facilities.

As shown in figure 5, the proposed Tioga-Elkhorn Creek pipeline route crosses both USFS and USACE land near the crossing of Lake Sakakawea. Because the USACE land extends about 45 miles west and over 100 miles southeast of the proposed pipeline at this location, a route alternative to avoid USACE lands would require an additional 90 to 200 miles of pipeline construction and the associated environmental impacts. Therefore, a route alternative to avoid crossing USACE lands would be impractical. However, we evaluated two major route alternatives along the Tioga-Elkhorn Creek pipeline to avoid crossing USFS land: the Western and Eastern Alternatives (see figure 6).

Western Alternative

Starting at MP 22.3 of the Tioga-Elkhorn Creek pipeline, the Western Alternative departs from the existing proposed pipeline route to the west, follows the north side of 51st Lane NW until Highway 1804, and then continues along the north side of Highway 1804 for an additional 2 miles. The alternative route then heads southwest through steep topography along the north side of Lake Sakakawea between existing oil and gas well pad development. The alternative route then crosses Lake Sakakawea following an existing ONEOK Rockies Midstream gathering line through a valley on the south side of the lake. It then continues south paralleling Highway 1806 west for about 1 mile before turning east and following 45th Street NW for an additional 0.9 mile. At this point, the alternative route rejoins the proposed Tioga-Elkhorn Creek pipeline route near MP 30.6.

The Western Alternative is 12.1 miles in length, compared to the 8.3-mile corresponding segment of the proposed Tioga-Elkhorn Creek pipeline route. In addition to crossing Lake Sakakawea, the Western Alternative would cross about 3.8 miles of USACE-owned land compared with 2.7 miles for the proposed route, including USACE-owned lands that extend on the north side of Highway 1804 near Lund's Landing Boat Ramp. In addition, the Western Alternative would be within 0.25 mile of Lund's Landing and 3 D's Campground, which would result in temporary visual, noise, and traffic impacts on these recreational areas during construction.



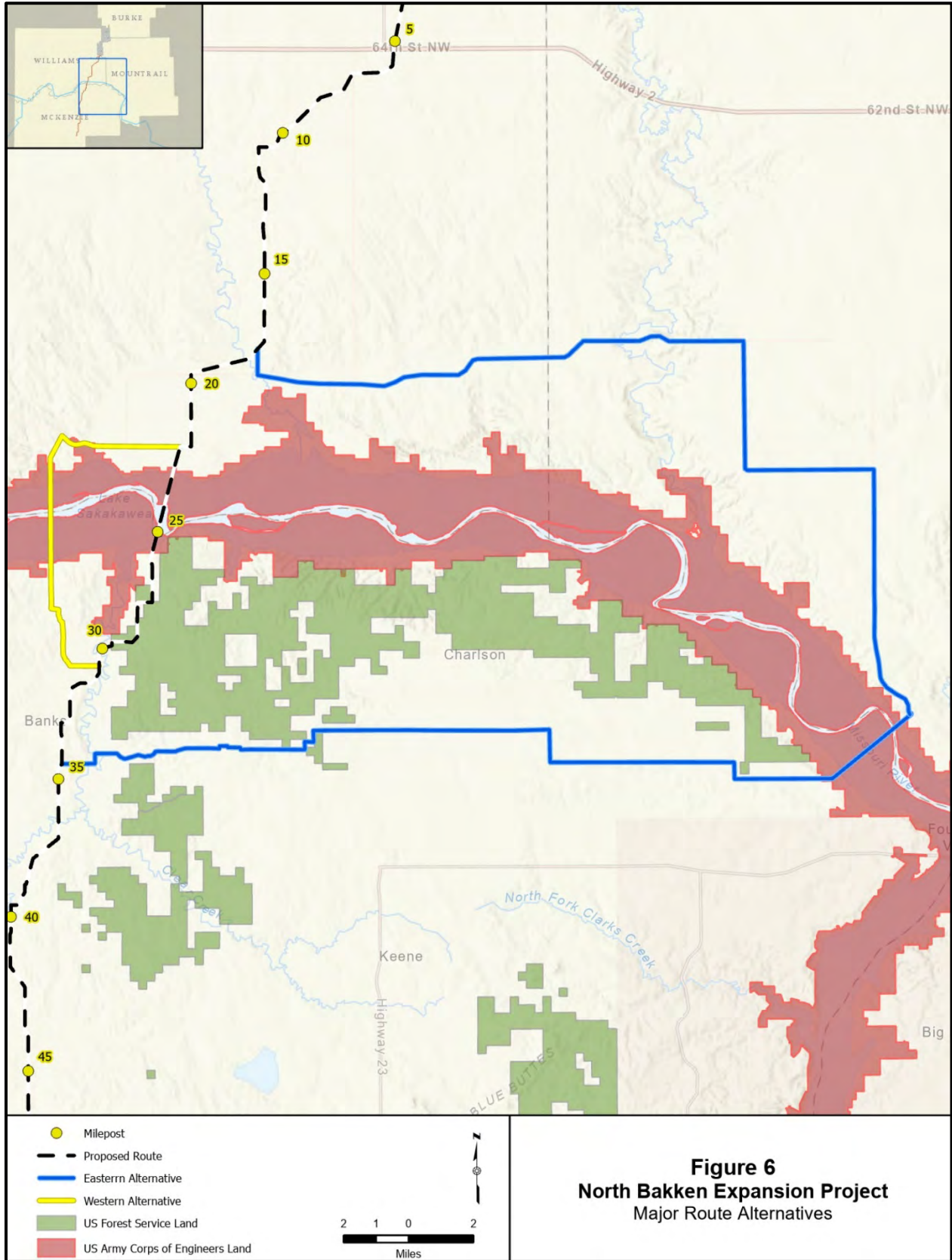


Figure 6
North Bakken Expansion Project
Major Route Alternatives

Review of NWI data indicates that the Western Alternative would cross three more emergent wetlands than the proposed route. Review of NHD data indicates that the Western Alternative would cross the same amount of intermittent and perennial waterbodies as the proposed route. In addition, the crossing distance at Lake Sakakawea would be 2.7 miles compared to 2.4 miles for the proposed route. While a layout for an HDD crossing of Lake Sakakawea was not developed for the Western Alternative, it is anticipated that the HDD would need to extend north and south of the lake proper, requiring a drill length about 0.3 mile longer than the proposed lake crossing. Additionally, the steep topography on the north shore of Lake Sakakawea at the Western Alternative crossing location would potentially require grading for placement of the HDD pipe pullback. At the south shore, there is potential viability of a pipe pullback area for the Western Alternative but only about 0.7 mile of contiguous agricultural fields are present (versus 2.7 miles for the proposed route) so additional shrub/tree clearing would be required.

While the Western Alternative would avoid the crossing of the USFS LMNG, it would add approximately 4 miles to the pipeline route, increase the crossing length of USACE lands, result in potential temporary impacts on two existing recreational areas during construction, increase the number of wetland areas crossed, and require a longer HDD crossing of Lake Sakakawea. For these reasons, we conclude that the Western Alternative would **[placeholder for FERC conclusion]**.

Eastern Alternative

Starting at MP 17.4 of the Tioga Elkhorn Creek pipeline, the Eastern Alternative departs from the existing proposed pipeline route to the south for about 1 mile, heads east following 54th and 55th Streets NW for about 16 miles, heads south following 96th Avenue NW for about 4 miles, turns east and proceeds along 51st Street NW for about 4 miles, and then heads southeast along Highway 1804 for about 8 miles before heading southwest across Lake Sakakawea. After crossing Lake Sakakawea, the alternative would head west generally following existing roads where possible for about 21 miles and following existing utility rights-of-way for another 5 miles before rejoining the Tioga-Elkhorn Creek pipeline route near MP 34.5.

The Eastern Alternative is about 61.8 miles in length, compared to the 17.1-mile-long corresponding segment of the proposed Tioga-Elkhorn Creek pipeline route. The Eastern Alternative would cross a total of 3.2 miles of USACE-owned land compared with 2.7 miles for the proposed route and would avoid crossing any USFS-owned land. While the alternative was routed to follow existing roads for the majority of the route, this does put the alternative in close proximity to various homes and businesses primarily along 54th Street NW, 92nd Avenue NW, 91st Avenue NW, 43rd Avenue NW, and 42nd Avenue NW. The Eastern Alternative would not cross the Fort Berthold Indian Reservation; however, it would be located about 2 miles west of the reservation boundary for about 10 miles along the route. The Eastern Alternative crossing of Lake Sakakawea would be just upstream of the reservation boundary.

Review of NWI data indicates that the Eastern Alternative would cross about 25 more emergent wetlands than the proposed route. Review of NHD data indicates that the Eastern Alternative would cross over 40 more intermittent waterbodies than the corresponding segment of the proposed route. In addition, the crossing distance at Lake Sakakawea would be 2.6 miles compared to 2.4 miles for the proposed route. While a layout for an HDD crossing of Lake Sakakawea was not developed for the Eastern Alternative, it is anticipated that the HDD would need to extend on either side of the lake proper, requiring a drill length about 0.2 mile longer than the proposed lake crossing. Similar to the Western Alternative, the topography along both shores of Lake Sakakawea is much steeper at the crossing site than it is for the proposed route, which could potentially require grading and/or tree clearing for placement of the HDD pipe pullback.

While the Eastern Alternative would avoid crossing the USFS LMNG, it would add over 50 miles to the pipeline route, increase the crossing length of USACE lands, be in close proximity to homes and businesses, increase the number of wetland and waterbody areas crossed, and require a longer HDD crossing of Lake Sakakawea. For these reasons, we conclude that the Eastern Alternative would **[placeholder for FERC conclusion]**.

4.2 Minor Route Alternatives

Minor route alternatives are typically smaller in scale and shorter than major route alternatives and developed in response to a site-specific resource issue or concern. During the scoping period, the Hartels provided comments on potential route alternatives. As an alternative to constructing the proposed Tioga-Elkhorn Creek pipeline, the Hartels suggested that WBI Energy consider replacing an existing pipeline that extends east of Watford City and ties into Northern Border south of Watford City with a larger diameter pipeline. WBI Energy's North Badlands sub-system's 16-inch-diameter pipeline generally follows a portion of the proposed Project route. This pipeline is designed to flow 200 MMcf/d, which would be interrupted for approximately 8 months during the construction of a replacement pipeline. The interruption would have a significant impact on upstream gas processing plants. To accommodate the combined volume level that would be flowing on the replacement pipeline, either the diameter of the pipeline would need to be increased or additional horsepower installed at the Elkhorn Creek Compressor Station, increasing Project costs. The pipeline would have to be extended from its current interconnect with Northern Border at Spring Creek to the Elkhorn Creek Compressor Station. In addition, WBI Energy's North Badlands sub-system is operated independently of WBI Energy's integrated system, with separate pressure requirements, transportation rates, and fuel reimbursement provision, which would be affected by replacing the current 16-inch-diameter pipeline. For these reasons, replacing the existing pipeline would not be a viable alternative.

The Hartels suggested a second minor route alternative that would involve routing the Tioga-Elkhorn Creek pipeline between two existing WBI Energy pipelines from about MPs 51.8 to 52.8. The two existing WBI Energy pipelines run parallel with the space between the pipelines varying from a minimum of 11 feet to a maximum of 60 feet. Given the space required to safely install the proposed 24-inch-diameter pipeline, this alternative is not considered feasible. WBI Energy did attempt to collocate the proposed pipeline with existing energy infrastructure across the property. The proposed route runs between an existing WBI Energy pipeline and an existing ONEOK pipeline for the first 0.6 mile and then parallels an existing Hiland crude oil pipeline for the remaining 0.4 mile. The current route was also engineered to minimize sidehill construction across the property. For these reasons, this minor route alternative is not a viable option.

4.3 Minor Route Variations

WBI Energy incorporated several minor pre-filing route variations into the Project's proposed route based on the results of ongoing environmental field surveys, regulatory agency consultations, landowner discussions, and continued engineering design. Table C-1 identifies the route variations incorporated into the proposed route since WBI Energy's submittal of the preliminary draft of Resource Reports 1 and 10 on August 2, 2019.

TABLE C-1

Summary of Minor Route Variations Identified During the Pre-Filing Process and Incorporated into the Proposed Pipeline Routes

Pipeline Facility/ Route Variation	Approximate Milepost Begin	Approximate Milepost End	County	Justification for Variation
Tioga-Elkhorn Creek				
Route Variation 1	0.0	2.0	Williams	Route change to avoid cultural site
Route Variation 2	12.0	13.4	Williams	Route change to avoid cultural sites
Route Variation 3	17.7	19.7	Williams	Route change to avoid cultural sites
Route Variation 4	29.0	29.7	McKenzie	Route change to avoid cultural sites
Route Variation 5	31.6	31.8	McKenzie	Route change to avoid DASK habitat
Route Variation 6	39.2	41.1	McKenzie	Route change to avoid cultural sites and DASK habitat
Route Variation 7	49.9	50.3	McKenzie	Route change to avoid DASK habitat
Route Variation 8	52.4	53.4	McKenzie	Route change to avoid cultural sites
Route Variation 9	55.1	56.9	McKenzie	Route change to avoid DASK habitat
Route Variation 10	58.3	59.1	McKenzie	Route change to avoid cultural sites and DASK habitat
Route Variation 11	59.3	59.6	McKenzie	Route change to avoid DASK habitat
Route Variation 12	60.0	61.5	McKenzie	Route change to avoid DASK habitat
Line Section 25 Loop				
Route Variation 13	0.0	0.7	Williams	Route change to avoid cultural sites
Route Variation 14	0.9	1.2	Williams	Route change to avoid cultural sites
Route Variation 15	4.8	4.9	Williams	Route change to avoid cultural site
Route Variation 16	13.1	13.4	Williams	Workspace adjustments to avoid cultural sites
Route Variation 17	18.9	19.3	Williams	Route change to avoid FWS wetland basins
Line Section 30 Loop				
Route Variation 18	0.0	0.5	Williams	Engineering constraints of the proposed receipt station
Route Variation 19	0.5	1.5	Williams	Route change to avoid FWS wetland basins
Route Variation 20	4.5	4.6	Williams	Pipeline engineering constraints
Route Variation 21	5.7	6.3	Williams	Landowner route variation request
Route Variation 22	7.5	9.4	Williams	Route change to avoid cultural site and landowner route variation request
Uprate Line Section 25				
Route Variation 23	N/A	N/A	Burke	Realignment of proposed bore replacement across 86 th Street due to engineering and environmental constraints
Route Variation 24	N/A	N/A	Burke	Realignment of proposed bore replacement across Highway 40 due to engineering and environmental constraints

TABLE C-1 (cont'd)				
Summary of Minor Route Variations Identified During the Pre-Filing Process and Incorporated into the Proposed Pipeline Routes				
Facility Name	Approximate Milepost Begin	Approximate Milepost End	County	Justification for Variation
Route Variation 26	N/A	N/A	Burke	Realignment of proposed bore replacement across 92 nd Avenue due to engineering and environmental constraints
Route Variation 26	N/A	N/A	Burke	Realignment of proposed bore replacement across 89 th Avenue and 93 rd Street due to engineering and environmental constraints

5. Aboveground Facility Site Alternatives

WBI Energy states that the location of the proposed Elkhorn Creek Compressor Station site was primarily determined by its proximity to Norther Border pipeline facilities for tie-in capabilities; its position near existing roads and electric power facilities; its flat terrain requiring minimal grading and filling; landowner considerations; and the availability of land for purchase. WBI Energy identified and evaluated one alternative site (Alternative 1) to the Elkhorn Creek Compressor Station (see figure 7). No alternative sites were evaluated for the proposed expansion of the Tioga Compressor Station.

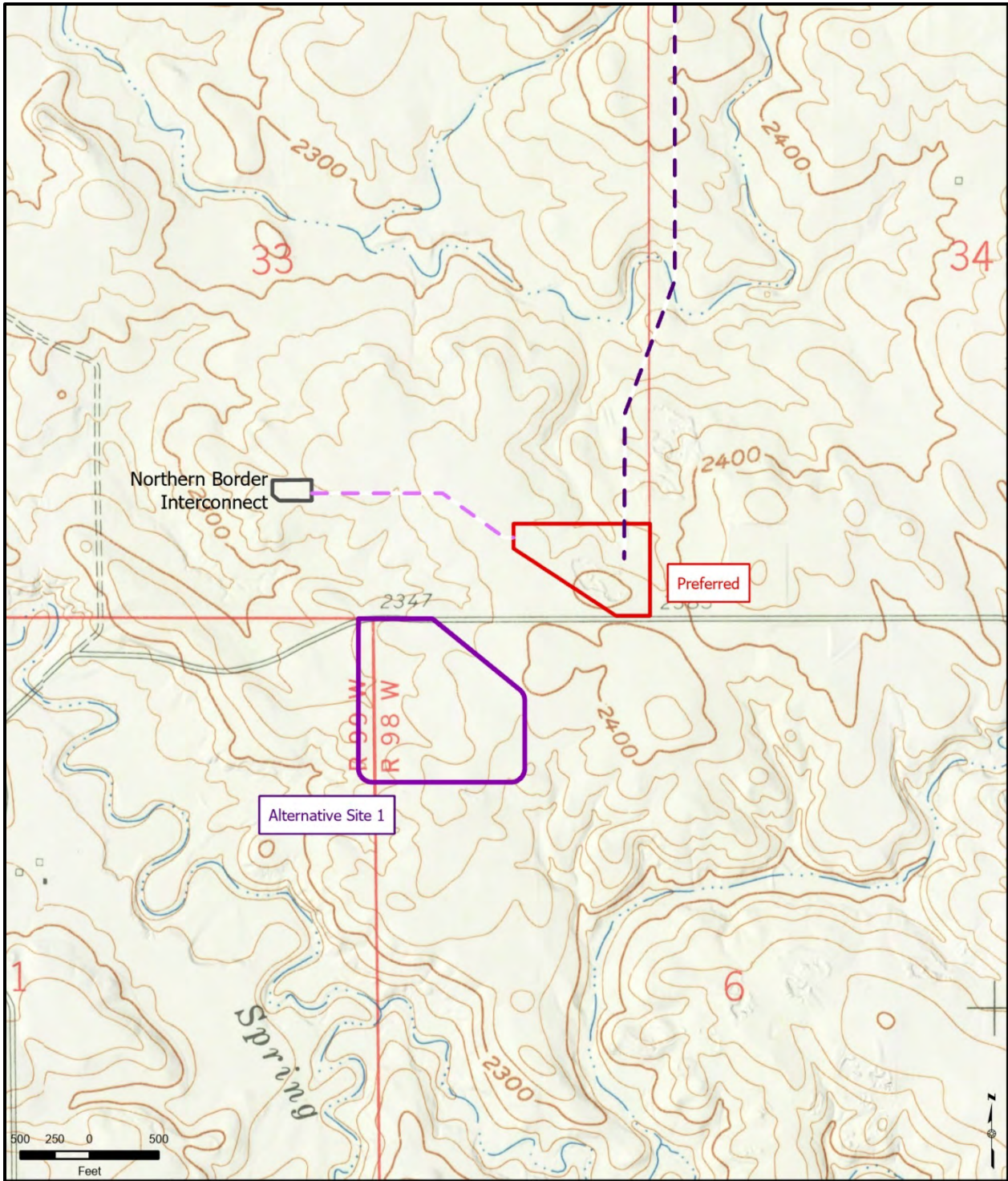
We determined that the alternative compressor station site identified by WBI Energy is a viable option to satisfy the Project objectives. We subsequently analyzed the site alternative based on assessment of potential impacts on environmental resources. Factors considered in this analysis included: land use, conservation easements, wetlands and waterbodies, and critical habitat for protected species.

Alternative Site 1 is about 0.1 mile southwest of the proposed compressor station site on the south side of 18th Street NW on about 20.0 acres of entirely privately owned agricultural land (see figure 7). The same landowner owns Alternative Site 1 and the proposed compressor station site. Alternative Site 1 would require a 0.2-mile increase in the length of the Tioga-Elkhorn Creek pipeline route. Similar to the proposed site, there are no conservation easements, wetlands, waterbodies, prime farmland, or critical habitats associated with Alternative Site 1. Because of the sand/gravel pit area within the proposed site, more grading and filling would be necessary to prepare the proposed site for construction. WBI Energy has signed a purchase agreement for the required easement of the proposed compressor station site; therefore Alternative Site 1 is no longer being evaluated as a potential alternative to the proposed site.

During Project scoping, no significant concerns, environmental issues, or alternative sites were identified by FERC staff or stakeholders for the Project’s delivery, receipt, and transfer stations or other Project facilities. Because our alternatives analyses are comment and resource driven, we have not evaluated alternatives to any of these facilities.

6. Conclusion

We reviewed alternatives to WBI Energy’s proposal based on our independent analysis. Although all of the system, pipeline route, and aboveground facility alternatives we evaluated appear to be technically feasible, none provide a significant environmental advantage over the Project design. Therefore, the proposed Project, as modified by our recommendations in section D of this EA, is the preferred alternative to meet Project objectives.



- Proposed Elkhorn Creek-Northern Border
- - - Proposed Tioga-Elkhorn Creek
- Alternate
- Preferred Elkhorn Creek Compressor Station
- Northern Border Interconnect

Figure 7
North Bakken Expansion Project
 Alternative Compressor Station Site

D. STAFF CONCLUSIONS AND RECOMMENDATIONS

The staff has determined that the Project would not constitute a major federal action significantly affecting the quality of the human environment based on the above environmental analysis, WBI Energy's application and supplements, and implementation of WBI Energy's proposed and our recommended mitigation measures. The staff recommends that the Commission Order contain a finding of no significant impact and that the following mitigation measures be included as conditions to the authorization the Commission may issue.

1. WBI Energy shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests) and as identified in the EA, unless modified by the Order. WBI Energy must:
 - a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;
 - b. justify each modification relative to site-specific conditions;
 - c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and
 - d. receive approval in writing from the Director of the OEP **before using that modification.**
2. The Director of OEP, or the Director's designee, has delegated authority to address any requests for approvals or authorizations necessary to carry out the conditions of the Order, and take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the Project. This authority shall allow:
 - a. the modification of conditions of the Order;
 - b. stop-work authority; and
 - c. the imposition of any additional measures deemed necessary to ensure continued compliance with the intent of the conditions of the Order as well as the avoidance or mitigation of unforeseen adverse environmental impact resulting from Project construction and operation.
3. **Prior to any construction**, WBI Energy shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel will be informed of the EIs' authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.
4. The authorized facility locations shall be as shown in the EA, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, WBI Energy shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

WBI Energy's exercise of eminent domain authority granted under NGA section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. WBI Energy's right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas pipelines or aboveground facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. WBI Energy shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, new access roads, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area.**

This requirement does not apply to extra workspace allowed by the FERC Plan and/or minor field realignments per landowner needs and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

- a. implementation of cultural resources mitigation measures;
 - b. implementation of endangered, threatened, or special concern species mitigation measures;
 - c. recommendations by state regulatory authorities; and
 - d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.
6. **Within 60 days of the acceptance of the Certificate and before construction begins**, WBI Energy shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. WBI Energy must file revisions to the plan **as schedules change**. The plan shall identify:
 - a. how WBI Energy will implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EA, and required by the Order;
 - b. how WBI Energy will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to on-site construction and inspection personnel;
 - c. the number of EIs assigned per spread, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;

- d. company personnel, including EIs and contractors, who will receive copies of the appropriate material;
 - e. the location and dates of the environmental compliance training and instructions WBI Energy will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s);
 - f. the company personnel (if known) and specific portion of WBI Energy's organization having responsibility for compliance;
 - g. the procedures (including use of contract penalties) WBI Energy will follow if noncompliance occurs; and
 - h. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:
 - i. the completion of all required surveys and reports;
 - ii. the environmental compliance training of onsite personnel;
 - iii. the start of construction; and
 - iv. the start and completion of restoration.
7. WBI Energy shall employ a team of EIs (i.e., **two or more or as may be established by the Director of OEP**) per construction spread. The EI(s) shall be:
- a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;
 - b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;
 - c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;
 - d. a full-time position, separate from all other activity inspectors;
 - e. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and
 - f. responsible for maintaining status reports.
8. **Beginning with the filing of its Implementation Plan**, WBI Energy shall file updated status reports with the Secretary on a **weekly/biweekly** basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:
- a. an update on WBI Energy's efforts to obtain the necessary federal authorizations;
 - b. the construction status of the Project **by spread**, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;

- c. a listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);
 - d. a description of the corrective actions implemented in response to all instances of noncompliance;
 - e. the effectiveness of all corrective actions implemented;
 - f. a description of any landowner/resident complaints which may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and
 - g. copies of any correspondence received by WBI Energy from other federal, state, or local permitting agencies concerning instances of noncompliance, and WBI Energy's response.
9. WBI Energy shall develop and implement an environmental complaint resolution procedure. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the Project and restoration of the right-of-way. **Prior to construction**, WBI Energy shall mail the complaint procedures to each landowner whose property would be crossed by the Project.
- a. In its letter to affected landowners, WBI Energy shall:
 - i. provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;
 - ii. instruct the landowners that if they are not satisfied with the response, they should call a WBI Energy regional contact; the letter should indicate how soon to expect a response; and
 - iii. instruct the landowners that if they are still not satisfied with the response from the regional contact, they should contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.
 - b. In addition, WBI Energy shall include in its weekly status report a copy of a table that contains the following information for each problem/concern:
 - i. the identity of the caller and date of the call;
 - ii. the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;
 - iii. a description of the problem/concern; and
 - iv. an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved.
10. WBI Energy must receive written authorization from the Director of OEP **before commencing construction of any Project facilities or abandonment by removal**. To obtain such authorization, Columbia must file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

11. WBI Energy must receive written authorization from the Director of OEP before placing the Project into service. Such authorization will only be granted following a determination that rehabilitation and restoration of the right-of-way and other areas affected by the Project are proceeding satisfactorily.
12. **Within 30 days of placing the authorized facilities in service**, WBI Energy shall file an affirmative statement with the Secretary, certified by a senior company official:
 - a. that the facilities have been constructed and installed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or
 - b. identifying which of the Certificate conditions WBI Energy has complied with or will comply with. This statement shall also identify any areas affected by the Project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.
13. **Prior to construction**, WBI Energy shall file with the Secretary a final HDD feasibility assessment and HDD Plan including information collected during the overwater geotechnical analysis on Lake Sakakawea. (*Section B.1.1*)
14. WBI Energy shall not begin construction activities **until**:
 - a. the FERC staff receives written comments from the FWS regarding the proposed action;
 - b. the FERC staff completes formal consultation with the FWS, if required; and
 - c. WBI Energy has received written notification from the Director of OEP that construction or use of mitigation may begin. (*Section B.4.1*)
15. WBI Energy **shall not begin construction** of facilities and/or use of staging, storage, or temporary work areas and new or to-be-improved access roads **until**:
 - a. WBI Energy files with the Secretary:
 - i. remaining cultural resources survey reports;
 - ii. site-specific evaluation reports, avoidance plans, and/or treatment plan(s), as required; and
 - iii. comments on the cultural resources reports and plans from the SHSND, USACE, USFS, and/or tribes, as applicable;
 - b. the ACHP is afforded an opportunity to comment if historic properties will be adversely affected; and
 - c. the FERC staff reviews and the Director of OEP approves the cultural resources reports and plans and notifies WBI Energy in writing that avoidance and/or treatment measures (including archaeological data recovery) may be implemented and/or construction may proceed.

All materials filed with the Commission containing **location, character, and ownership information** about cultural resources must have the cover and any relevant pages therein clearly labeled in **bold** lettering: “**CUI//PRIV – DO NOT RELEASE.**” (*Section B.7.5*)

16. WBI Energy shall file a noise survey with the Secretary **no later than 60 days** after placing the authorized unit(s) at the Tioga Compressor Station in service. If a full-load condition noise survey is not possible, WBI Energy shall provide an interim survey at the maximum possible horsepower load and provide the full-load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at the Tioga Compressor Station under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, WBI Energy shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. WBI Energy shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*Section B.8.2*)
17. WBI Energy shall file a noise survey with the Secretary **no later than 60 days** after placing the Elkhorn Creek Compressor Station in service. If a full-load condition noise survey is not possible, WBI Energy shall provide an interim survey at the maximum possible horsepower load and provide the full load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at the Elkhorn Creek Compressor Station under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, WBI Energy shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. WBI Energy shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*Section B.8.2*)

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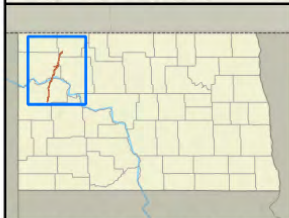
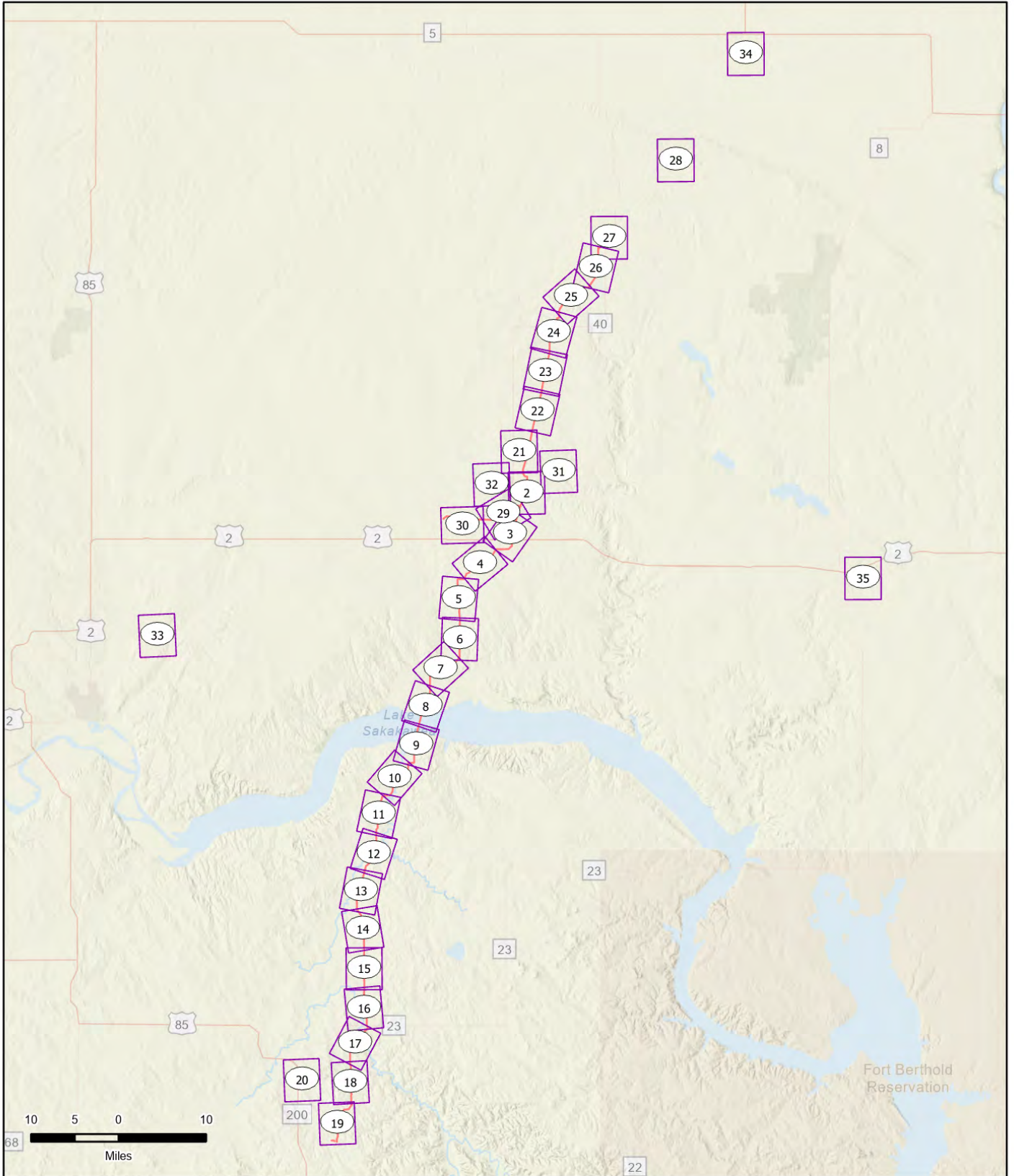
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F. LIST OF PREPARERS

Federal Energy Regulatory Commission

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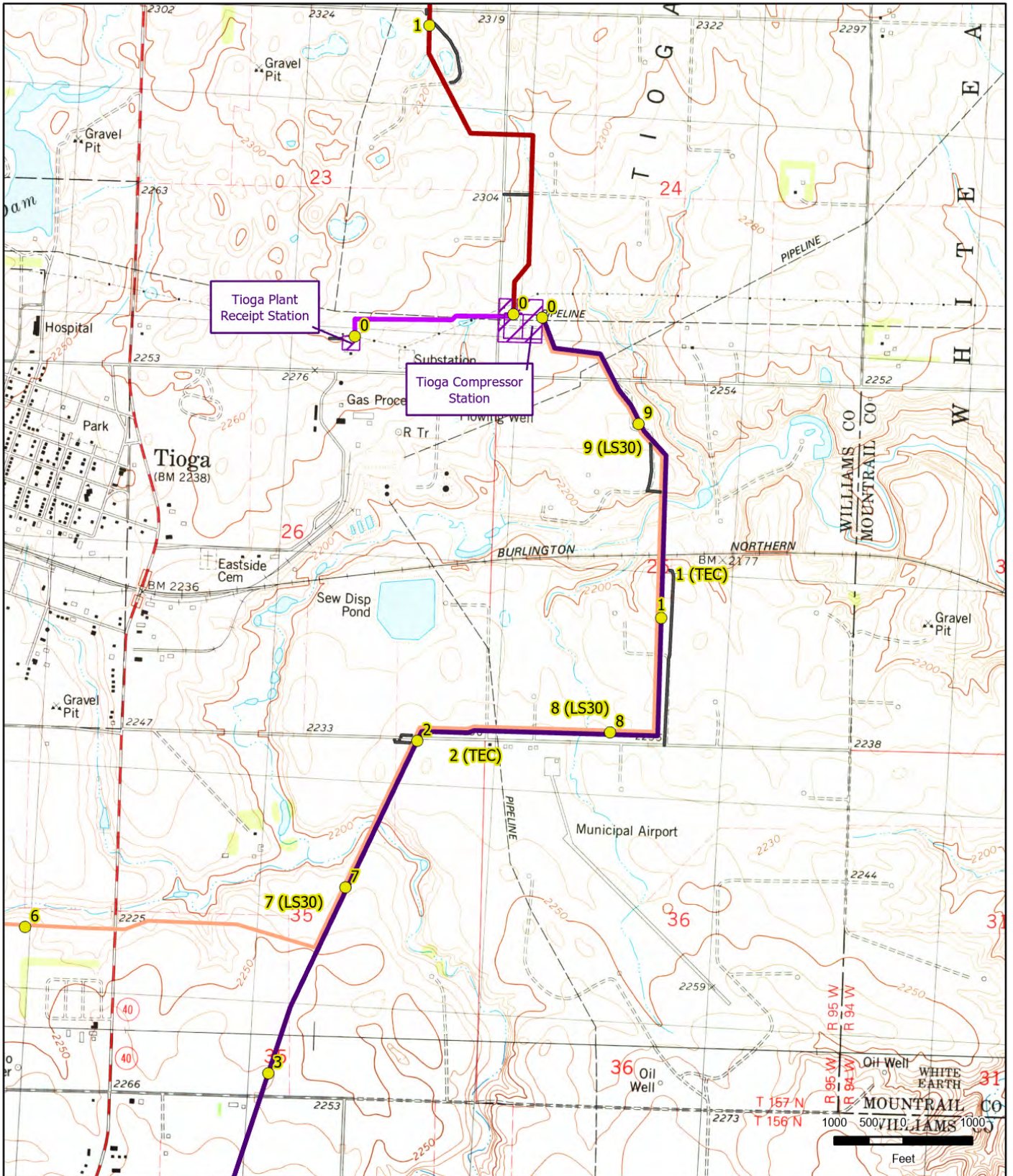
APPENDIX A
PROJECT ROUTE MAPS (TOPOGRAPHIC)



- Appendix A Sheet Page
- Preliminary Route



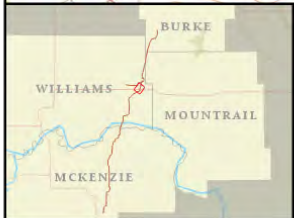
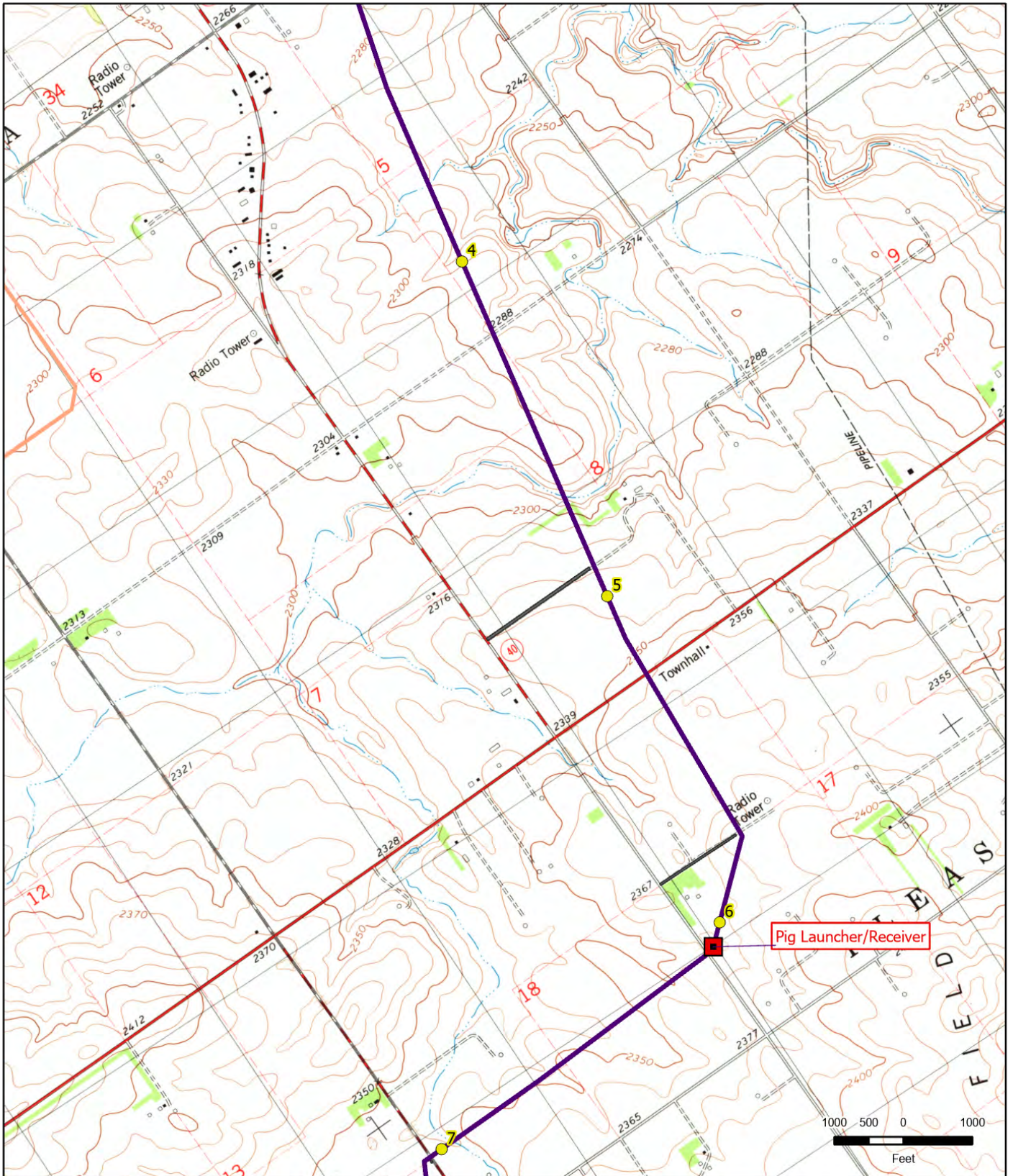
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North Bakken Expansion Project
 Project Route Maps
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- Milepost
- Proposed Line Section 25 Loop
- Proposed Line Section 30 Loop
- Proposed Tioga-Elkhorn Creek
- Proposed Tioga Compressor Lateral
- Aboveground Facility
- Access Road

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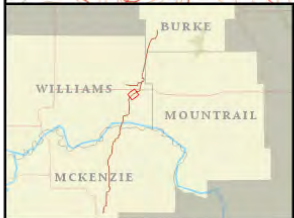
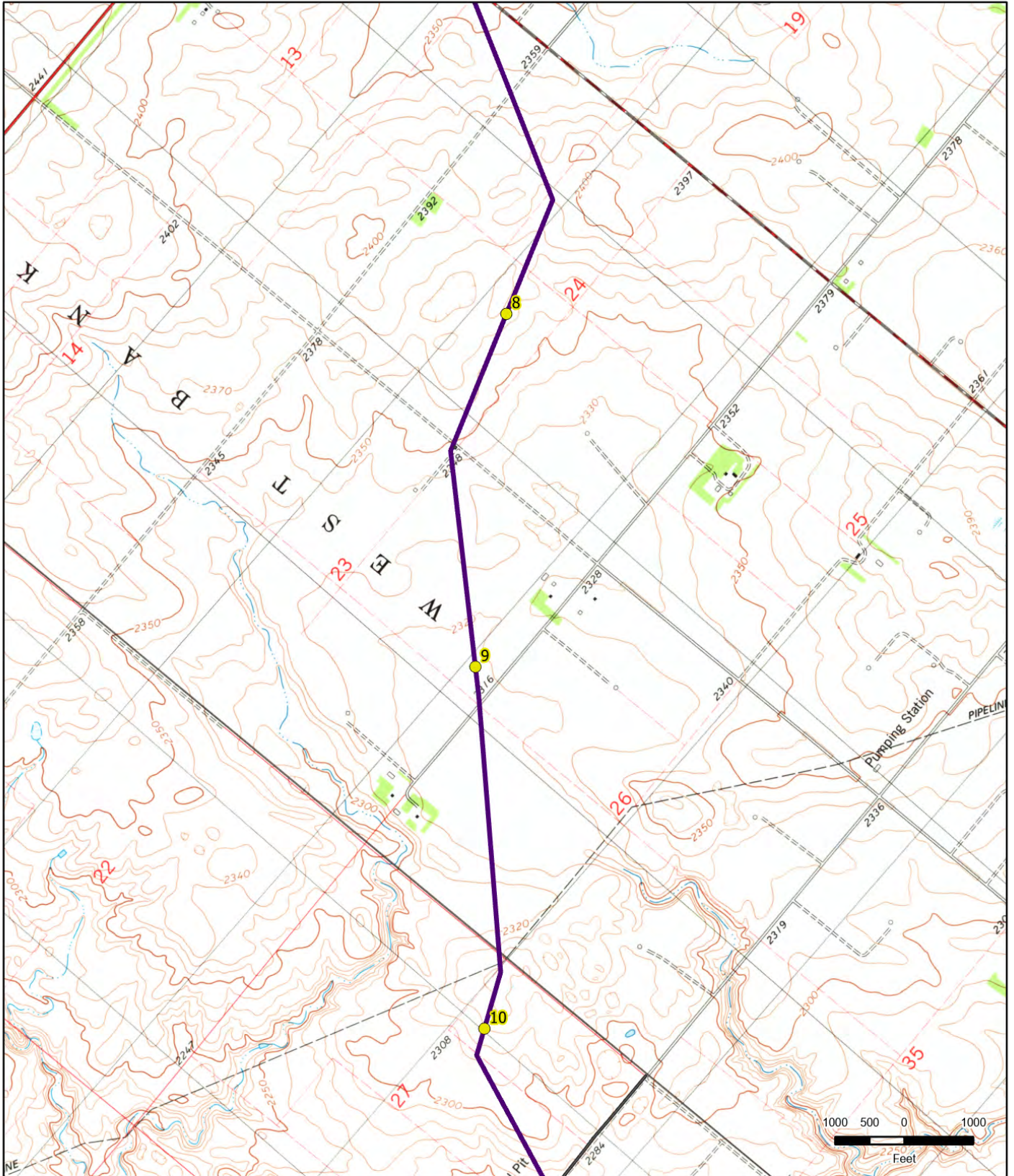
Appendix A
North Bakken Expansion Project
 Project Route Maps
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- Milepost
- Proposed Line Section 30 Loop
- Proposed Tioga-Elkhorn Creek
- Access Road

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North Bakken Expansion Project
 Project Route Maps
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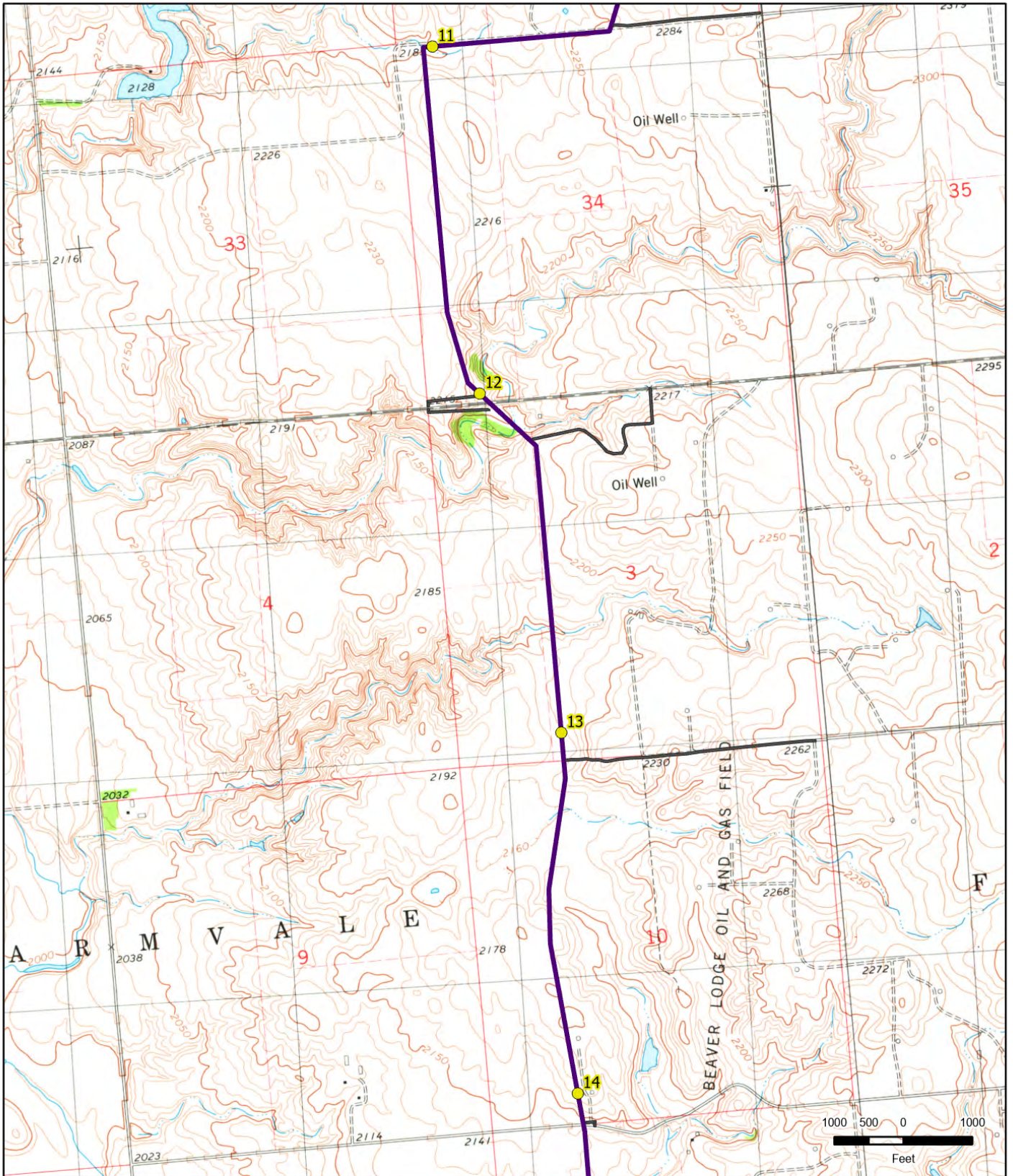
- Milepost
- Proposed Tioga-Elkhorn Creek
- Access Road



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North Bakken Expansion Project

Project Route Maps
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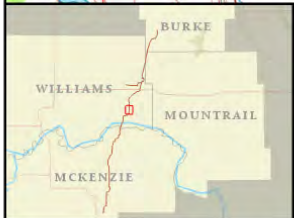
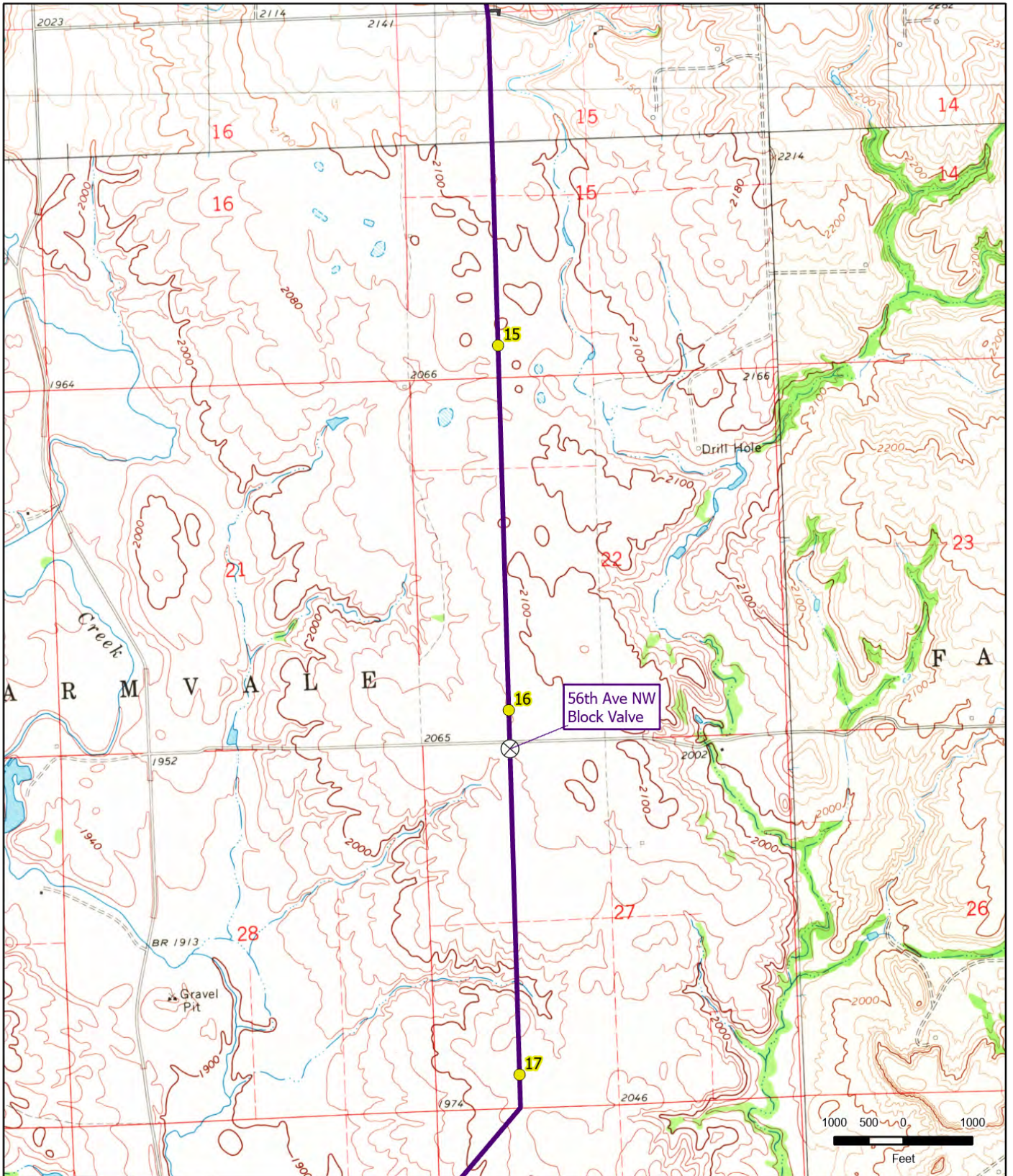


- Milepost
- Proposed Tioga-Elkhorn Creek
- Access Road



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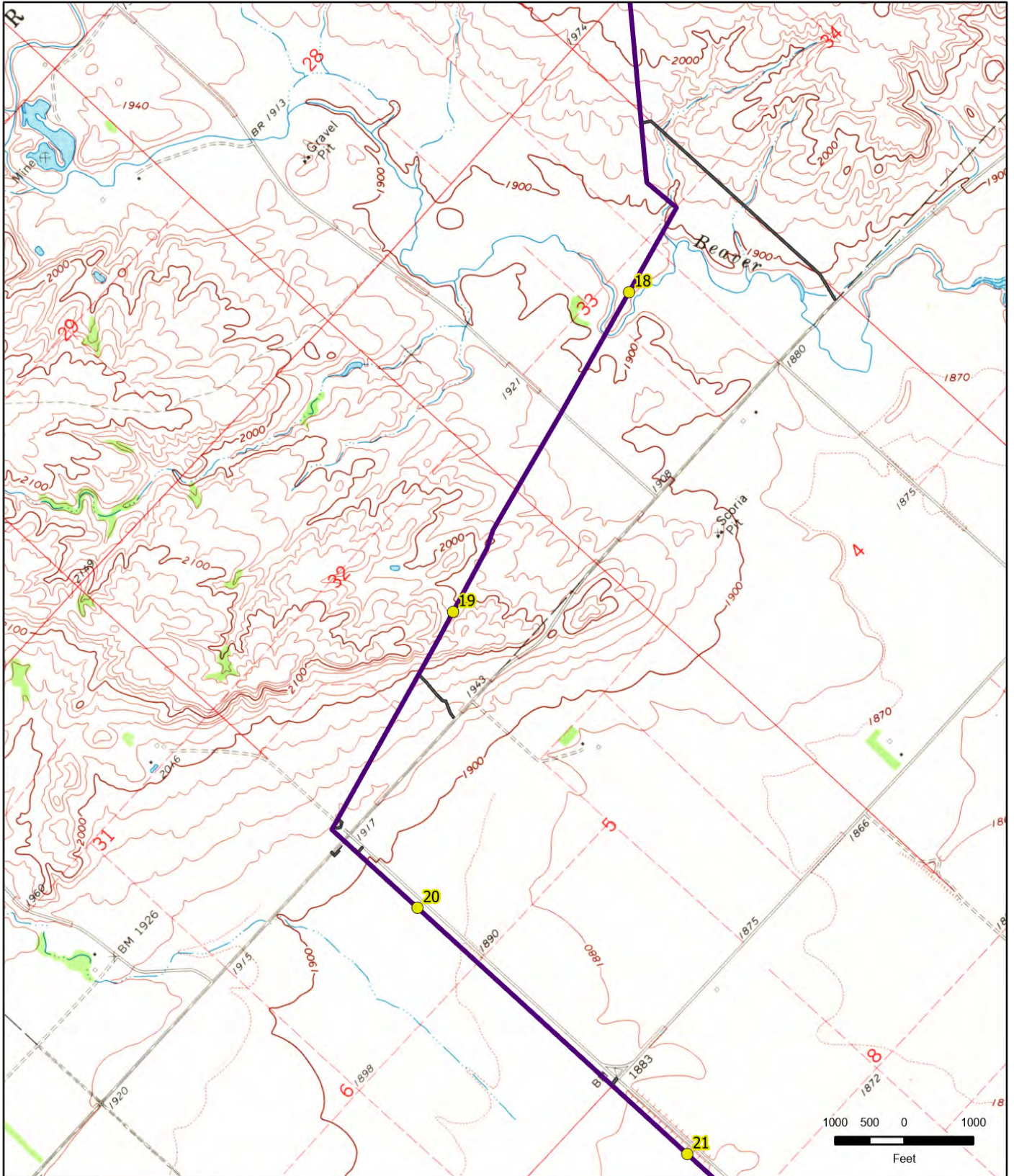
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 Project Route Maps
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- Milepost
- ⊗ Valve Site
- Proposed Tioga-Elkhorn Creek
- Access Road

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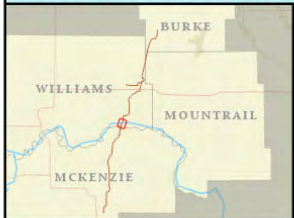
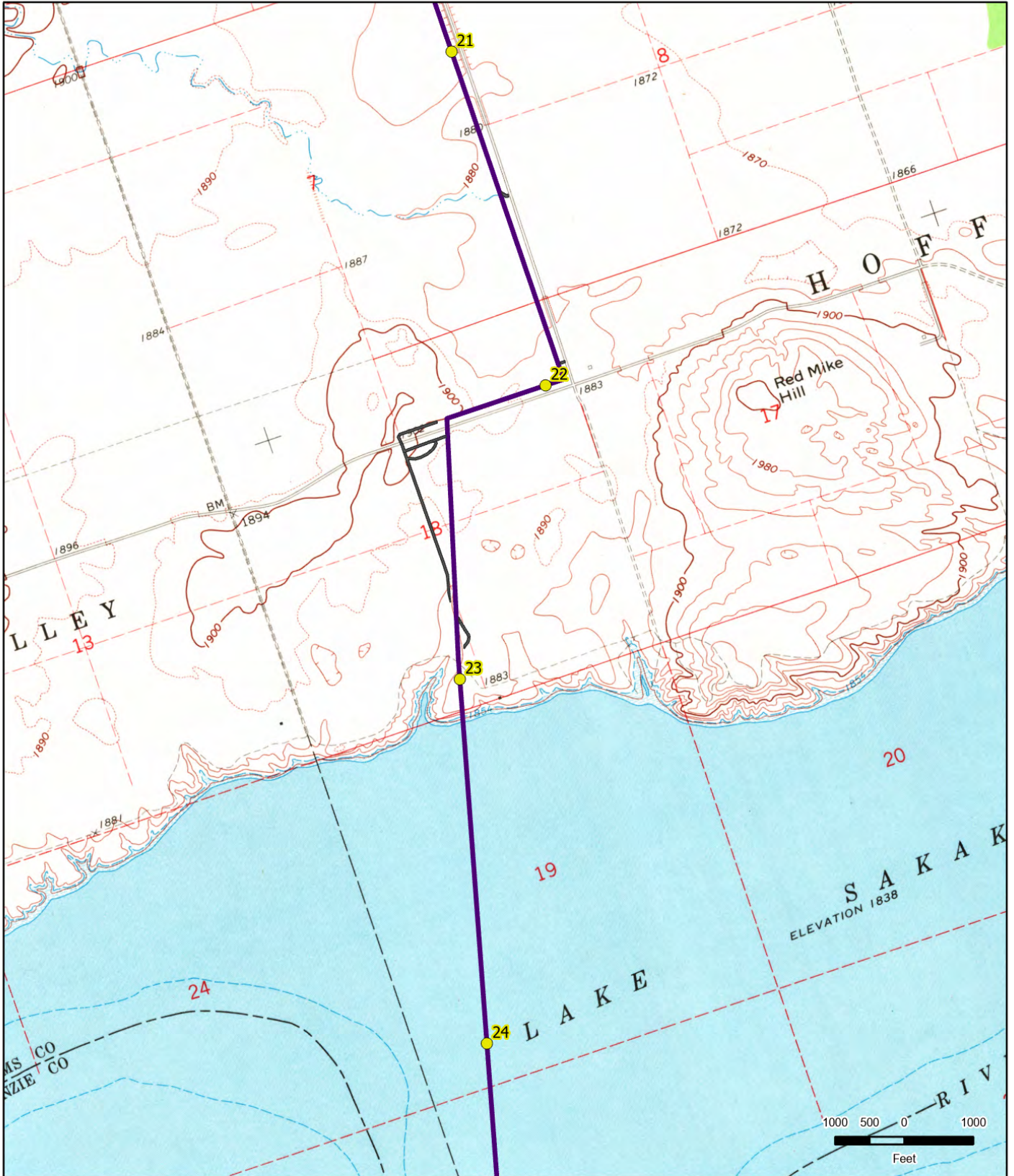
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North Bakken Expansion Project
 Project Route Maps
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- Milepost
- Proposed Tioga-Elkhorn Creek
- Access Road

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North Bakken Expansion Project
 Project Route Maps
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- Milepost
- Proposed Tioga-Elkhorn Creek
- Access Road



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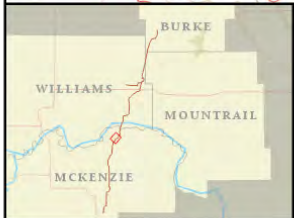
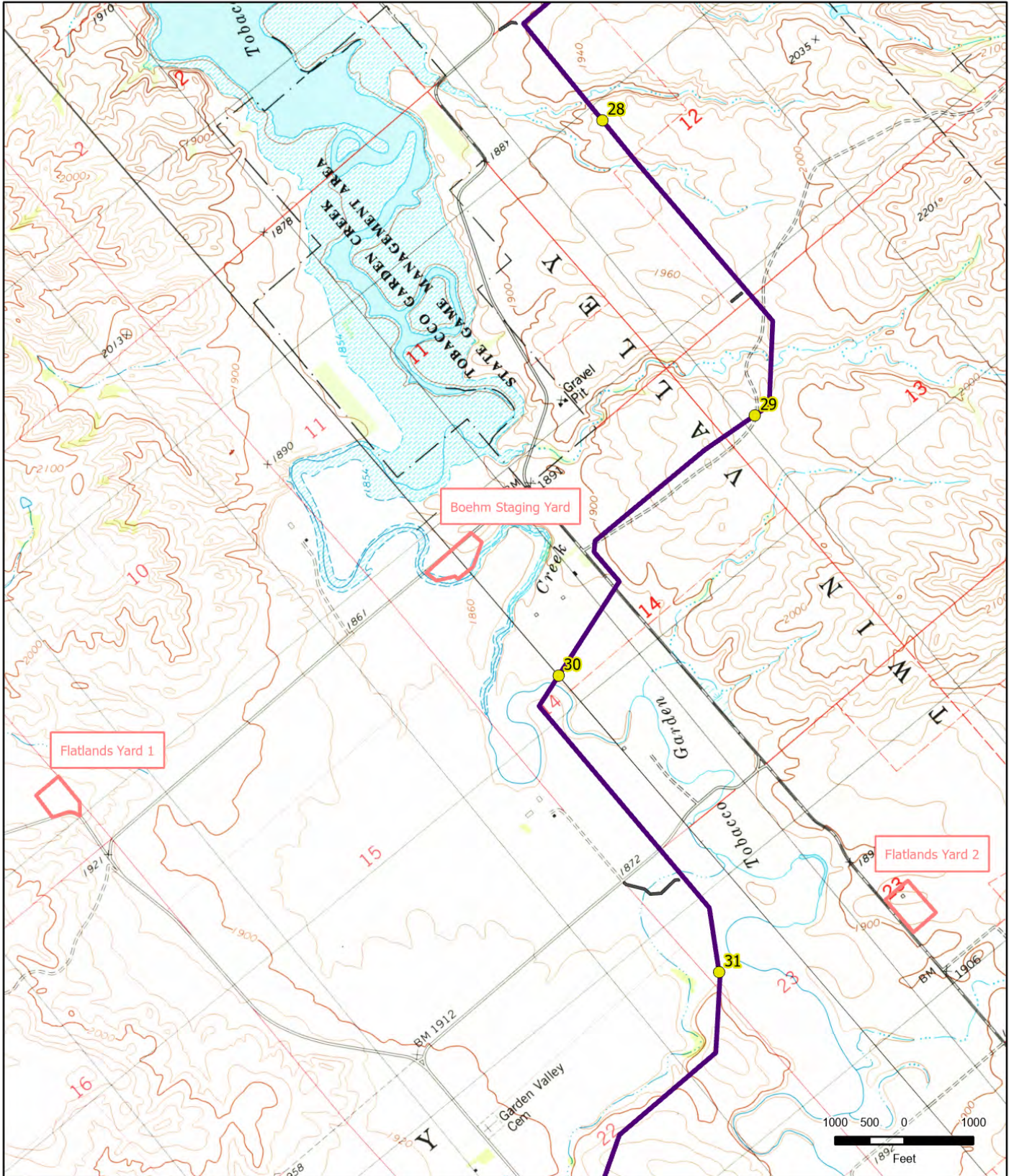
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 Project Route Maps
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- Milepost
- ⊗ Valve Site
- Proposed Tioga-Elkhorn Creek
- Access Road

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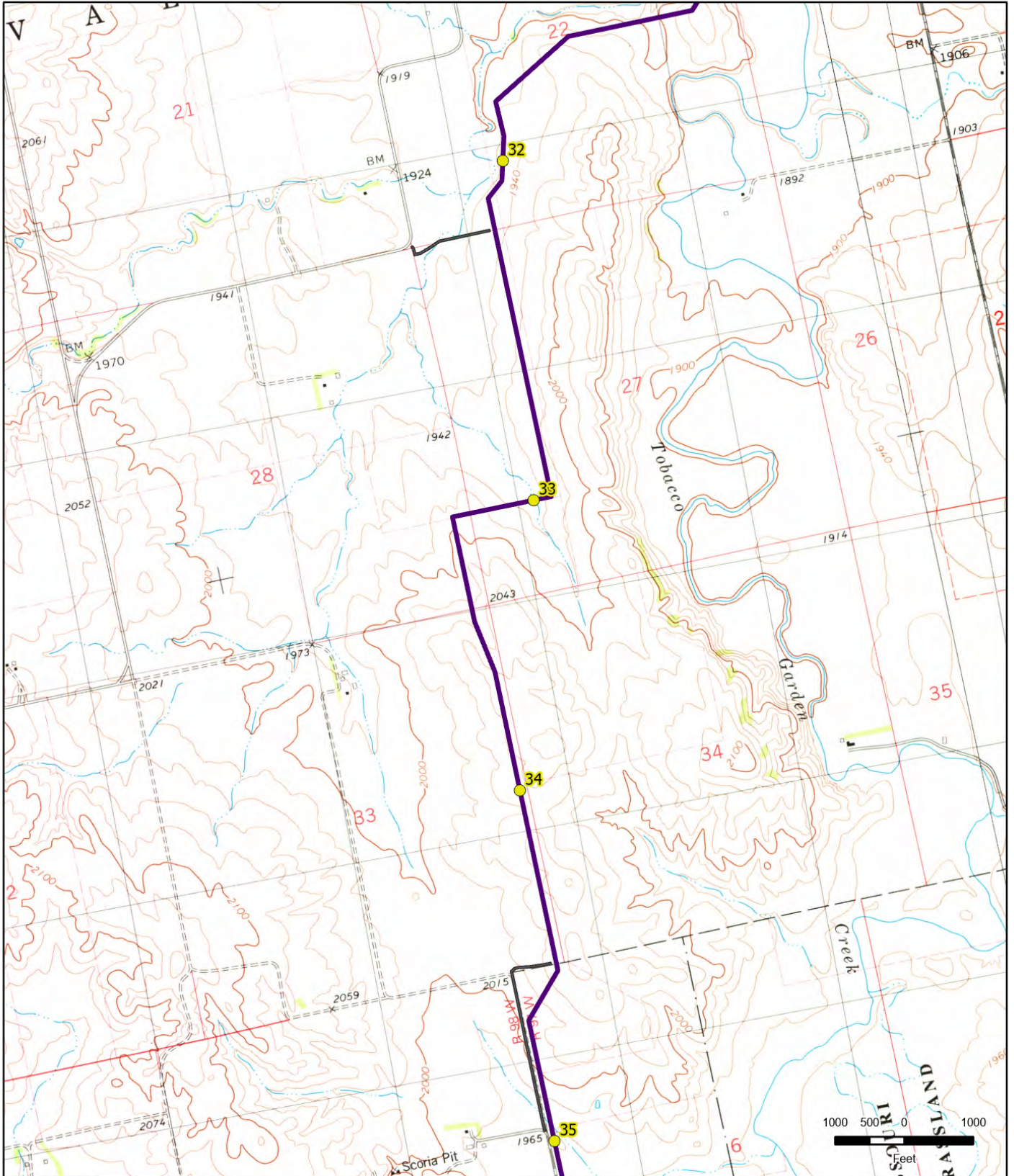
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 Project Route Maps
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- Milepost
- Proposed Tioga-Elkhorn Creek
- Staging Area
- Access Road

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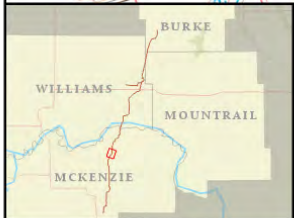
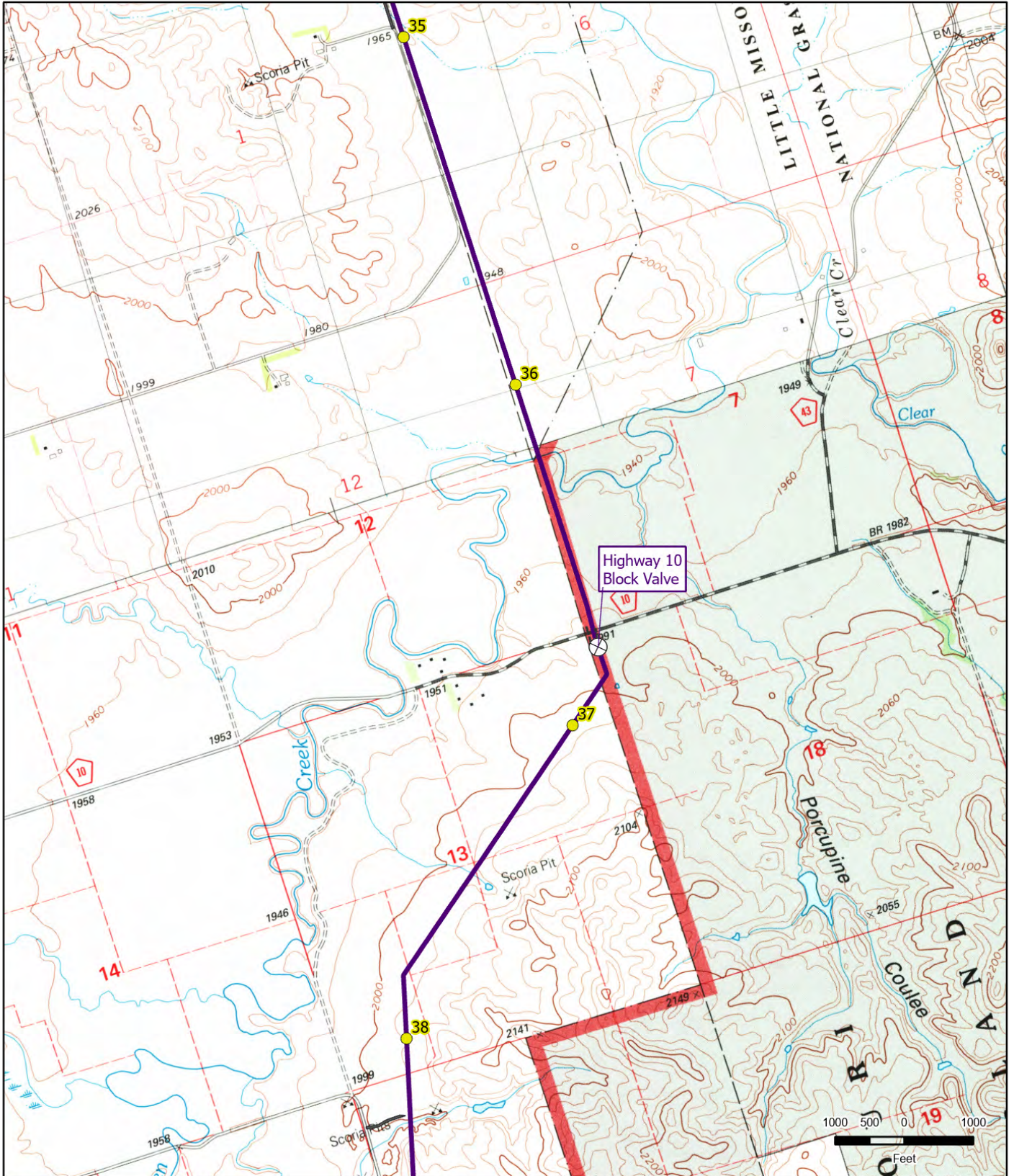
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 Project Route Maps
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- Milepost
- Proposed Tioga-Elkhorn Creek
- Access Road

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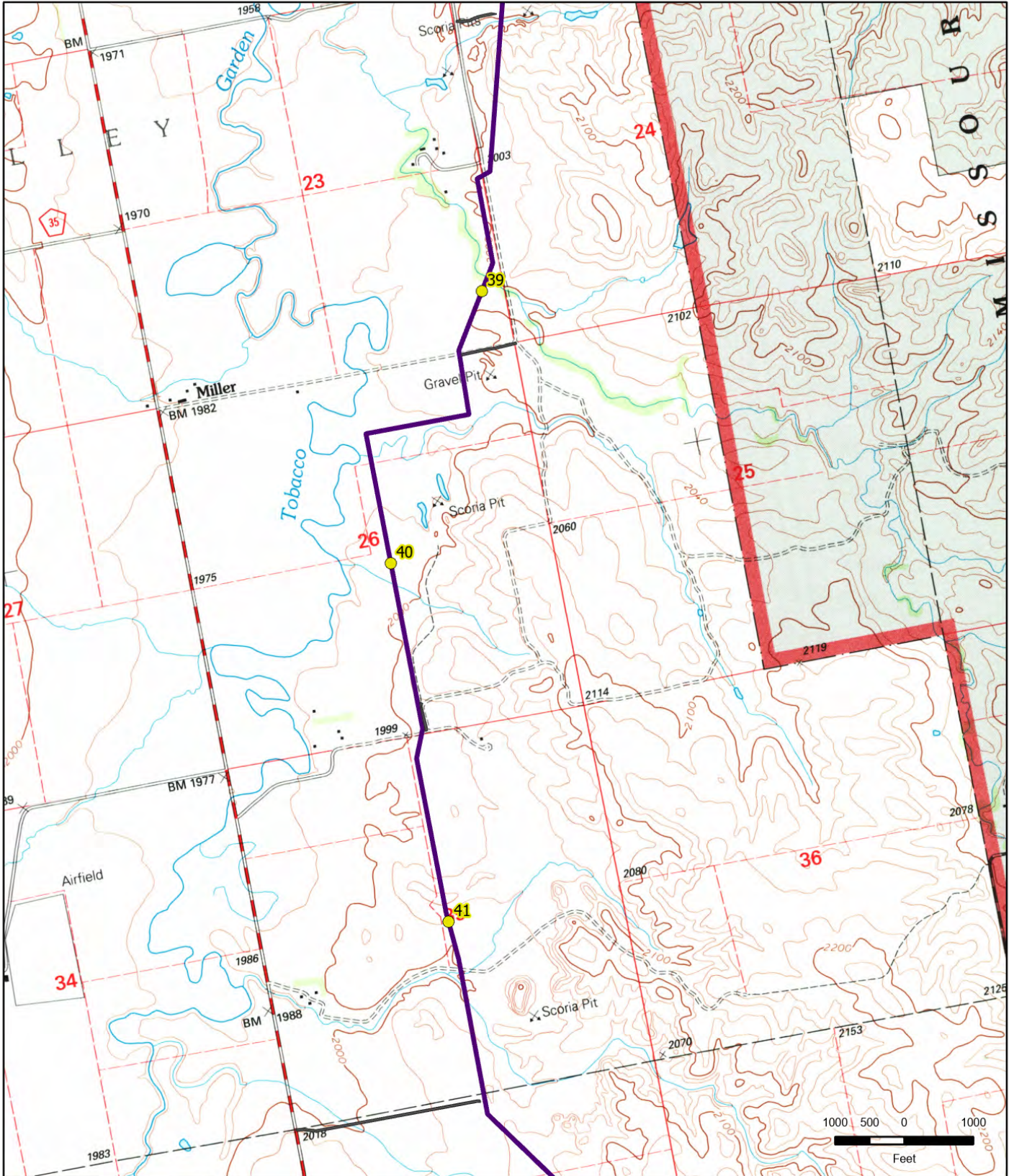
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North Bakken Expansion Project
 Project Route Maps
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- Milepost
- ⊗ Valve Site
- Proposed Tioga-Elkhorn Creek
- Access Road

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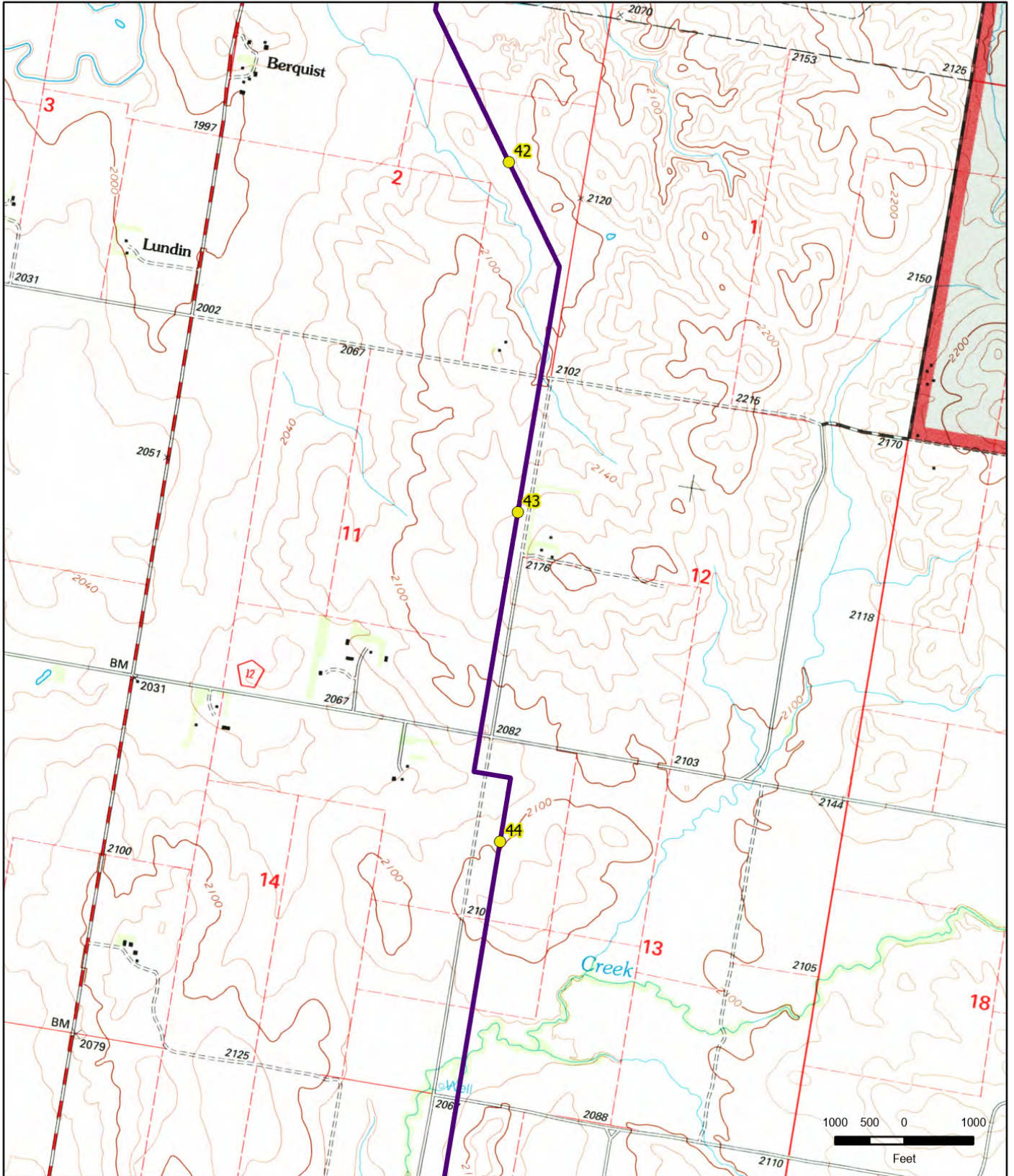
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 Project Route Maps
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- Milepost
- Proposed Tioga-Elkhorn Creek
- Access Road

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Appendix A
North Bakken Expansion Project
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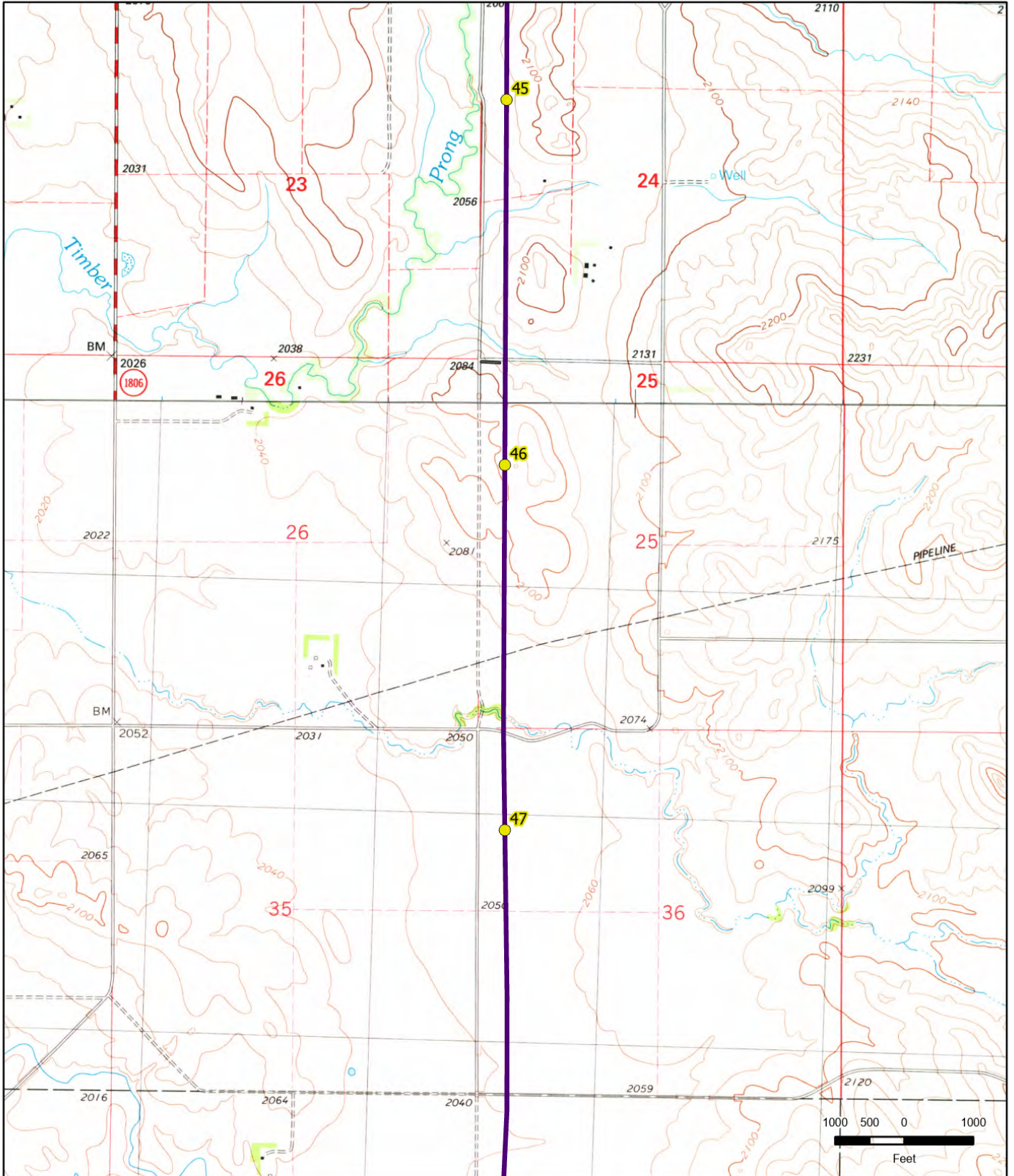


- Milepost
- Proposed Tioga-Elkhorn Creek



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Appendix A
North Bakken Expansion Project
 Project Route Maps
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- Milepost
- Proposed Tioga-Elkhorn Creek
- Access Road

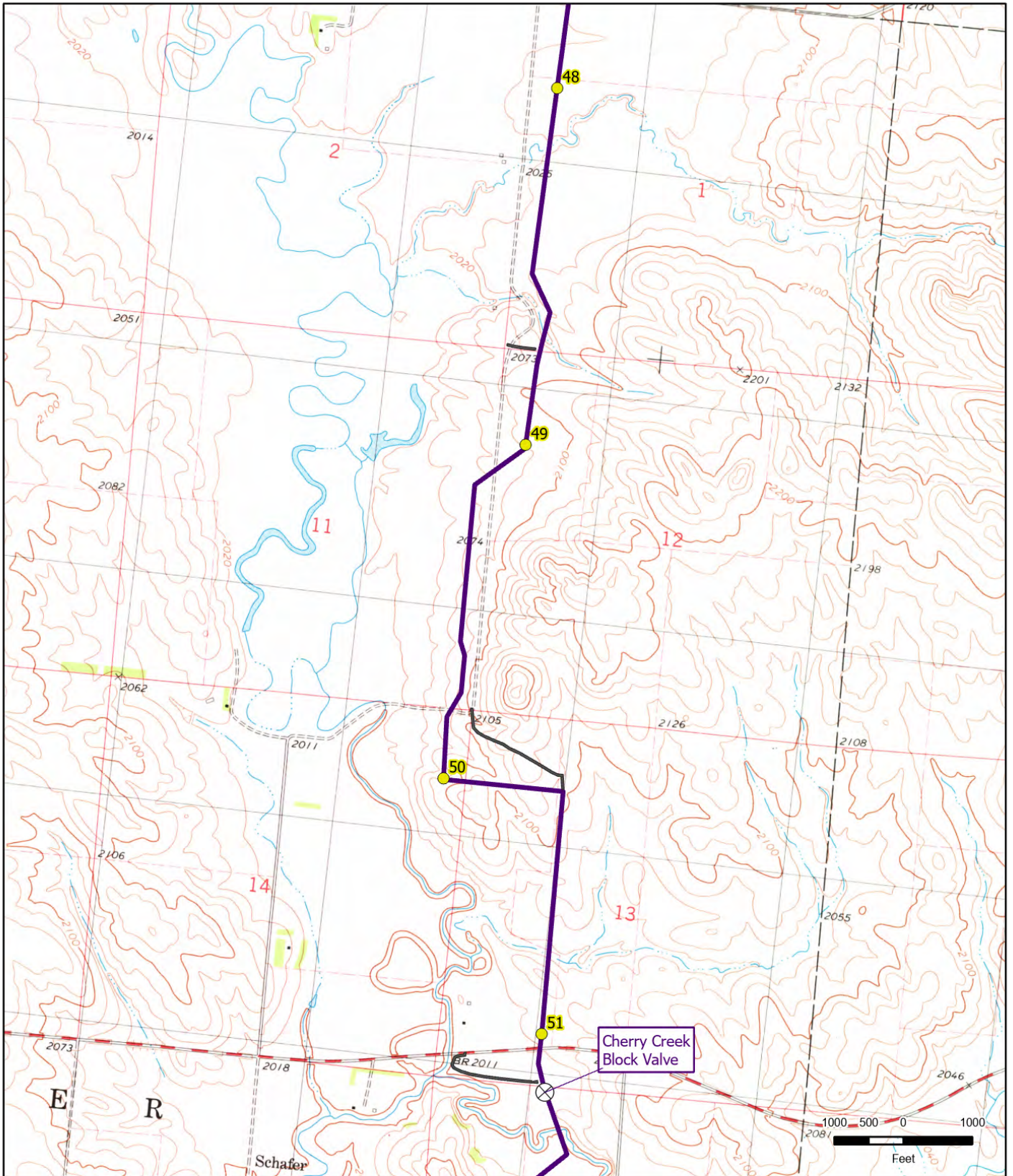


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Appendix A

North Bakken Expansion Project

Project Route Maps
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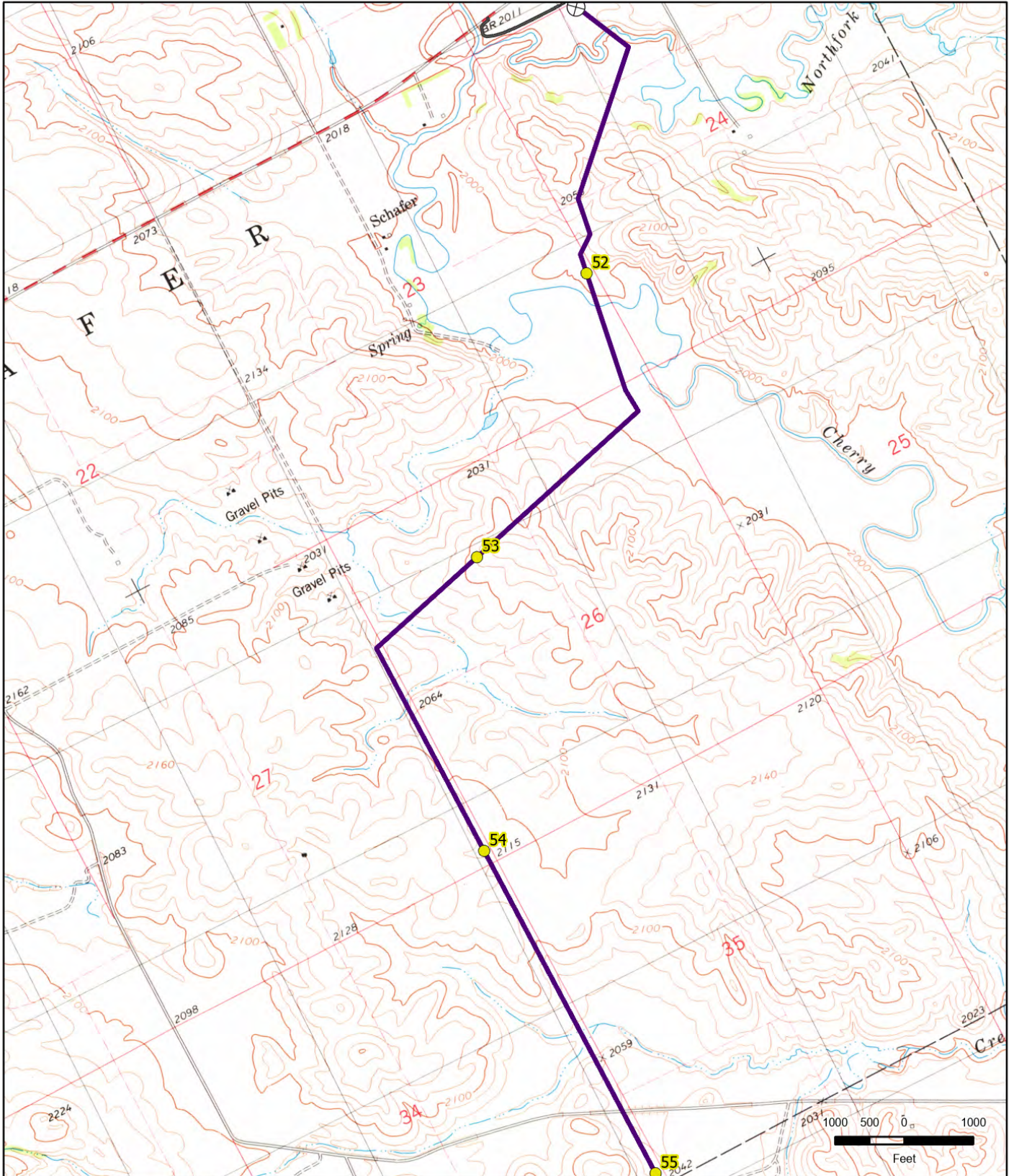
- Milepost
- ⊗ Valve Site
- Proposed Tioga-Elkhorn Creek
- Access Road



Appendix A

North Bakken Expansion Project

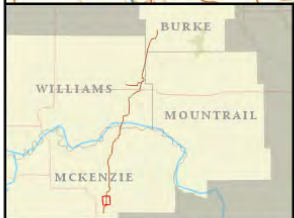
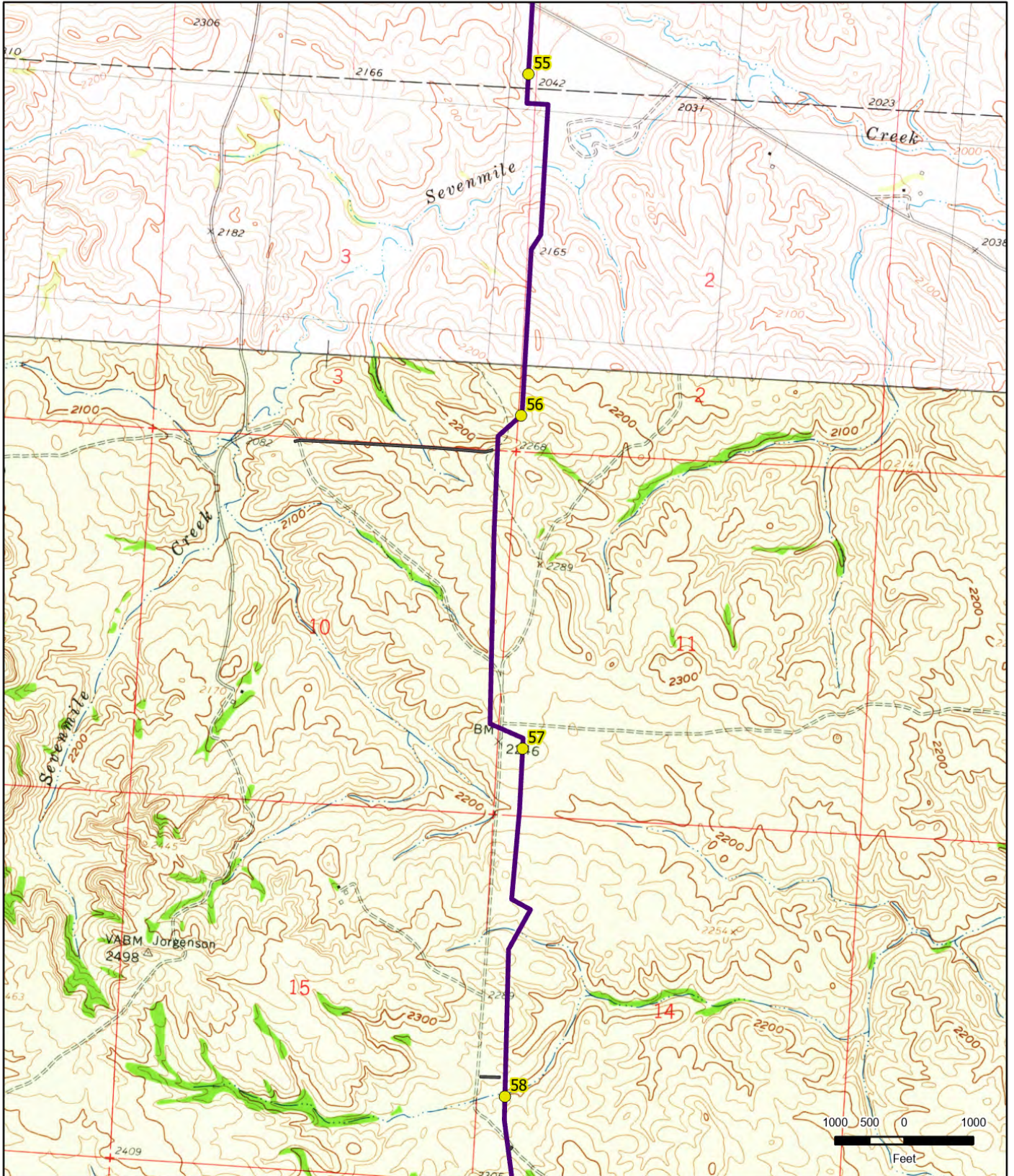
Project Route Maps
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- Milepost
- ⊗ Valve Site
- Proposed Tioga-Elkhorn Creek
- Access Road

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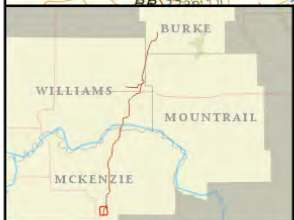
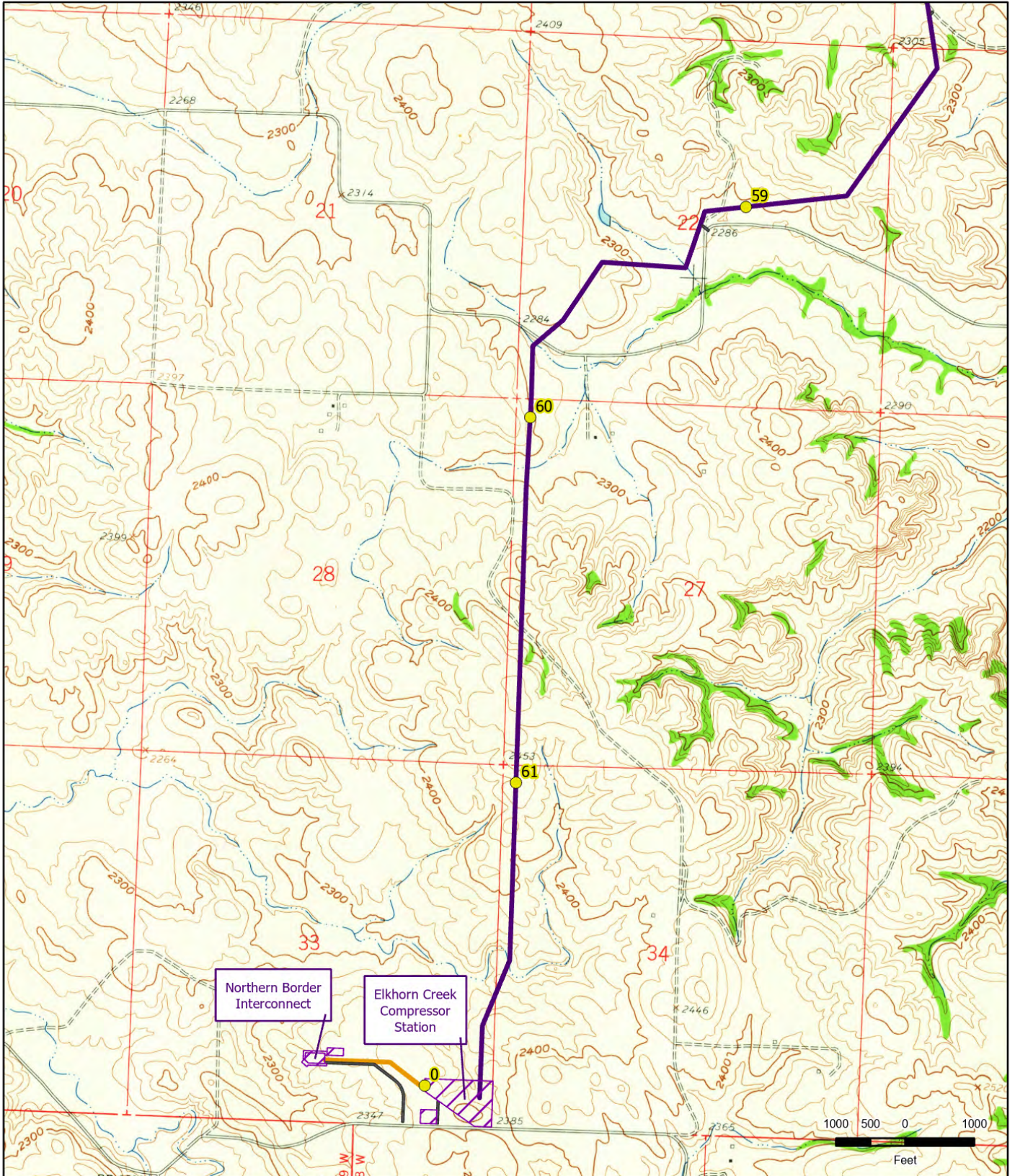
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North Bakken Expansion Project
 Project Route Maps
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- Milepost
- Proposed Tioga-Elkhorn Creek
- Access Road

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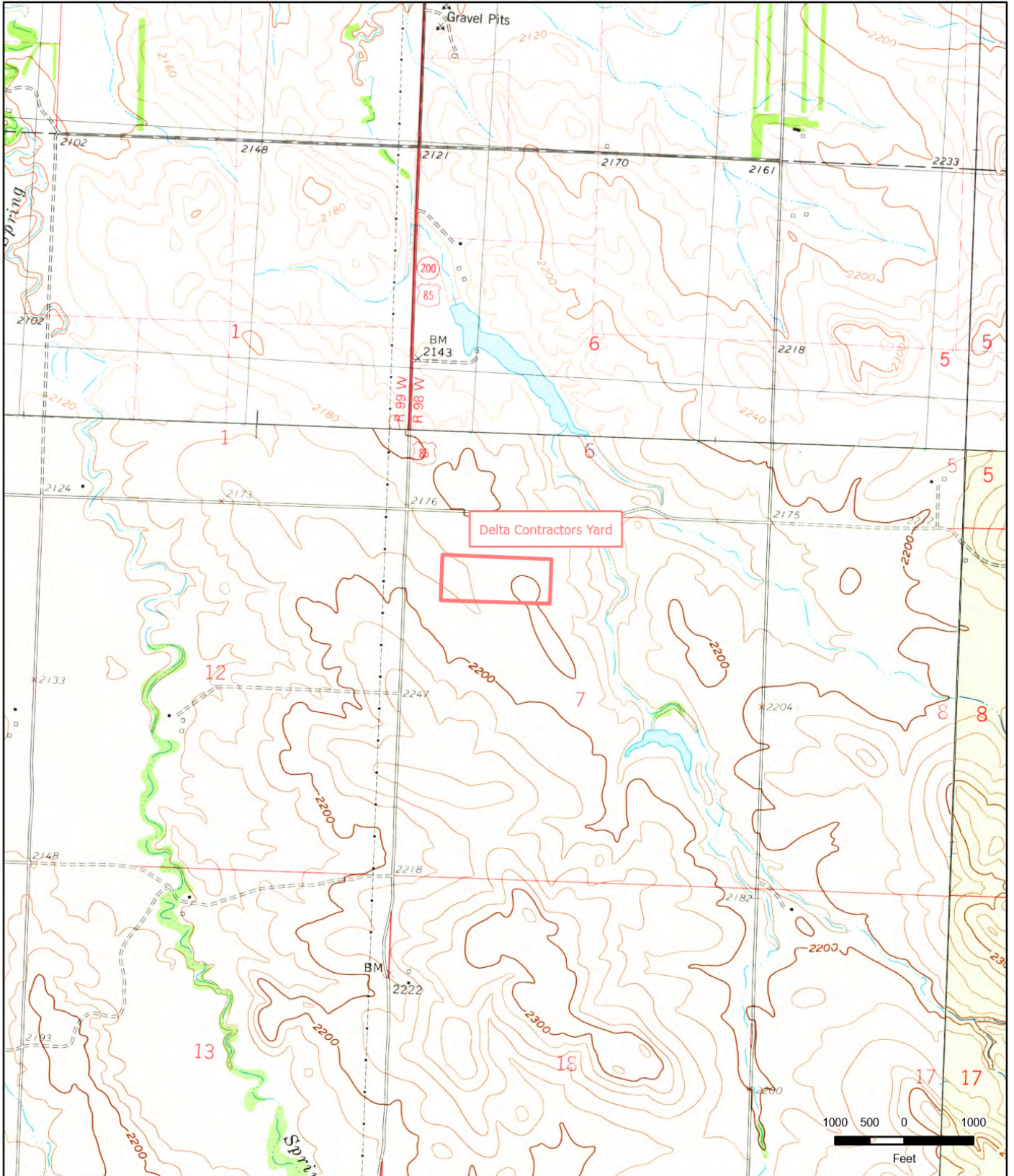
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 Project Route Maps
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- Milepost
- Proposed Tioga-Elkhorn Creek
- Proposed Elkhorn Creek-Northern Border
- Aboveground Facility
- Access Road

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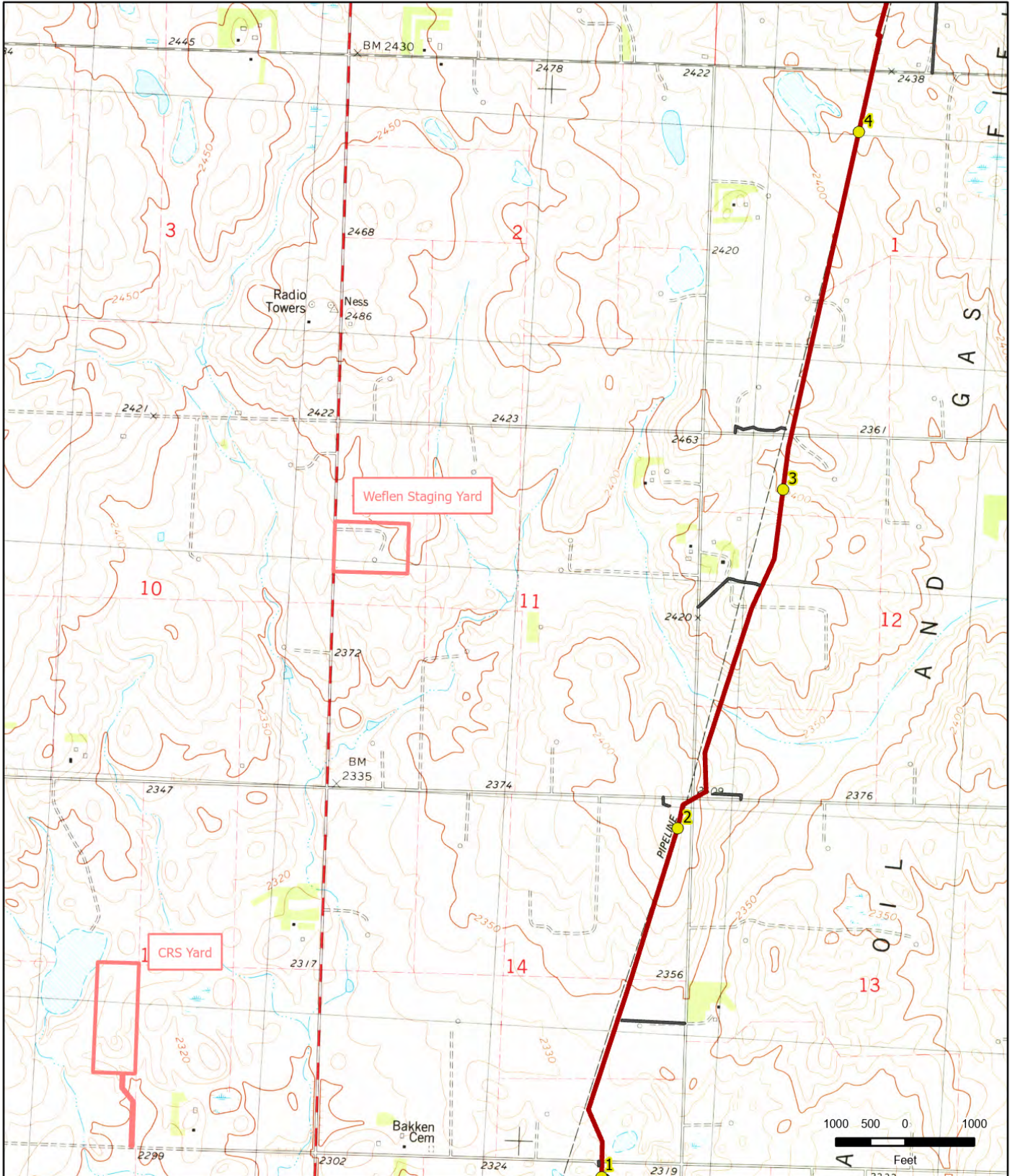
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North Bakken Expansion Project
 Project Route Maps
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Staging Area

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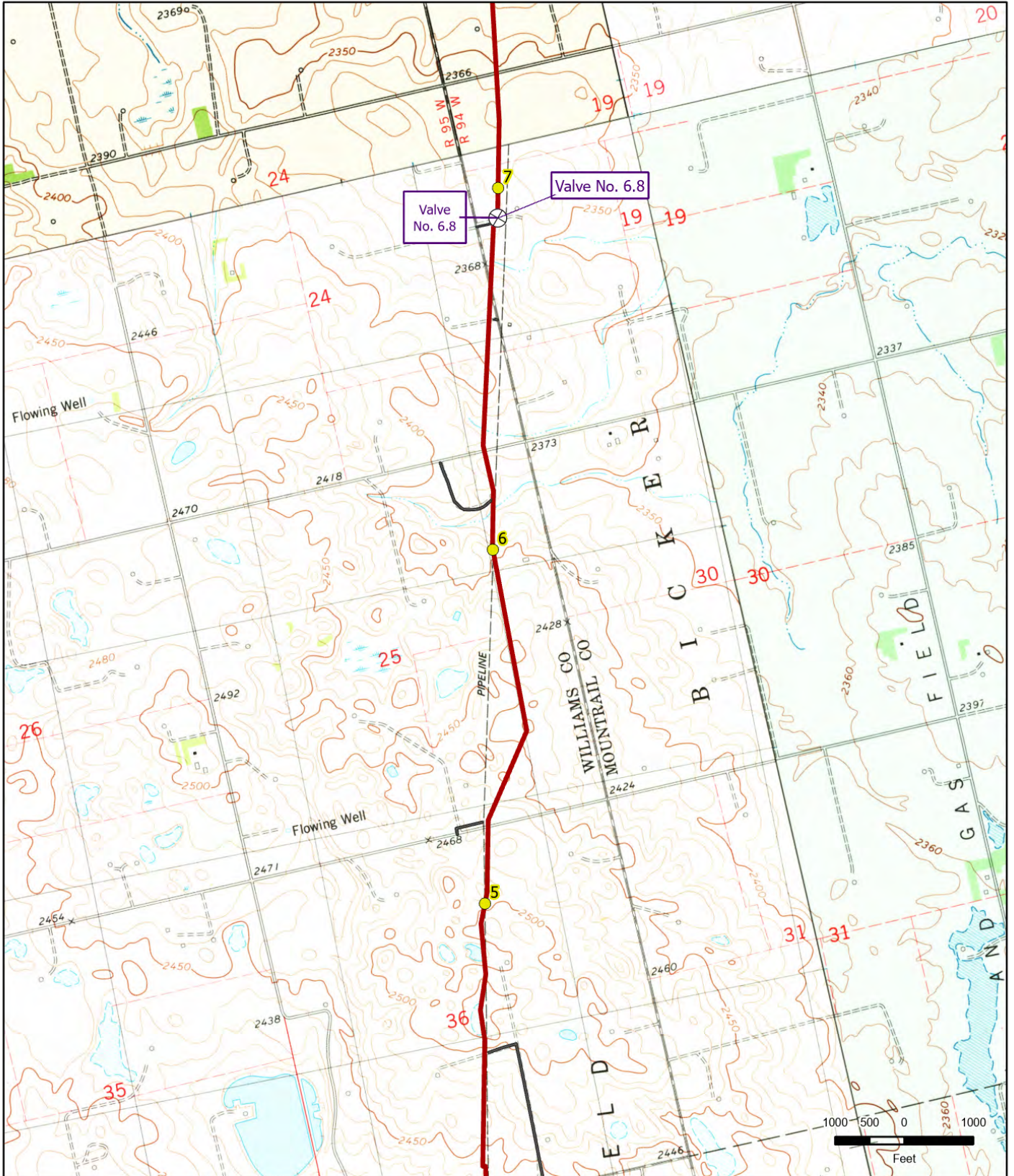
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North Bakken Expansion Project
 Project Route Maps
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- Milepost
- Proposed Line Section 25 Loop
- Staging Area
- Access Road

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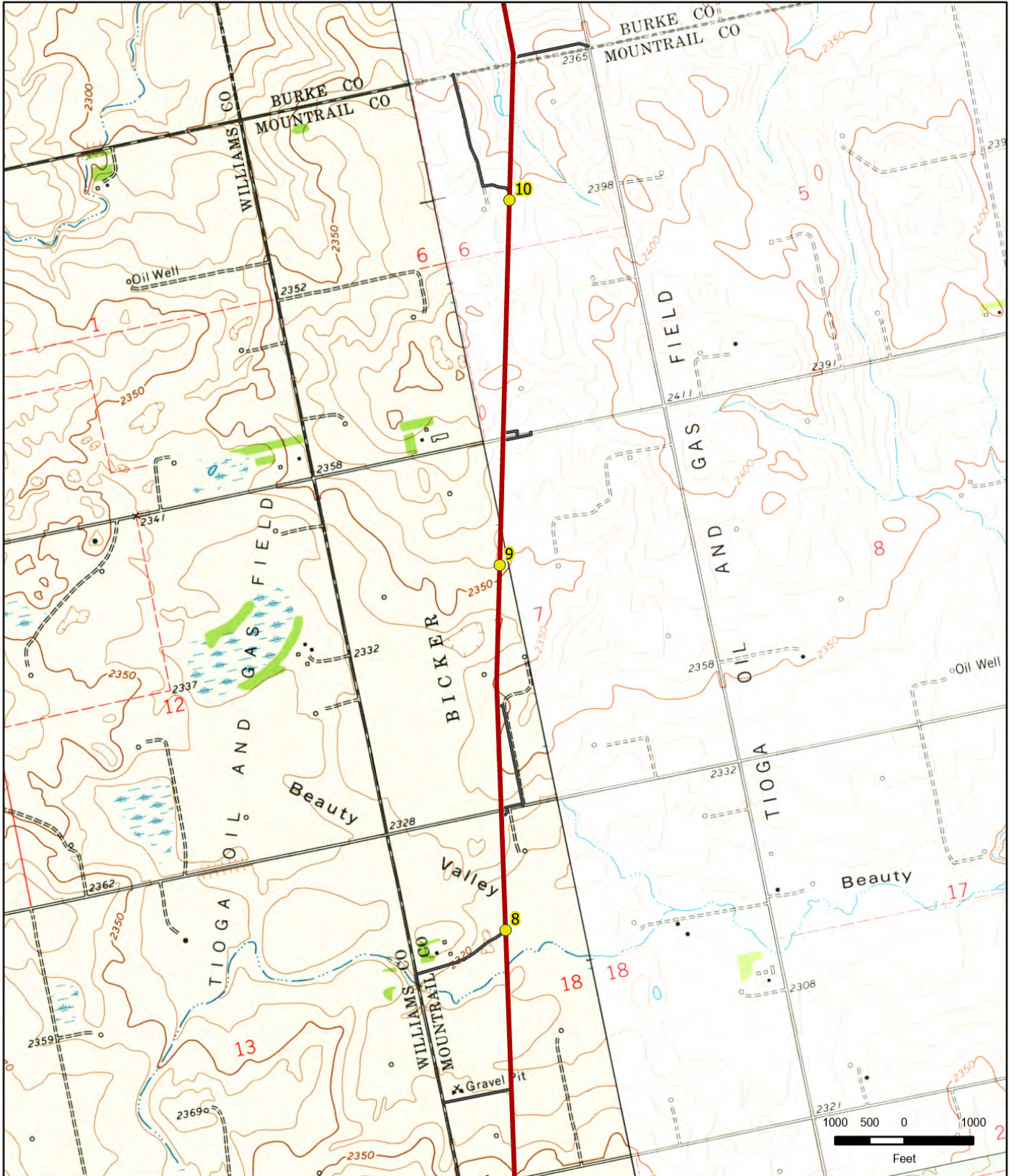
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 Project Route Maps
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- Milepost
- ⊗ Valve Site
- Proposed Line Section 25 Loop
- Aboveground Facility
- Access Road

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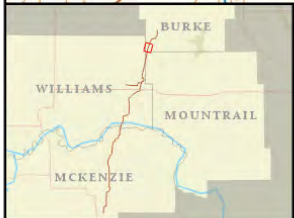
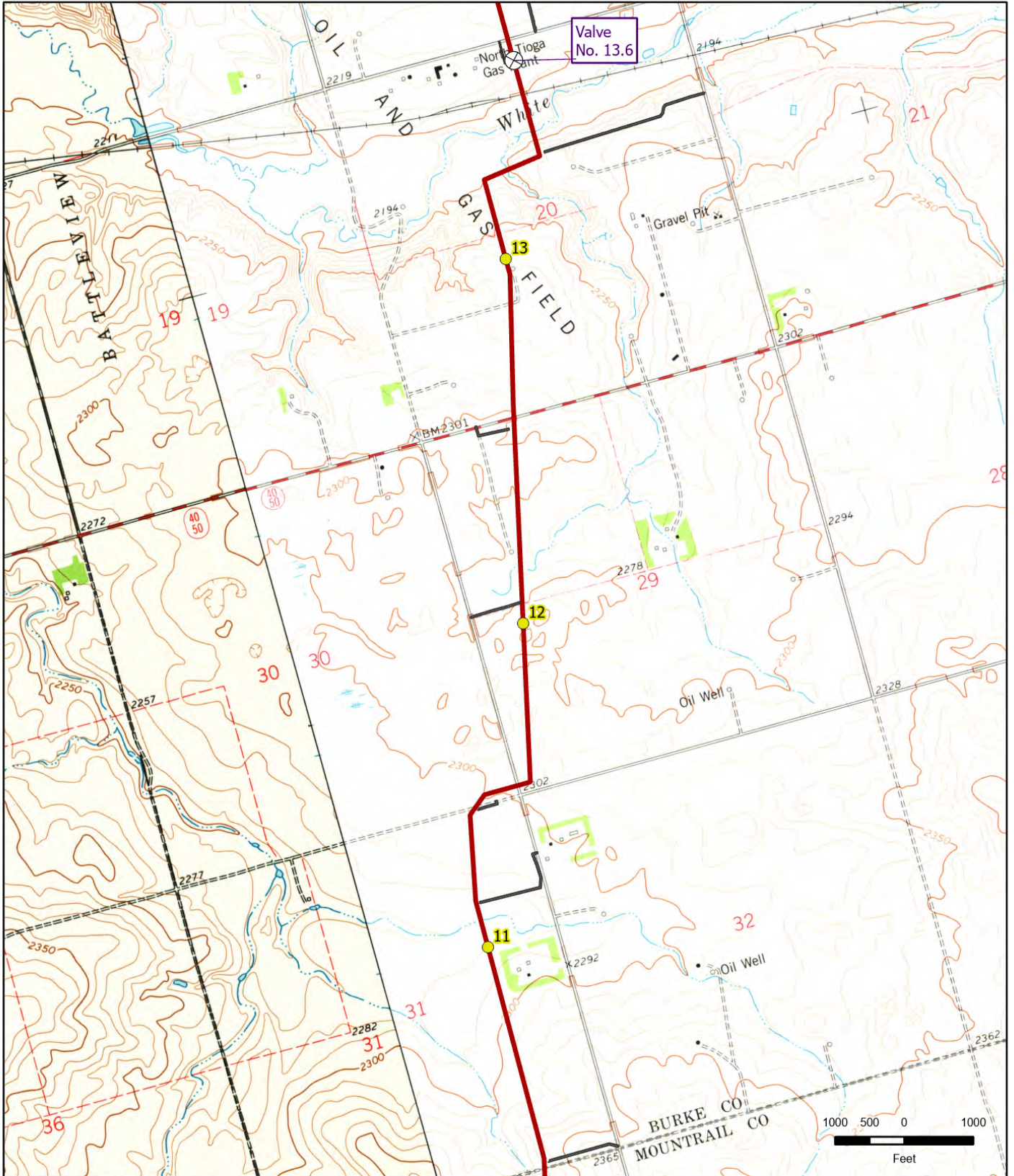
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North Bakken Expansion Project
 Project Route Maps
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- Milepost
- Proposed Line Section 25 Loop
- Access Road

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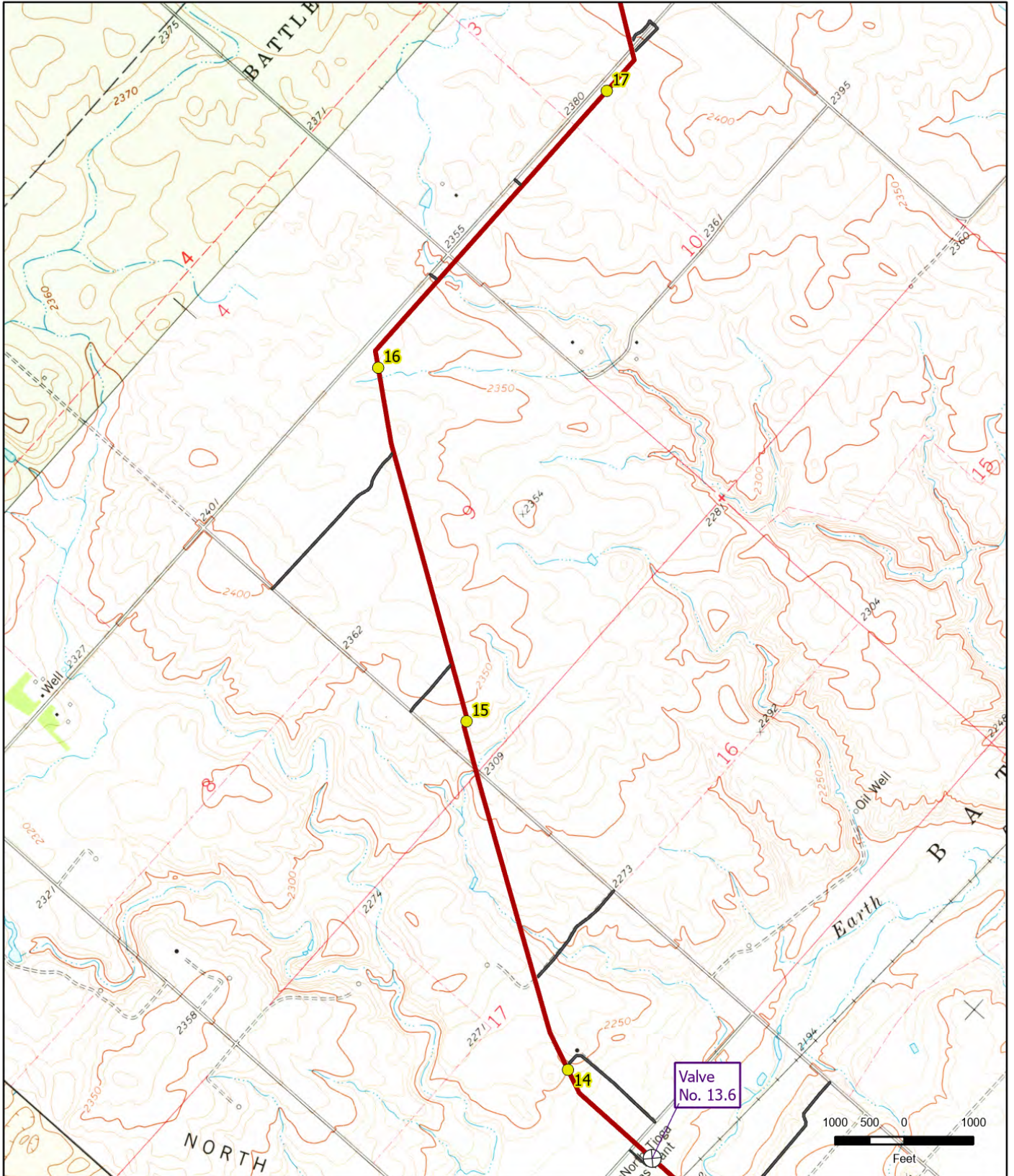
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- Milepost
- ⊗ Valve Site
- Proposed Line Section 25 Loop
- Access Road

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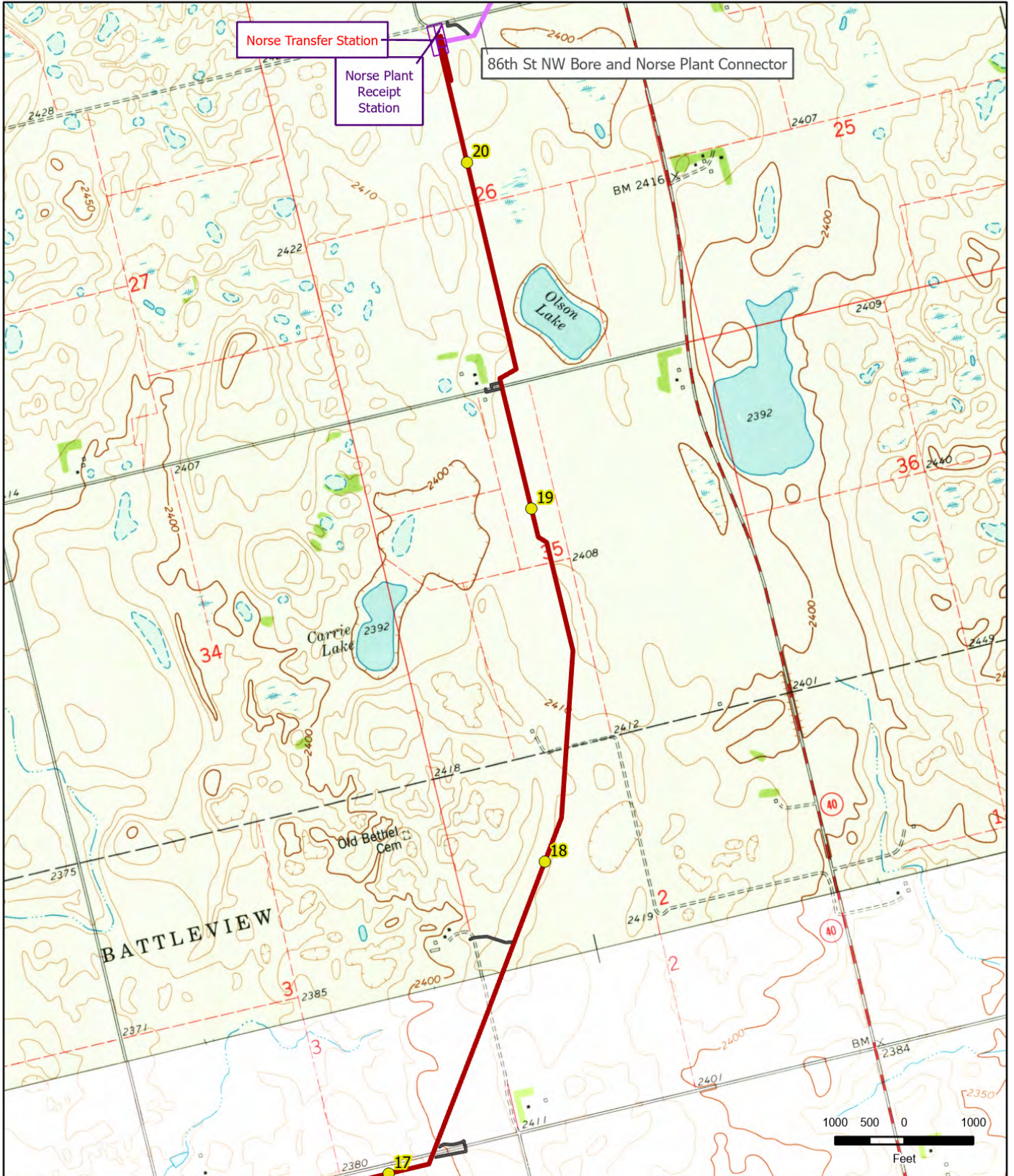
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North Bakken Expansion Project
 Project Route Maps
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- Milepost
- ⊗ Valve Site
- Proposed Line Section 25 Loop
- Access Road

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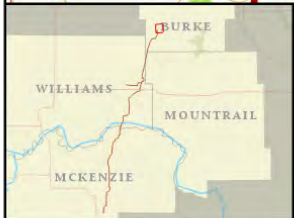
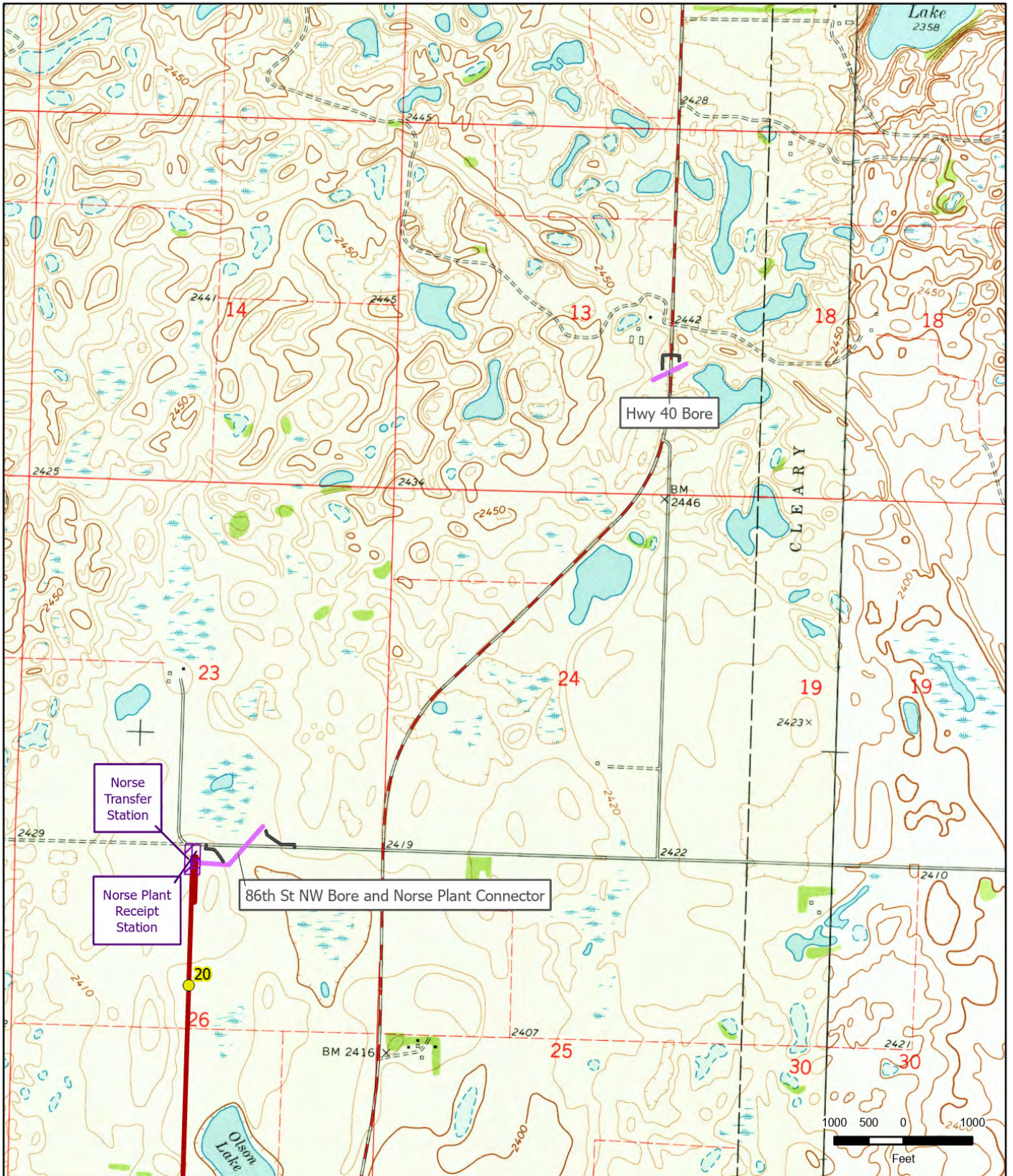
Appendix A
North Bakken Expansion Project
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- Milepost
- Proposed Line Section 25 Loop
- Proposed Uprating Site
- Aboveground Facility
- Access Road

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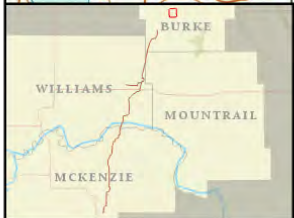
Appendix A
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- Milepost
- Proposed Line Section 25 Loop
- Proposed Uprating Site
- Aboveground Facility
- Access Road

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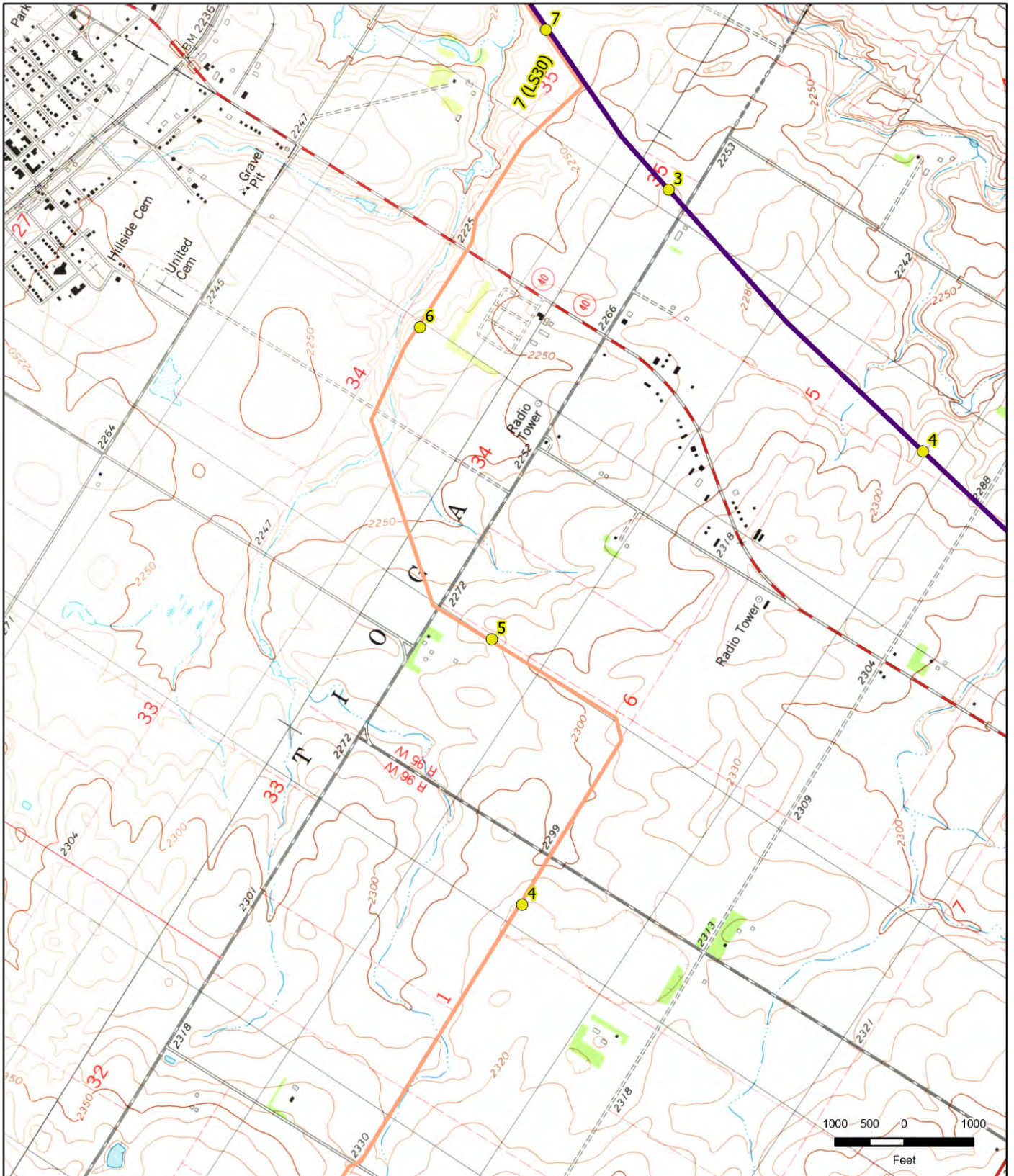
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— Proposed Uprating Site

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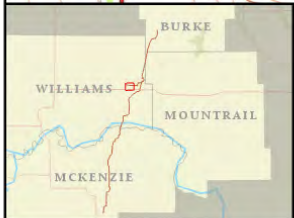
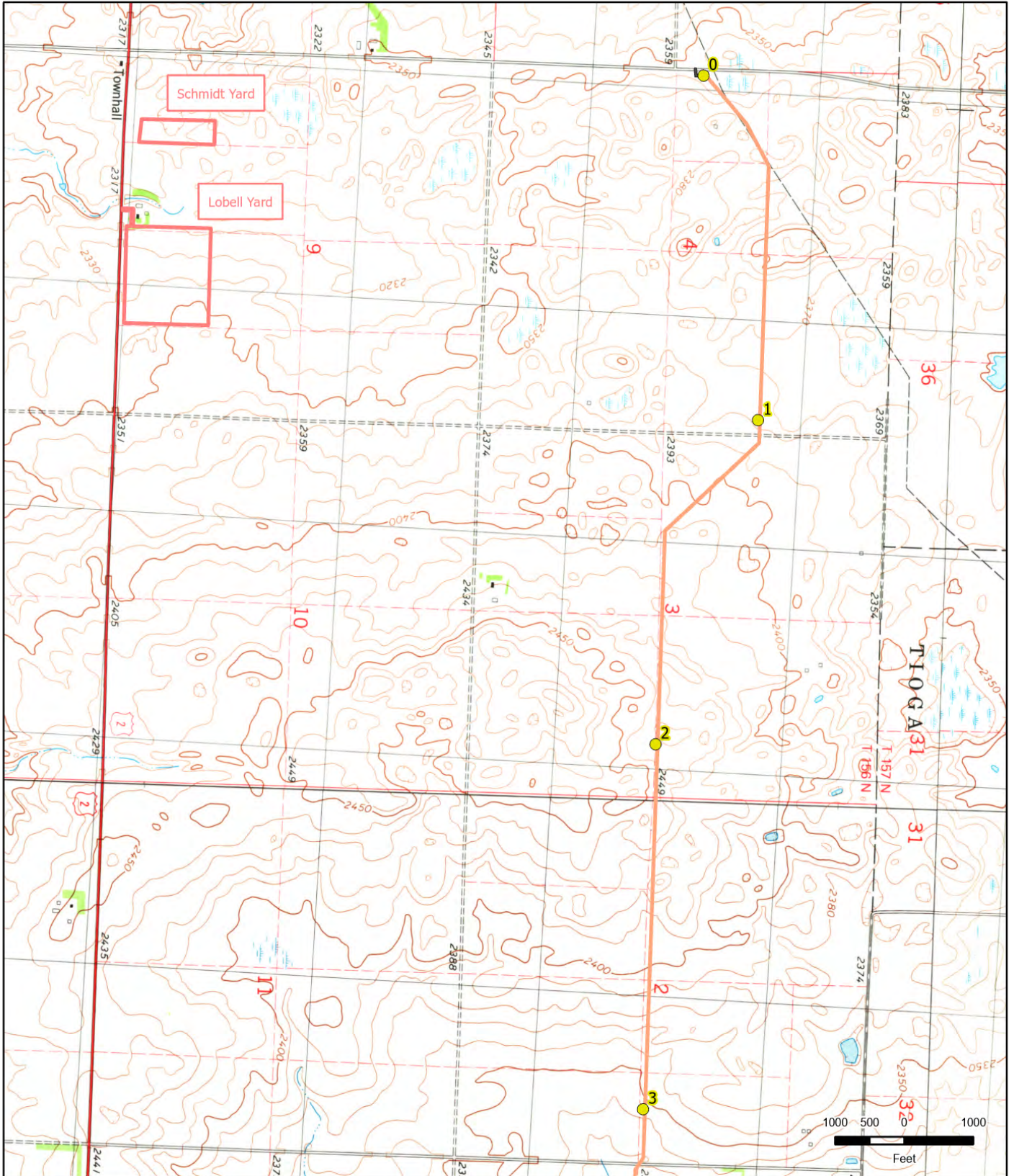
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- Milepost
- Proposed Line Section 30 Loop
- Proposed Tioga-Elkhorn Creek

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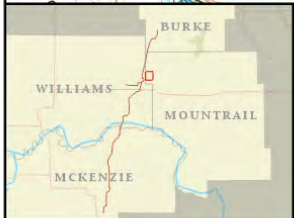
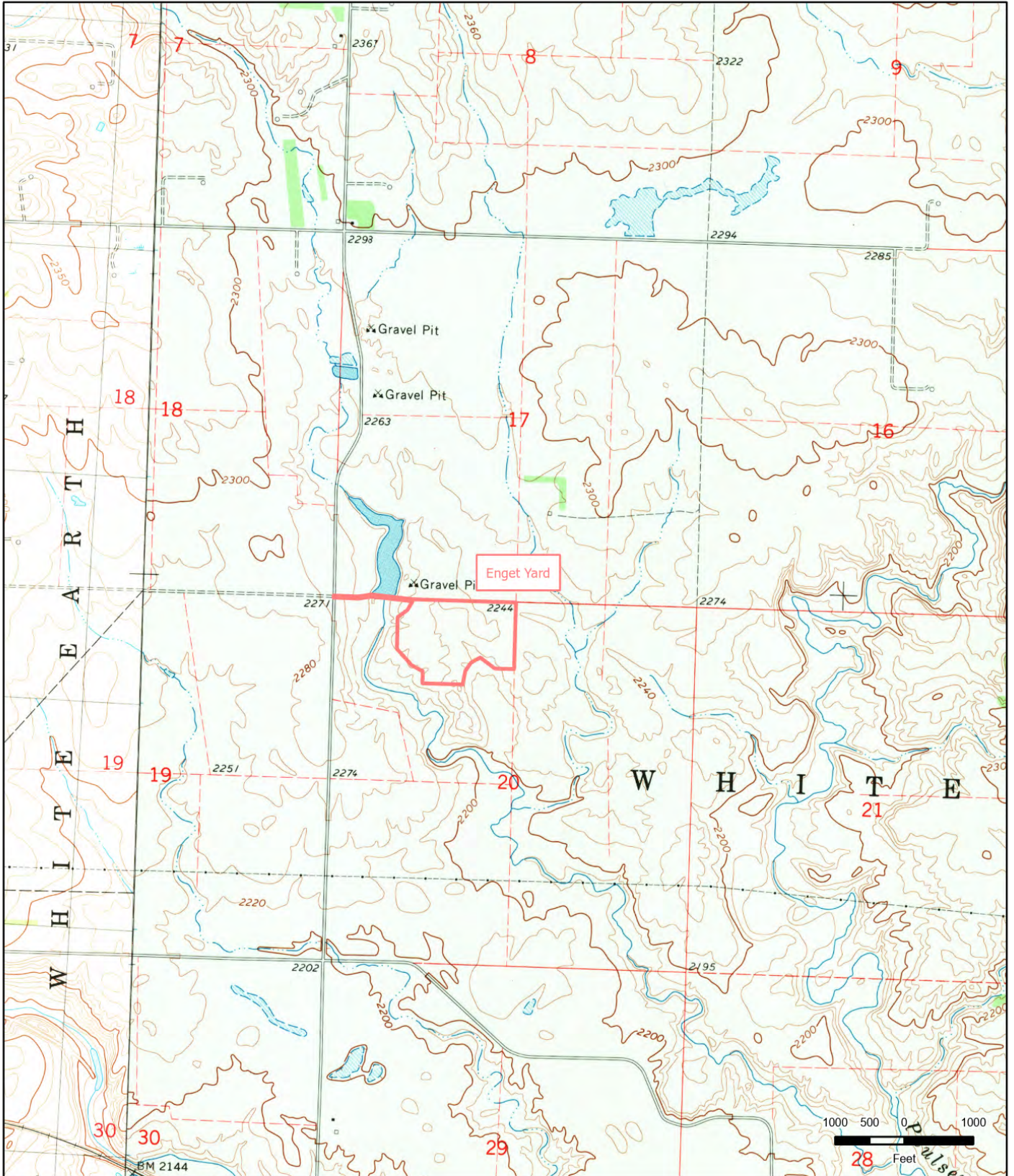
Appendix A
North Bakken Expansion Project
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- Milepost
- Proposed Line Section 30 Loop
- Staging Area
- Access Road

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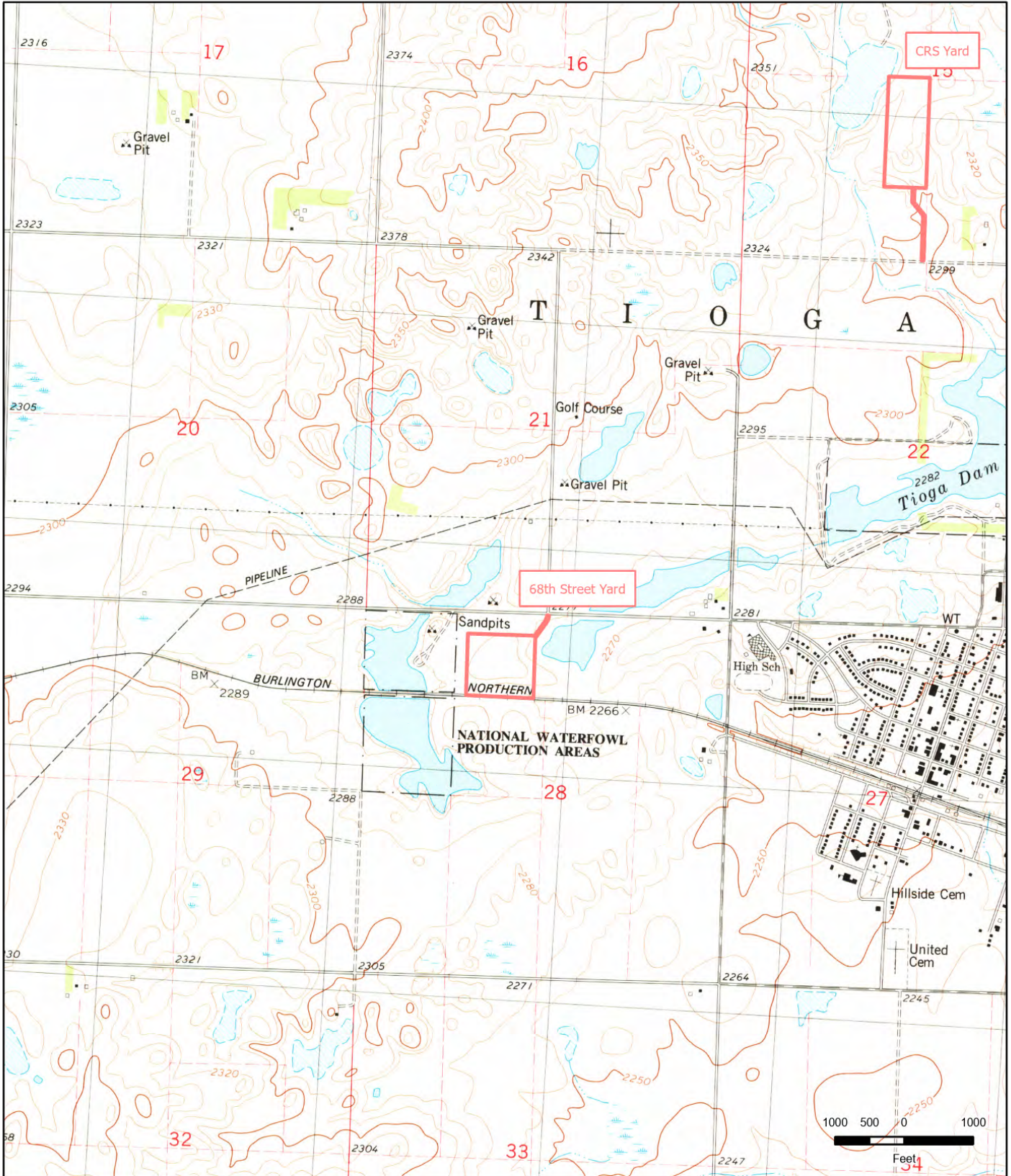
Appendix A
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Staging Area

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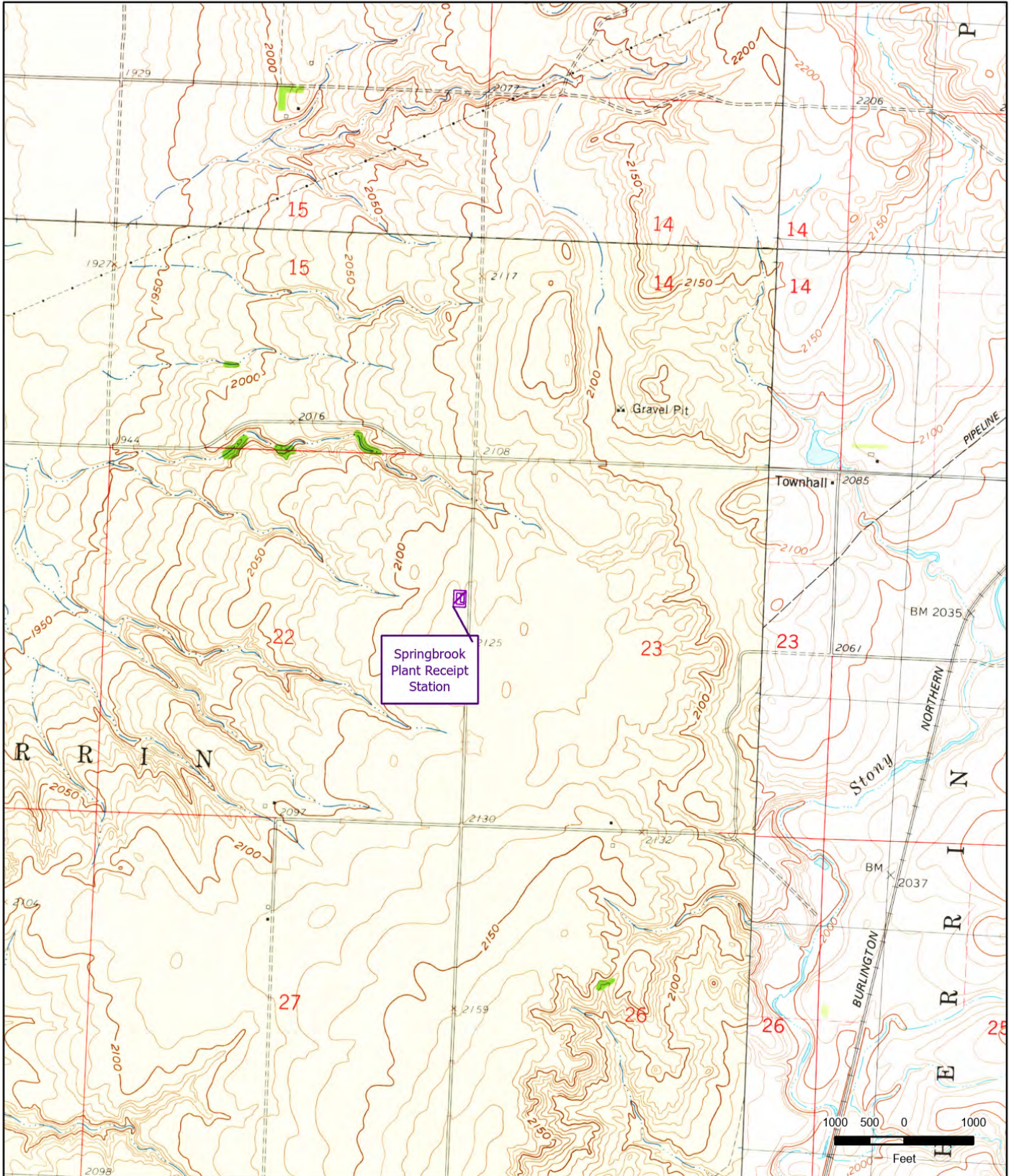
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Staging Area

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Appendix A
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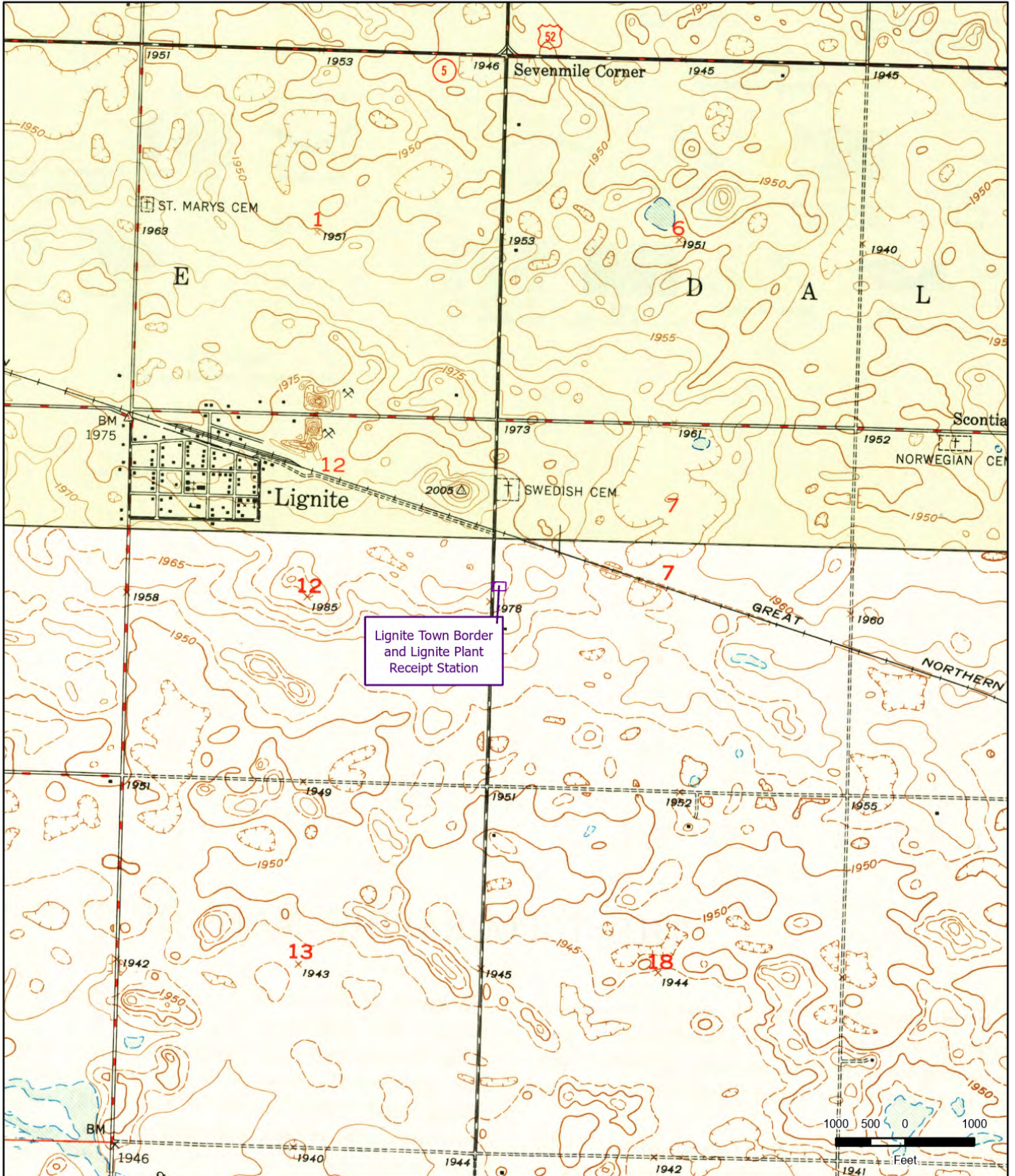


 Aboveground Facility



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Lignite Town Border
and Lignite Plant
Receipt Station

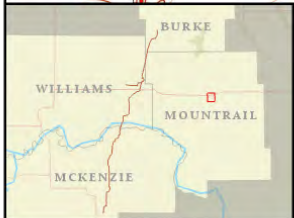
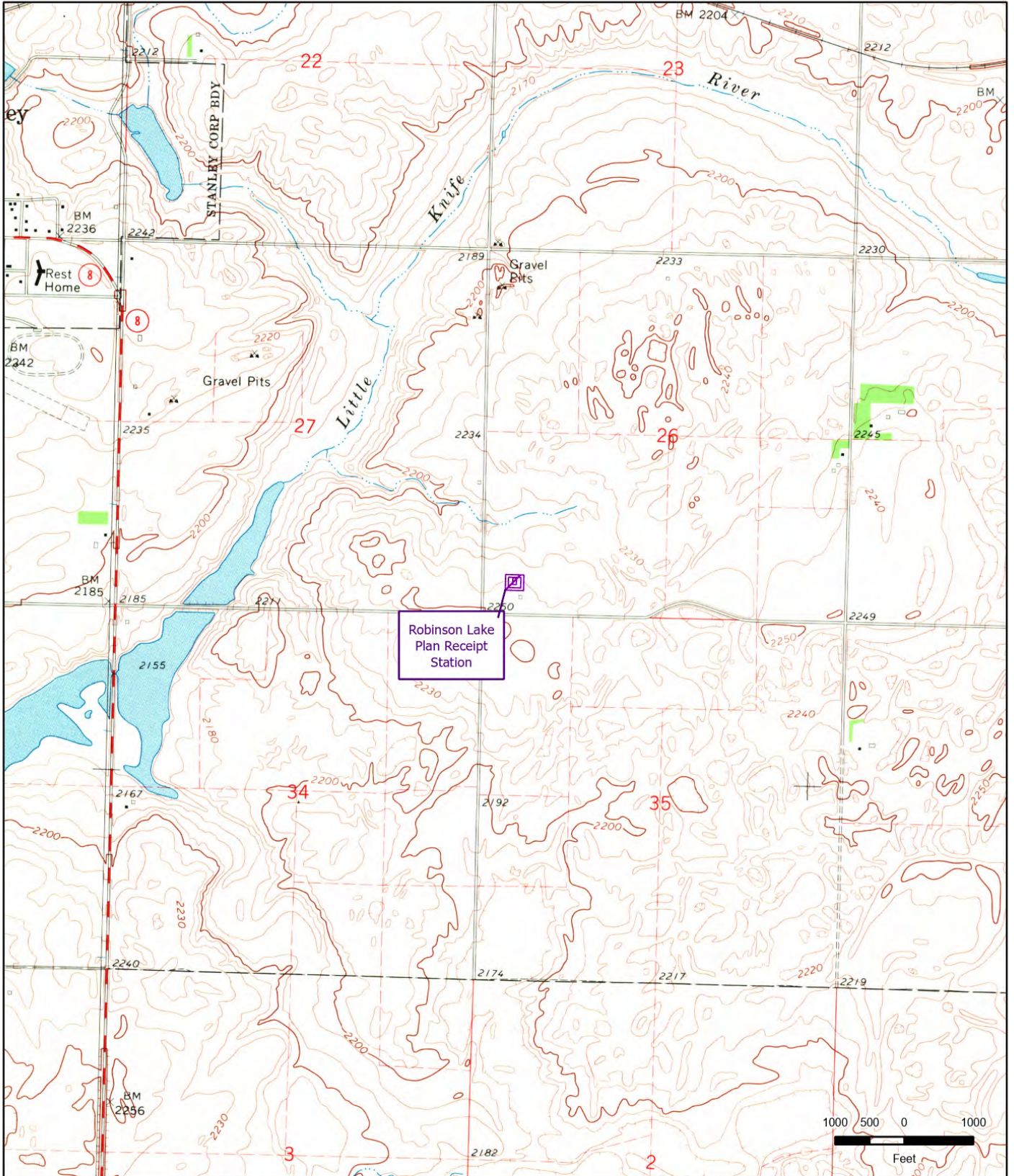


 Aboveground Facility



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North Bakken Expansion Project
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 Aboveground Facility



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Appendix A
North Bakken Expansion Project
 Project Route Maps
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APPENDIX B

SUMMARY OF COLLOCATED FACILITIES

APPENDIX B

**North Bakken Expansion Project
Summary of Collocated Facilities**

New Pipeline Facility/Collocated Utility Owner	Utility Type	Begin Milepost	End Milepost	Direction to Existing Utility/Road Right-of-Way	Paralleled Length ^a
Tioga-Elkhorn Creek					
Hess Corporation	Natural gas pipeline	5.3	5.4	West	0.2
Enable Bakken Crude Services	Crude oil pipeline	19.1	19.8	East/West	0.7
Enable Bakken Crude Services	Crude oil pipeline	19.8	21.8	East	2.0
Enable Bakken Crude Services, LLC, Mountrail-Williams Electric Cooperative	Crude oil pipeline, electric utility, road	21.8	22.4	South	0.6
ONEOK Inc.	Natural gas pipeline	27.1	28.9	West/North	1.8
Road	Road	33.1	33.5	East	0.4
ONEOK Inc.	Natural gas pipeline	34.6	35.6	West	1.0
Road	Road	38.5	39.0	East/West	0.5
ONEOK Inc.	Natural gas pipeline	39.4	39.6	South	0.3
Hiland Crude, LLC	Crude oil pipeline	42.9	45.6	East/West	2.7
Hiland Crude, LLC	Crude oil pipeline	45.6	45.9	West	0.3
Oasis Midstream Services, LLC, ONEOK Inc.	Crude oil pipeline, natural gas pipeline	47.2	48.1	East/West	0.9
ONEOK Inc.	Natural gas pipeline	48.1	48.3	North	0.2
Hiland Crude, LLC, ONEOK Inc.	Crude oil pipeline, natural gas pipeline	48.3	48.5	West	0.2
Hiland Crude, LLC, ONEOK Inc., WBI Energy Transmission	Crude oil pipeline, natural gas pipeline	48.5	48.6	West	0.1
WBI Energy Transmission	Natural gas pipeline	48.6	48.7	West	0.1
ONEOK Inc., WBI Energy Transmission	Natural gas pipeline	48.7	49.0	West	0.3
ONEOK Inc., WBI Energy Transmission	Natural gas pipeline, road	49.0	49.2	North/South	0.2
WBI Energy Transmission	Natural gas pipeline, road	49.2	49.8	East	0.6
WBI Energy Transmission	Natural gas pipeline, road	49.8	50.1	East	0.2
Hiland Crude, LLC, WBI Energy Transmission	Crude oil pipeline, natural gas pipeline	49.9	50.2	North	0.2
WBI Energy Transmission	Natural gas pipeline	50.3	50.5	West	0.2

APPENDIX B (cont'd)

**North Bakken Expansion Project
Summary of Collocated Facilities**

New Pipeline Facility/Collocated Utility Owner	Utility Type	Begin Milepost	End Milepost	Direction to Existing Utility/Road Right-of-Way	Paralleled Length
Hiland Crude, LLC, ONEOK Inc., WBI Energy Transmission	Crude oil pipeline, natural gas pipeline	50.5	51.0	West	0.5
Hess Corporation, Hiland Crude, LLC, ONEOK Inc., WBI Energy Transmission	Crude oil pipeline, natural gas pipeline	51.0	51.3	West	0.2
Hess Corporation	Natural gas pipeline	51.3	51.7	North	0.4
Hess Corporation, Hiland Crude, LLC, ONEOK Inc., WBI Energy Transmission	Crude oil pipeline, natural gas pipeline	51.7	51.9	West	0.2
Andeavor Logistics, LP, Hiland Crude, LLC, ONEOK Inc., WBI Energy Transmission	Crude oil pipeline, natural gas pipeline	51.9	52.4	East/West	0.6
Hiland Crude, LLC	Crude oil pipeline	52.4	53.1	North	0.6
Targa Midstream Services, LLC	Crude oil pipeline	53.3	53.6	East/West	0.3
Targa Midstream Services, LLC	Crude oil pipeline, road	53.6	54.0	East	0.5
Targa Midstream Services, LLC	Crude oil pipeline	54.0	55.1	East/West	1.0
Targa Midstream Services, LLC	Crude oil pipeline, road	56.1	56.1	East	<0.1
Targa Midstream Services, LLC	Crude oil pipeline	56.1	56.6	East	0.5
ONEOK Inc., Targa Midstream Services, LLC	Crude oil pipeline, natural gas pipeline, road	56.6	57.0	East/West	0.4
Targa Midstream Services, LLC	Crude oil pipeline	57.0	57.2	West	0.2
WBI Energy Transmission	Natural gas pipeline	57.3	57.9	West	0.6
Road	Road	58.0	58.2	East/West	0.2
WBI Energy Transmission	Natural gas pipeline	59.8	60.0	West	0.3
Subtotal					20.1
Line Section 25 Loop					
WBI Energy Transmission	Natural gas pipeline, road	0.1	0.1	West	0.1
Hess Corporation	Natural gas pipeline, road	0.1	0.5	West	0.4
Hess Corporation, WBI Energy Transmission	Crude oil pipeline, natural gas pipeline	0.9	1.3	West	0.4
WBI Energy Transmission	Natural gas pipeline	1.3	1.9	East/West	0.6
WBI Energy Transmission	Natural gas pipeline, road	1.9	2.1	East/West	0.1
Hess Corporation, WBI Energy Transmission	Natural gas pipeline, road	2.1	2.3	East/West	0.3

APPENDIX B (cont'd)

**North Bakken Expansion Project
Summary of Collocated Facilities**

New Pipeline Facility/Collocated Utility Owner	Utility Type	Begin Milepost	End Milepost	Direction to Existing Utility/Road Right-of-Way	Paralleled Length
Hess Corporation, WBI Energy Transmission	Natural gas pipeline	2.3	2.5	West	0.2
WBI Energy Transmission	Natural gas pipeline	2.5	5.4	East/West	2.8
WBI Energy Transmission	Natural gas pipeline	5.7	7.2	East	1.5
Hess Corporation, WBI Energy Transmission	Natural gas pipeline	7.2	7.5	East/West	0.3
Hess Corporation, WBI Energy Transmission	Natural gas pipeline	7.5	7.6	East	0.1
Hess Corporation, WBI Energy Transmission	Natural gas pipeline	7.6	8.3	East/West	0.7
WBI Energy Transmission	Natural gas pipeline	8.3	10.7	East	2.4
Hess Corporation, WBI Energy Transmission	Natural gas pipeline, road	11.3	11.6	South	0.2
Hess Corporation, WBI Energy Transmission	Natural gas pipeline	11.6	12.2	West	0.7
Hess Corporation, WBI Energy Transmission	Natural gas pipeline	12.2	13.3	East/West	1.1
WBI Energy Transmission	Natural gas pipeline	13.8	14.2	East/West	0.4
Hess Corporation, WBI Energy Transmission	Natural gas pipeline	14.2	14.8	East	0.6
WBI Energy Transmission	Natural gas pipeline	14.8	16.0	East/West	1.3
Road	Road	16.0	17.2	North	1.2
WBI Energy Transmission	Natural gas pipeline	20.1	20.3	East	0.2
Subtotal					15.4
Line Section 30 Loop					
WBI Energy Transmission	Natural gas pipeline	0.0	0.4	North	0.4
Road	Road	2.3	3.1	South	0.9
Hess Corporation	Crude oil pipeline, natural gas pipeline	4.5	6.8	West	2.6
Hess Corporation	Crude oil pipeline, natural gas pipeline	5.8	7.1	North	1.4
Hess Corporation	Crude oil pipeline, natural gas pipeline	6.8	7.1	West	0.3
Road	Road	7.4	8.0	South	0.6
WBI Energy Transmission	Natural gas pipeline	9.2	9.4	North	0.3

APPENDIX B (cont'd)

**North Bakken Expansion Project
Summary of Collocated Facilities**

New Pipeline Facility/Collocated Utility Owner	Utility Type	Begin Milepost	End Milepost	Direction to Existing Utility/Road Right-of-Way	Paralleled Length
WBI Energy Transmission	Natural gas pipeline	9.4	9.4	South	<0.1
Subtotal					6.6
Tioga Compressor Lateral					
WBI Energy Transmission	Natural gas pipeline, road	0.0	0.5	North/South	0.5
WBI Energy Transmission	Natural gas pipeline, road	0.5	0.5	West	0.1
Subtotal					0.5
PROJECT TOTAL					42.6

^a The totals may not match the sum of addends due to rounding.

APPENDIX C
ACCESS ROADS

APPENDIX C

North Bakken Expansion Project
Access Roads

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Tioga-Elkhorn Creek										
Access 1	0.6	Gravel	None	Temp.	Existing, New	Agricultural, Open Land	829	30	0.6	0.0
Access 2	1.1	Dirt/Vegetation	None	Temp.	Existing	Agricultural, Developed	2,593	20	1.8	0.0
Access 3_R1	2.0	Dirt/Vegetation	None	Temp.	Existing, New	Agricultural, Developed	183	20	0.1	0.0
Access 4_R1	2.0	Dirt/Vegetation	None	Temp.	Existing, New	Agricultural, Developed	298	20	0.2	0.0
Access 5	4.9	Gravel	None	Temp.	Existing	Agricultural, Developed	1,790	30	1.7	0.0
Access 6	5.8	Gravel	None	Temp.	Existing	Agricultural, Developed	1,310	30	0.9	0.0
Access to 104 th Ave NW Pig Launcher	6.1	Dirt/Vegetation	Remove Topsoil, add gravel	Perm.	Existing, New	Developed	38	20	<0.1	<0.1
Access 7	7.0	Vegetation	None	Temp.	Existing	Agricultural, Developed	35	20	<0.1	0.0
Access 8	8.4	Dirt/Vegetation	None	Temp.	Existing	Agricultural, Developed	44	20	<0.1	0.0
Access 9	10.4	Gravel/Dirt/Vegetation	Remove/Replace Topsoil	Temp.	Existing	Agricultural, Developed, Open Land	2,137	20	1.5	0.0
Access 10	12.0	Vegetation	None	Temp.	Existing, New	Agricultural, Developed, Open Land	1,663	20	1.2	0.0
Access 10a	12.2	Gravel/Dirt/Vegetation	Remove/Replace Topsoil	Temp.	Existing	Agricultural, Developed, Open Land	2,766	20	1.9	0.0

APPENDIX C (cont'd)

**North Bakken Expansion Project
Access Roads**

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Access 11_R1	13.1	Gravel/Dirt/Vegetation	Remove/Replace Topsoil	Temp.	Existing	Agricultural, Developed, Open Land	3,641	20	2.5	0.0
Access 12	14.1	Gravel/Dirt/Vegetation	None	Temp.	Existing, New	Agricultural, Developed	266	20	0.1	0.0
Access 13	17.5	Gravel/Dirt/Vegetation	None	Temp.	Existing, New	Agricultural, Open Land	3,842	20	2.6	0.0
Access 14	19.2	Gravel/Dirt	None	Temp.	Existing	Developed, Agricultural	796	20	0.5	0.0
Access 15	19.7	Dirt/Vegetation	None	Temp.	Existing, New	Developed	110	20	0.1	0.0
Access 16	19.7	Dirt/Vegetation	None	Temp.	New	Developed, Open Land	71	20	<0.1	0.0
Access 17	19.7	Vegetation	None	Temp.	Existing, New	Agricultural, Developed	254	20	0.1	0.0
Access 18	19.8	Vegetation	None	Temp.	New	Developed	81	20	0.1	0.0
Access 19	20.7	Gravel/Dirt/Vegetation	Remove/Replace Topsoil	Temp.	Existing	Developed	80	20	0.1	0.0
Access 20	21.4	Vegetation	None	Temp.	Existing	Agricultural	46	20	0.1	0.0
Access 21	21.9	Vegetation	None	Temp.	Existing	Agricultural, Developed	74	20	0.1	0.0
Access 22	22.3	Gravel	None	Temp.	Existing, New	Agricultural, Developed, Open Land	4,251	20	3.0	0.0
Access 23	22.9	Dirt	Remove Topsoil, add gravel, restore	Temp.	Existing	Agricultural, Open Land	114	30	0.1	0.0
Access 24	25.9	Dirt/Vegetation	Remove Topsoil, add gravel, restore	Temp.	Existing, New	Agricultural, Developed, Open Land	1,640	30	1.1	0.0

APPENDIX C (cont'd)

**North Bakken Expansion Project
Access Roads**

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Access 24_R1	26.1	Dirt/Vegetation	Remove Topsoil, add gravel	Perm.	New	Agricultural, Developed, Open Land	712	30	0.5	0.5
Access 24b	27.7	Dirt/Vegetation	Remove/Replace Topsoil	Temp.	Existing, New	Agricultural, Open Land	262	20	0.2	0.0
Access 24c	28.6	Dirt/Vegetation	Remove/Replace Topsoil	Temp.	Existing, New	Open Land	225	20	0.2	0.0
Access 24d	30.6	Dirt/Vegetation	Remove/Replace Topsoil	Temp.	Existing, New	Developed, Open Land	926	20	0.6	0.0
Access 24e	32.2	Dirt/Vegetation	Remove/Replace Topsoil	Temp.	Existing	Agricultural, Developed, Open Land	1,280	20	0.9	0.0
Access 25_R1	34.6	Gravel	None	Temp.	Existing	Agricultural, Open Land	2,964	30	2.0	0.0
NO NAME - 40 th Street	36.7	Dirt/Vegetation	Remove/Replace Topsoil	Temp.	New	Developed, Open Land	120	20	0.1	0.0
Highway 10 Block Valve	36.7	Dirt/Vegetation	Remove Topsoil, add gravel	Perm.	Existing, New	Developed, Open Land	212	20	0.1	0.1
Access 26	36.7	Dirt/Vegetation	None	Temp.	Existing	Agricultural, Developed	114	20	<0.1	0.0
Access 27	38.2	Dirt/Vegetation	Remove/Replace Topsoil	Temp.	New	Developed, Open Land	509	20	0.4	0.0
Access 28	39.1	Gravel	None	Temp.	Existing	Agricultural, Developed	814	20	0.6	0.0
Access 29	40.4	Dirt	None	Temp.	Existing	Agricultural	424	20	0.3	0.0
Access 30	41.5	Gravel	None	Temp.	Existing	Agricultural	2,698	30	1.9	0.0
Access 31	45.7	Dirt/Vegetation	None	Temp.	Existing	Agricultural, Developed, Open Land	290	20	0.2	0.0
Access 32	48.7	Gravel	None	Temp.	Existing	Developed	419	20	0.3	0.0

APPENDIX C (cont'd)

**North Bakken Expansion Project
Access Roads**

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Access 33	50.2	Gravel	Remove/Replace Topsoil	Temp.	Existing, New	Developed, Agricultural, Open Land	1,951	20	1.3	0.0
Access 34	51.1	Gravel	None	Perm.	Existing	Developed, Open Land	1,590	20	1.1	1.1
Access 35_R1	56.1	Dirt	None	Temp.	Existing	Agricultural, Open Land	2,878	20	2.0	0.0
NO NAME - 122 nd Street	57.9	Dirt/Vegetation	Remove/Replace Topsoil	Temp.	New	Open Land	292	20	0.2	0.0
Access 36	59.2	Dirt/Vegetation	None	Temp.	New	Agricultural, Open Land	122	20	0.1	0.0
Elkhorn Creek-Northern Border										
Unk_1-Elkhorn Crk CS	0.1	Dirt/Vegetation	New construction, grade/level, add gravel	Perm.	Existing, New	Agricultural, Developed, Open Land	1,685	30	1.2	1.2
Unk_2-Elkhorn Crk CS	0.0	Dirt/Vegetation	New construction, grade/level, add gravel	Perm.	Existing, New	Agricultural	341	30	0.2	0.2
Line Section 25 Loop										
Access Road B	0.3	Gravel (Well Pad Access)	None	Temp.	Existing	Developed, Open Land	382	30	0.3	0.0
Access Road D	1.0	Dirt/Vegetation (Existing two-track)	None	Temp.	Existing	Developed, Open Land	1,205	20	0.8	0.0
Access Road F	1.5	Gravel (Well Pad Access)	None	Temp.	Existing	Agricultural, Open Land	934	30/20 (through field)	0.6	0.0

APPENDIX C (cont'd)

**North Bakken Expansion Project
Access Roads**

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Access Road G	2.1	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to right-of-way (ROW)	Temp.	New	Agricultural, Developed	223	20	0.1	0.0
Access Road H	2.1	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	493	20	0.3	0.0
Access Road I	2.7	Gravel/Dirt/Vegetation (Well Pad Access + Existing two-track + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	Existing	Agricultural, Developed	1,178	30 (well pad)/20 (two-track & field)	0.7	0.0
Access Road K	3.1	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural	996	20	0.6	0.0
Access Road M1	4.3	Gravel (Well Pad Access)	None	Temp.	Existing	Open Land	2,586	30	1.8	0.0
Access Road N	5.2	Gravel/Dirt/Vegetation (Existing approach & two-track + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural	525	20	0.3	0.0

APPENDIX C (cont'd)

**North Bakken Expansion Project
Access Roads**

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Access Road O	6.1	Dirt/Vegetation (Existing two-track)	Use existing approach/may need to blade to ROW	Temp.	Existing	Open Land	1,251	20	0.8	0.0
Access Road P	6.6	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	Existing	Agricultural, Developed	235	20	<0.1	0.0
Access Road R	6.9	Gravel (Well Pad Access)	None	Perm.	Existing	Agricultural, Developed	237	30	0.1	0.1
Access Road S	7.5	Dirt/Vegetation (Existing two-track)	May need to blade out ruts and clear of vegetation	Temp.	Existing	Developed, Open Land	989	20	0.7	0.0
Access Road T	7.9	Gravel/Dirt/Vegetation (Well pad access + two-track)	Use existing well pad road/May need to blade two-track to ROW to clear of vegetation	Temp.	New	Agricultural, Developed, Open Land	1,457	30/20 (through field)	1.0	0.0
Access Road U	8.3	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	108	20	0.1	0.0
Access Road V1	8.3	Gravel (Well Pad Access Approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	253	30/20 (through field)	0.2	0.0

APPENDIX C (cont'd)

North Bakken Expansion Project
Access Roads

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Access Road V2	8.5	Gravel (Well Pad Access Approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural	1,577	30/20 (through field)	1.0	0.0
Access Road W	9.4	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	443	20	0.3	0.0
Access Road X	9.4	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	270	20	0.2	0.0
Access Road Y2	10.0	Dirt/Vegetation (Existing approach + two-track)	May need to blade out ruts and clear of vegetation	Temp.	Existing	Developed, Open Land	2,085	20	1.4	0.0
Access Road Z	10.4	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	1,111	20	0.7	0.0
Access Road BB	11.2	Gravel/Dirt/Vegetation (Existing two-track + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	1,502	20	1.0	0.0

APPENDIX C (cont'd)

North Bakken Expansion Project
Access Roads

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Access Road CC	11.4	Gravel/Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	305	20	0.2	0.0
Access Road FF	12.0	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	759	20	0.5	0.0
Access Road GG	12.5	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Developed, Agricultural	605	20	0.4	0.0
Access Road JJ	13.4	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Open Land	2,602	20	1.7	0.0
Access Road L	13.7	Vegetation	Remove Topsoil, add gravel	Perm.	New	Developed, Agricultural, Open Land	423	20	0.2	0.2
Access Road MM	13.8	Gravel/Dirt/Vegetation (Well pad access + farmed field)	Use existing road/May need to blade field clear (if planted)	Temp.	Existing	Agricultural, Developed	1,749	30/20 (through field)	1.2	0.0

APPENDIX C (cont'd)

North Bakken Expansion Project
Access Roads

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Access Road NN	14.4	Dirt/Vegetation	Use existing approach/may need to blade clear of vegetation to ROW, restore	Temp.	Existing	Developed, Open Land	1,711	20	1.2	0.0
Access Road QQ	15.1	Dirt/Vegetation	Use existing approach/may need to blade clear of vegetation to ROW, restore	Temp.	New	Agricultural, Developed, Open Land	928	20	0.6	0.0
Access Road RR	15.6	Dirt/Vegetation (Existing two-track)	May need to blade out ruts and clear of vegetation	Temp.	Existing	Agricultural, Developed	2,657	20	1.8	0.0
Access Road SS	16.3	Dirt/Vegetation (Existing two-track)	None	Temp.	New	Developed, Open Land	111	20	0.1	0.0
Access Road TT	16.7	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	113	20	0.1	0.0
Access Road UU 1	17.2	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed	607	20	0.4	0.0
Access Road UU 2	17.2	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	Existing	Agricultural, Developed	542	20	0.3	0.0

APPENDIX C (cont'd)

**North Bakken Expansion Project
Access Roads**

Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Access Road VV	17.8	Dirt/Vegetation (Existing two-track)	May need to blade out ruts and clear of vegetation	Temp.	New	Agricultural, Developed, Open Land	676	20	0.4	0.0
Access Road WW	19.3	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Developed, Open Land	333	20	0.2	0.0
Access Road XX	19.4	Dirt/Vegetation (Existing approach + road ditch)	Use existing approach/No changes to road ditch	Temp.	New	Developed, Open Land	193	20	0.1	0.0
Line Section 30 Loop										
NL Access 1	0.0	Gravel/Dirt/Vegetation	Remove Topsoil, add gravel	Perm.	Existing, New	Agricultural, Developed	187	30	0.1	0.1
Tioga Compressor Lateral										
Tioga Plant Access Road	0.0	Dirt/Vegetation	New construction, grade/level, add gravel	Perm	New	Agricultural, Developed	315	30	0.1	0.3
Uprate Line Section 25										
Access Road YY 2	0.0	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	Existing	Agricultural, Developed, Open Land	472	20	0.3	0.0
Uprating Access Road 1	0.2	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Agricultural, Developed, Open Land	644	20	0.4	0.0

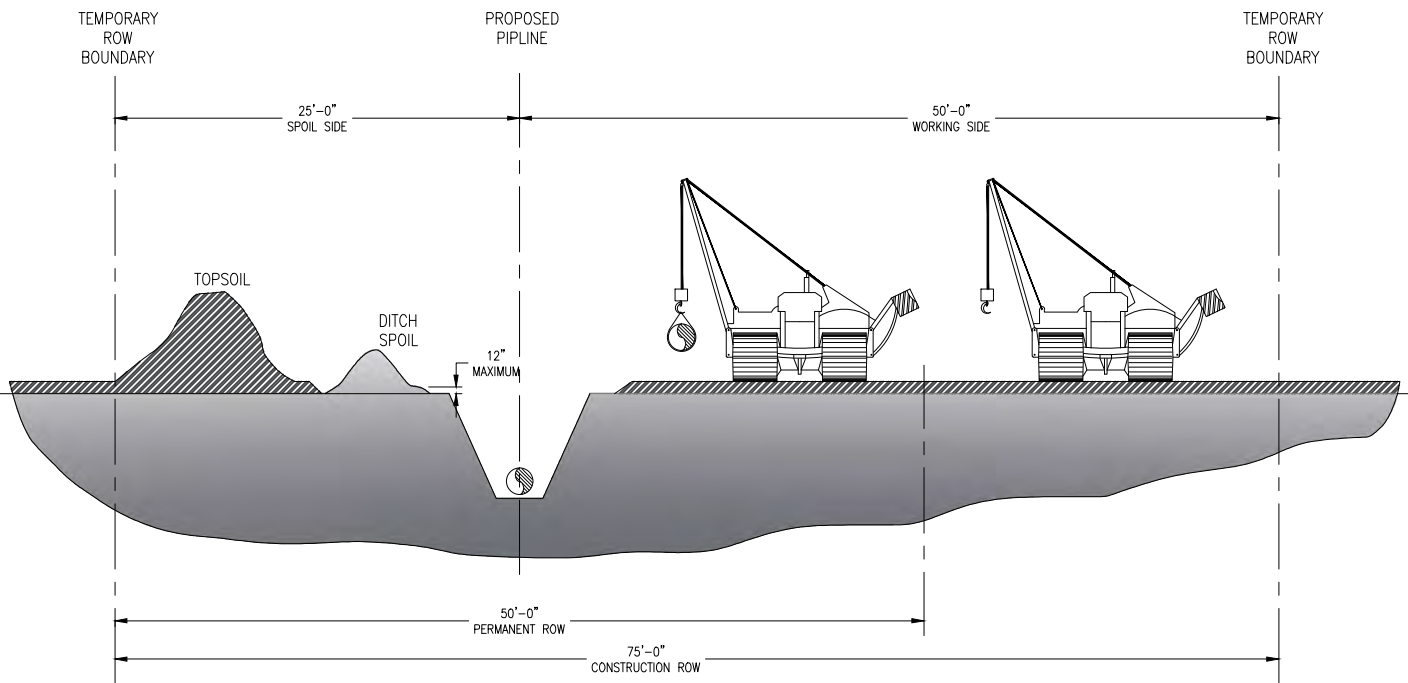
APPENDIX C (cont'd)

**North Bakken Expansion Project
Access Roads**


Access Road Name	Milepost	Existing Road Type	Modification Required	Use (Temp. or Perm.)	Existing or New	Existing Land Uses	Length (feet)	Width (feet)	Area Affected by Construction (acres)	Area Affected by Operations (acres)
Uprating Access Road 2	0.1	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	New	Developed, Open Land	425	20	0.2	0.0
Uprating Access Road 3	0.1	Dirt/Vegetation (Existing approach + farmed field)	Use existing approach/may need to blade clear of vegetation (if planted) to ROW	Temp.	Existing	Developed, Open Land	215	20	0.1	0.0

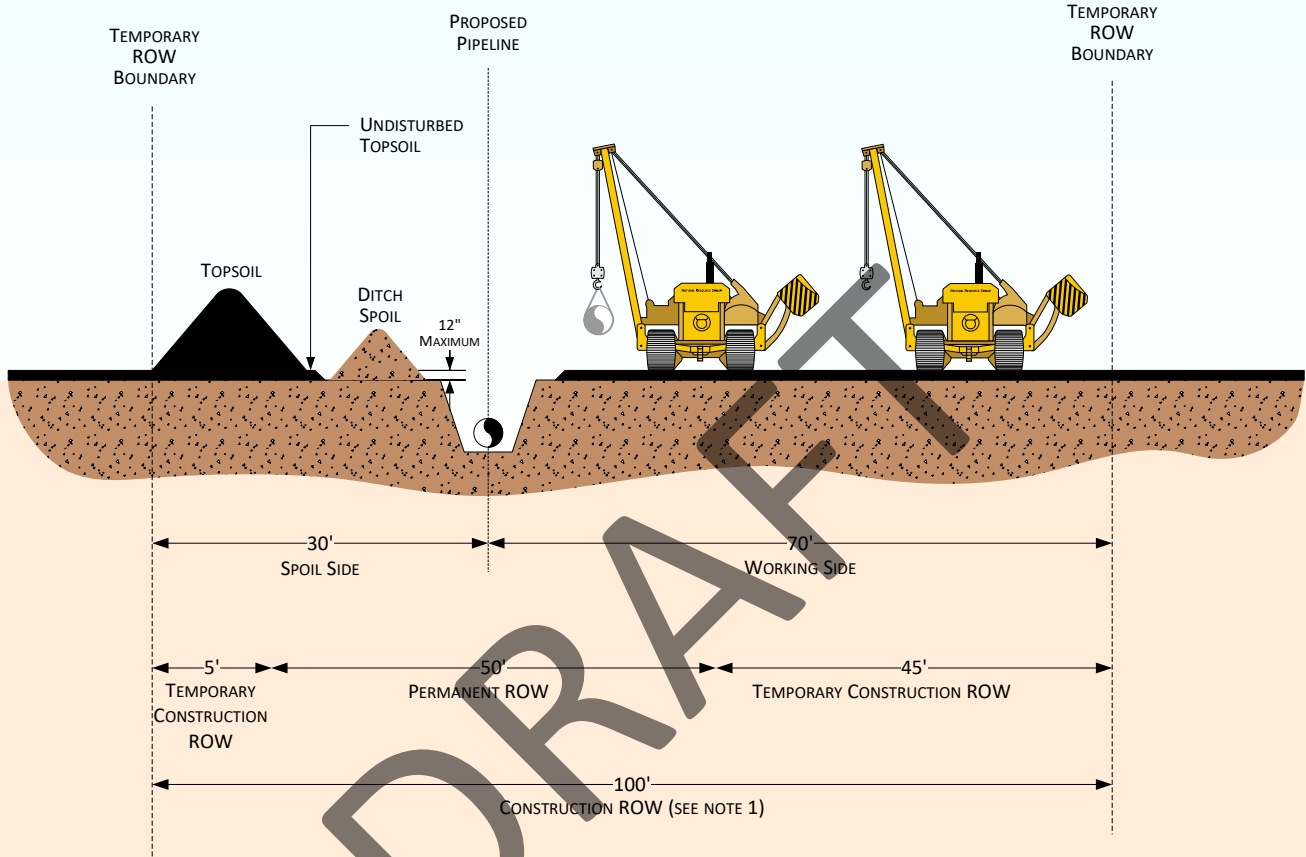
^a This access road is entirely within the workspaces associated with the pipeline right-of-way and additional temporary workspaces. The area affected by construction of the road is included within those acreages and not counted here.

APPENDIX D
TYPICAL CONSTRUCTION DRAWINGS



PROFILE

NO.	DATE	DRWN BY	DSGN BY	CHKD BY	DESCRIPTION			
-	-	-	-	-	-			
<p>W.O. # XXXXXXXX.XXXXXXXX</p> <p>DESIGNED BY TJR</p> <p>DRAWN BY TJR</p> <p>CHECKED BY -</p> <p>DATE CREATED 4/7/15</p>					 WBI ENERGY TRANSMISSION <small>An NDU Resources Group Company</small>			
					TYPICAL CONSTRUCTION ROW			
					SCALE	FILE NAME	DWG. NO.	SHEET NO.
					NONE	A-8-9670	A9670	1 OF 1



PROFILE

NOTES:

1. CONSTRUCTION RIGHT-OF-WAY WILL TYPICALLY BE 100' WIDE. THE PERMANENT RIGHT-OF-WAY WILL BE 50'. ADDITIONAL TEMPORARY WORKSPACE WILL BE NECESSARY AT MAJOR ROAD, RAIL, RIVER CROSSINGS, SIDESLOPES, WHERE FULL RIGHT-OF-WAY TOPSOIL STRIPPING IS CONDUCTED, AND OTHER SPECIAL CIRCUMSTANCES AS REQUIRED.
2. THIS DRAWING REFLECTS "TRENCH AND SPOIL SIDE" TOPSOIL STRIPPING PROCEDURE.
3. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN ANY CONFIGURATION APPROVED BY THE ENVIRONMENTAL INSPECTOR.

For environmental review purposes only.

North Bakken Expansion Project

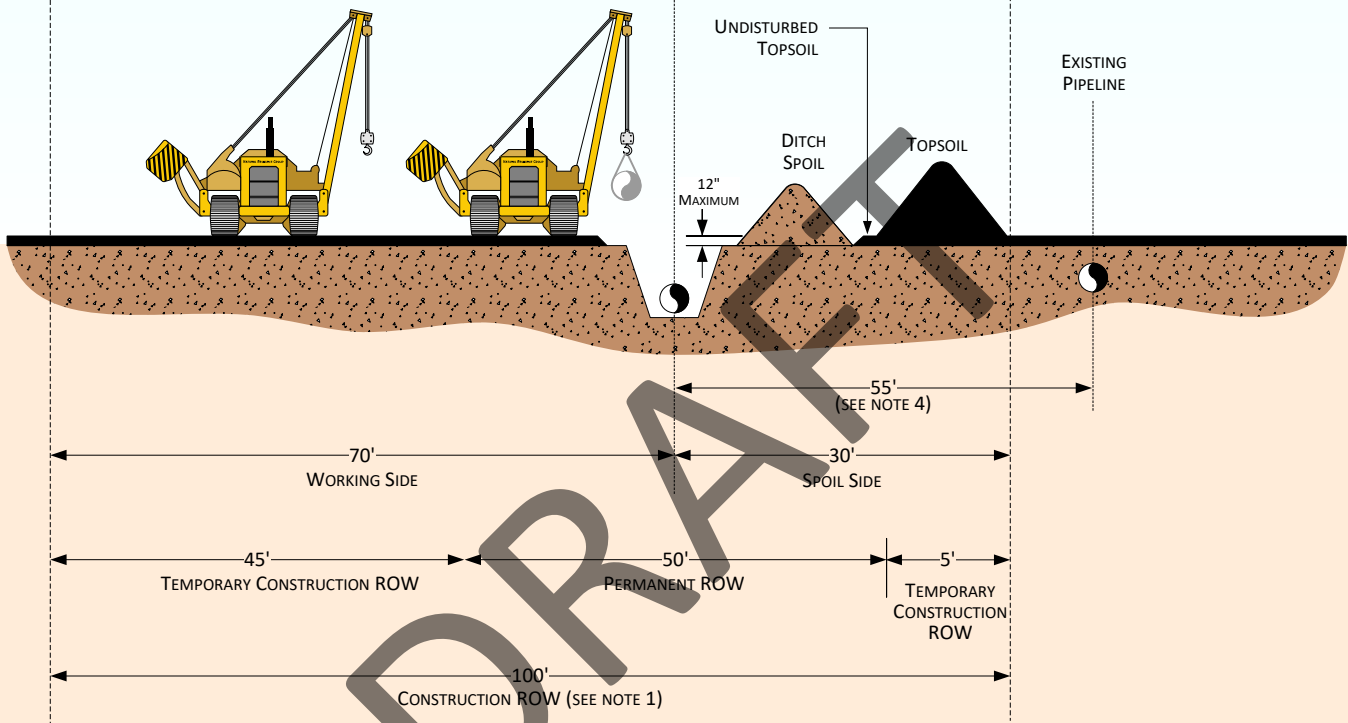
Typical Construction ROW 100 foot ROW



TEMPORARY ROW BOUNDARY

PROPOSED PIPELINE

TEMPORARY ROW BOUNDARY

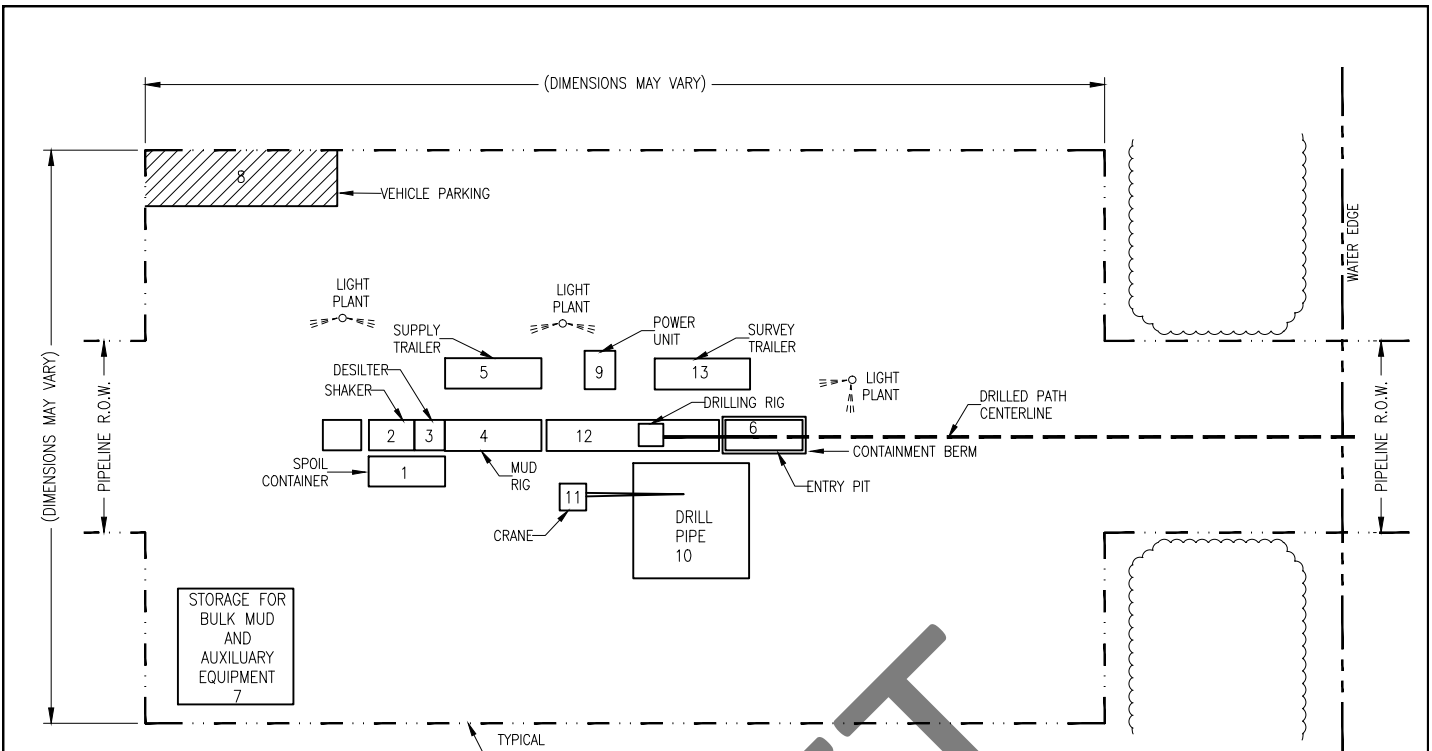


PROFILE

NOTES:

1. CONSTRUCTION RIGHT-OF-WAY WILL TYPICALLY BE 100' WIDE. THE PERMANENT RIGHT-OF-WAY WILL BE 50'. ADDITIONAL TEMPORARY WORKSPACE WILL BE NECESSARY AT MAJOR ROAD, RAIL, RIVER CROSSINGS, SIDESLOPES, WHERE FULL RIGHT-OF-WAY TOPSOIL STRIPPING IS CONDUCTED, AND OTHER SPECIAL CIRCUMSTANCES AS REQUIRED.
2. THIS DRAWING REFLECTS "TRENCH AND SPOIL SIDE" TOPSOIL STRIPPING PROCEDURE.
3. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN ANY CONFIGURATION APPROVED BY THE ENVIRONMENTAL INSPECTOR.
4. THE OFFSET FROM ACTIVE PIPELINE, WHERE APPLICABLE, WILL BE 55' FOR MOST LOCATIONS BUT MAY BE INCREASED OR DECREASED DEPENDING ON THE SITE SPECIFIC CONSTRUCTION REQUIREMENTS.

For environmental review purposes only.



EQUIPMENT:

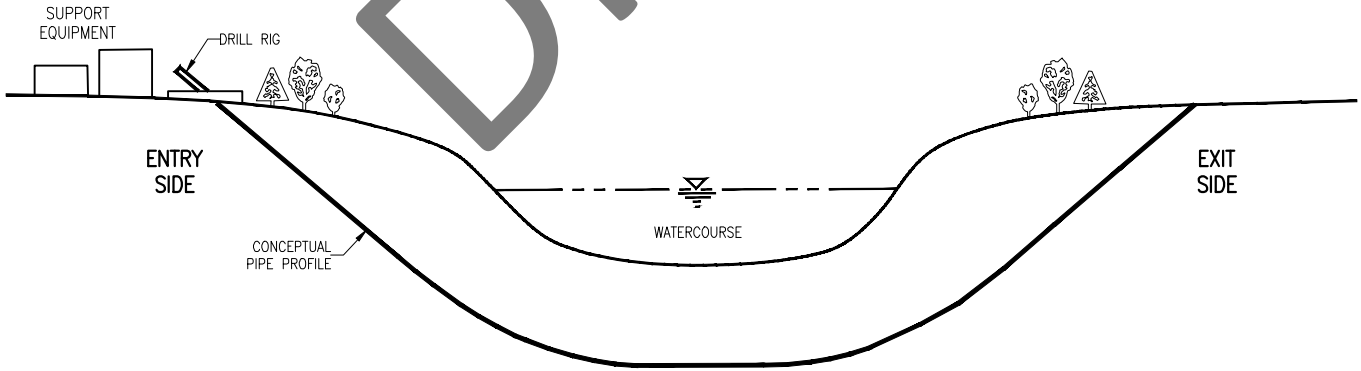
1. SPOIL CONTAINMENT
2. SHAKER
3. DESILTER
4. MUD RIG
5. SUPPLY TRAILER
6. ENTRY PIT
7. STORAGE
8. VEHICLE PARKING
9. POWER UNIT
10. DRILL PIPE
11. CRANE
12. DRILLING RIG
13. SURVEY TRAILER

NOTES:

1. TYPE OF EQUIPMENT AND EQUIPMENT ORIENTATION MAY VARY DEPENDING ON CONTRACTOR OR SITE CONDITIONS.
2. EQUIPMENT TO BE SUPPORTED ON THE GROUND SURFACE OR TIMBER MATS AS CONDITIONS DICTATE.
3. SILT FENCE, BERMS AND/OR STRAW BALE BARRIER TO BE USED AS REQUIRED TO PREVENT IMPACTS FROM OCCURRING OUTSIDE OF PROJECT LIMITS.

ENTRY SITE PLAN

DRAFT

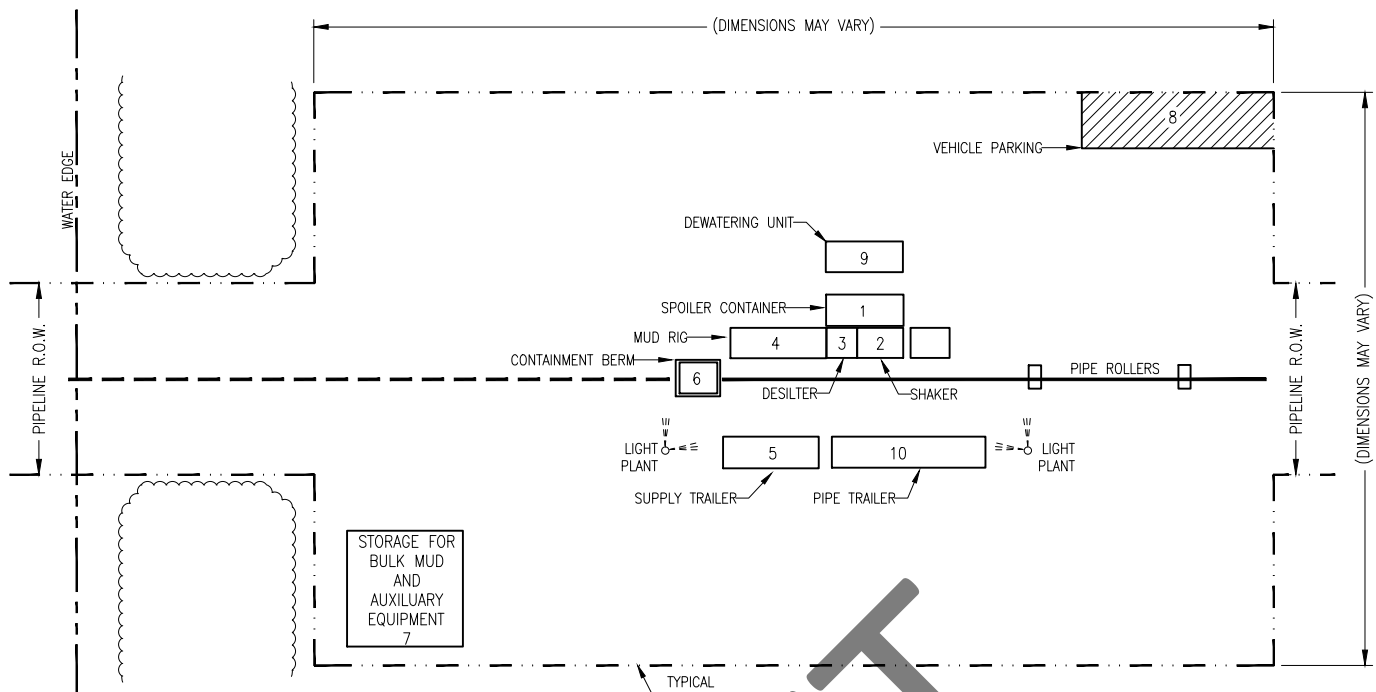


PROFILE

GENERAL NOTES:

- 1.) PIPE DEPTHS MAY VARY.

NO.	DATE	DRWN BY	DSGN BY	CHKD BY	DESCRIPTION			
					MAINLINE CONSTRUCTION TYPICAL DIRECTIONAL DRILL ENTRY SITE PLAN & PROFILE			
W.O. # XXXXXXXX.XXXXXXXX								
DESIGNED BY		J.L.						
DRAWN BY		TJR						
CHECKED BY		-			SCALE	FILE NAME	DWG. NO.	SHEET NO.
DATE CREATED		4/8/15			NONE	A-8-9671	A9671	2 OF 2

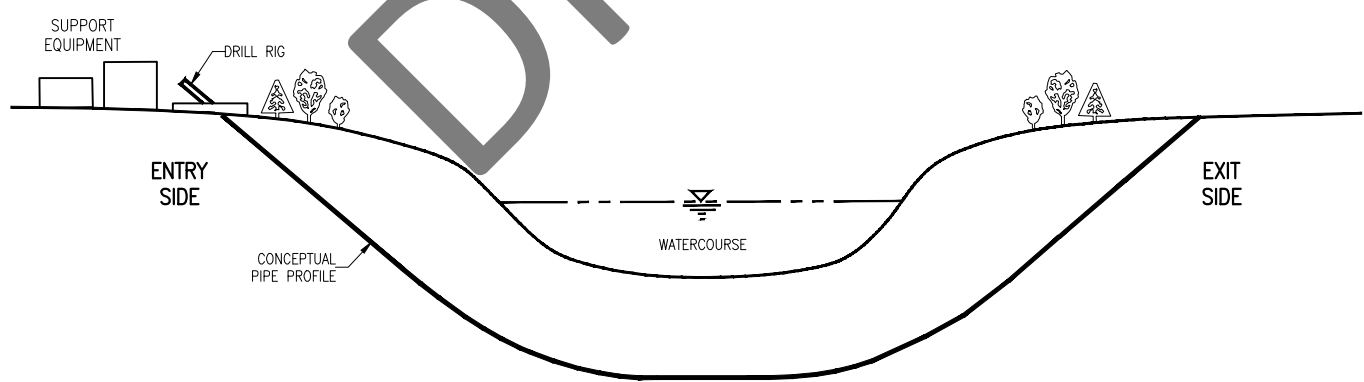


- EQUIPMENT:**
1. SPOIL CONTAINMENT
 2. SHAKER
 3. DESILTER
 4. MUD RIG
 5. SUPPLY TRAILER
 6. EXIT PIT
 7. STORAGE
 8. VEHICLE PARKING
 9. DEWATERING UNIT
 10. PIPE TRAILER

- NOTES:**
1. TYPE OF EQUIPMENT AND EQUIPMENT ORIENTATION MAY VARY DEPENDING ON CONTRACTOR OR SITE CONDITIONS.
 2. EQUIPMENT TO BE SUPPORTED ON THE GROUND SURFACE OR TIMBER MATS AS CONDITIONS DICTATE.
 3. SILT FENCE, BERMS AND/OR STRAW BALE BARRIER TO BE USED AS REQUIRED TO PREVENT IMPACTS FROM OCCURRING OUTSIDE OF PROJECT LIMITS.

EXIT SITE PLAN

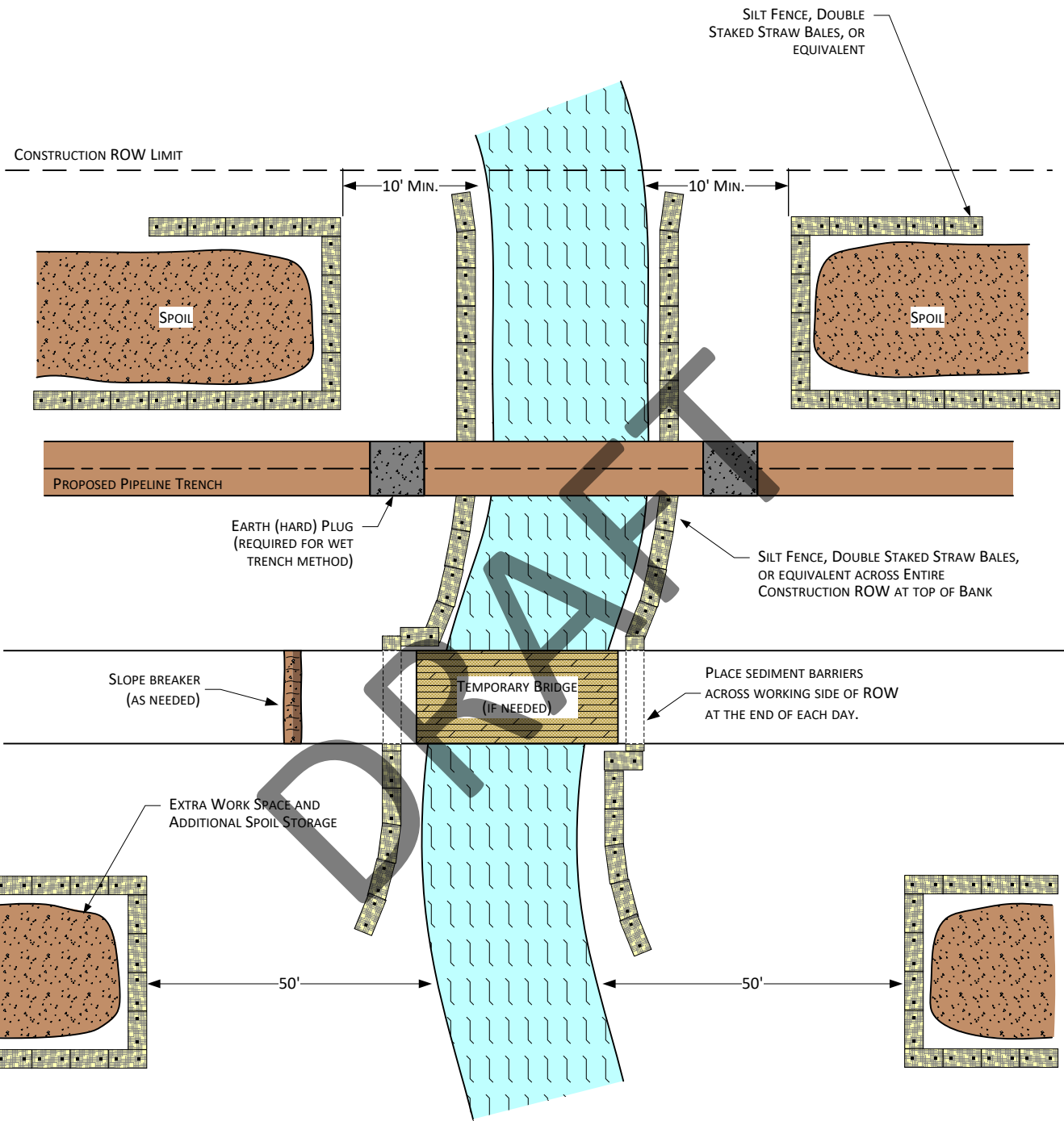
DRAFT



PROFILE

- GENERAL NOTES:**
- 1.) PIPE DEPTHS MAY VARY.

NO.	DATE	DRWN BY	DSGN BY	CHKD BY	DESCRIPTION
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					MAINLINE CONSTRUCTION TYPICAL DIRECTIONAL DRILL EXIT SITE PLAN & PROFILE
W.O. # XXXXXXXX.XXXX.XXXX		DESIGNED BY	J.L.		
		DRAWN BY	TJR		
		CHECKED BY	-	SCALE	FILE NAME
DATE CREATED	4/8/15			NONE	A-8-9671
			DWG. NO.	A9671	SHEET NO.
			1 OF 2		

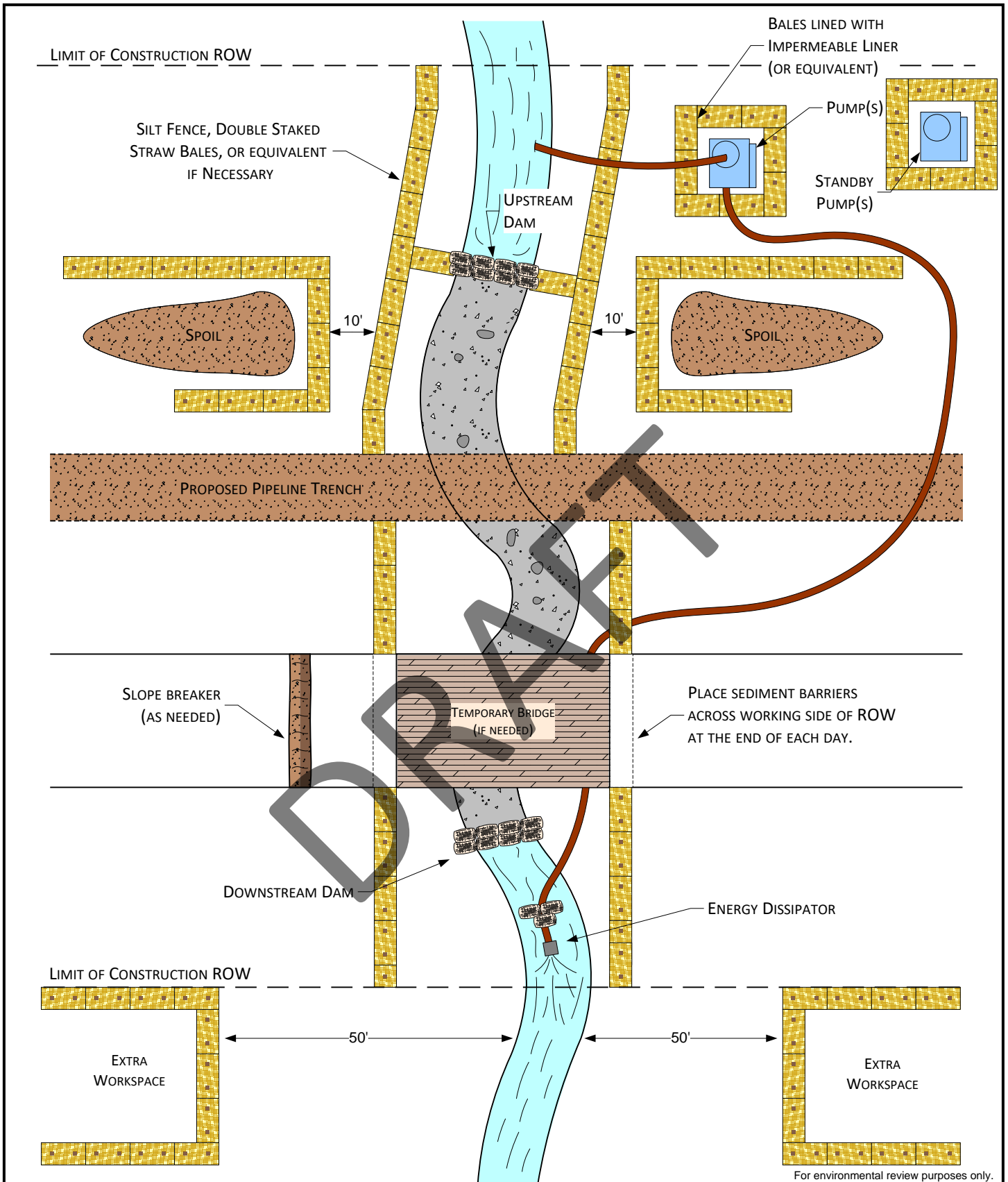


For environmental review purposes only.



North Bakken Expansion Project

Typical Water Body Crossing
Open Cut Method

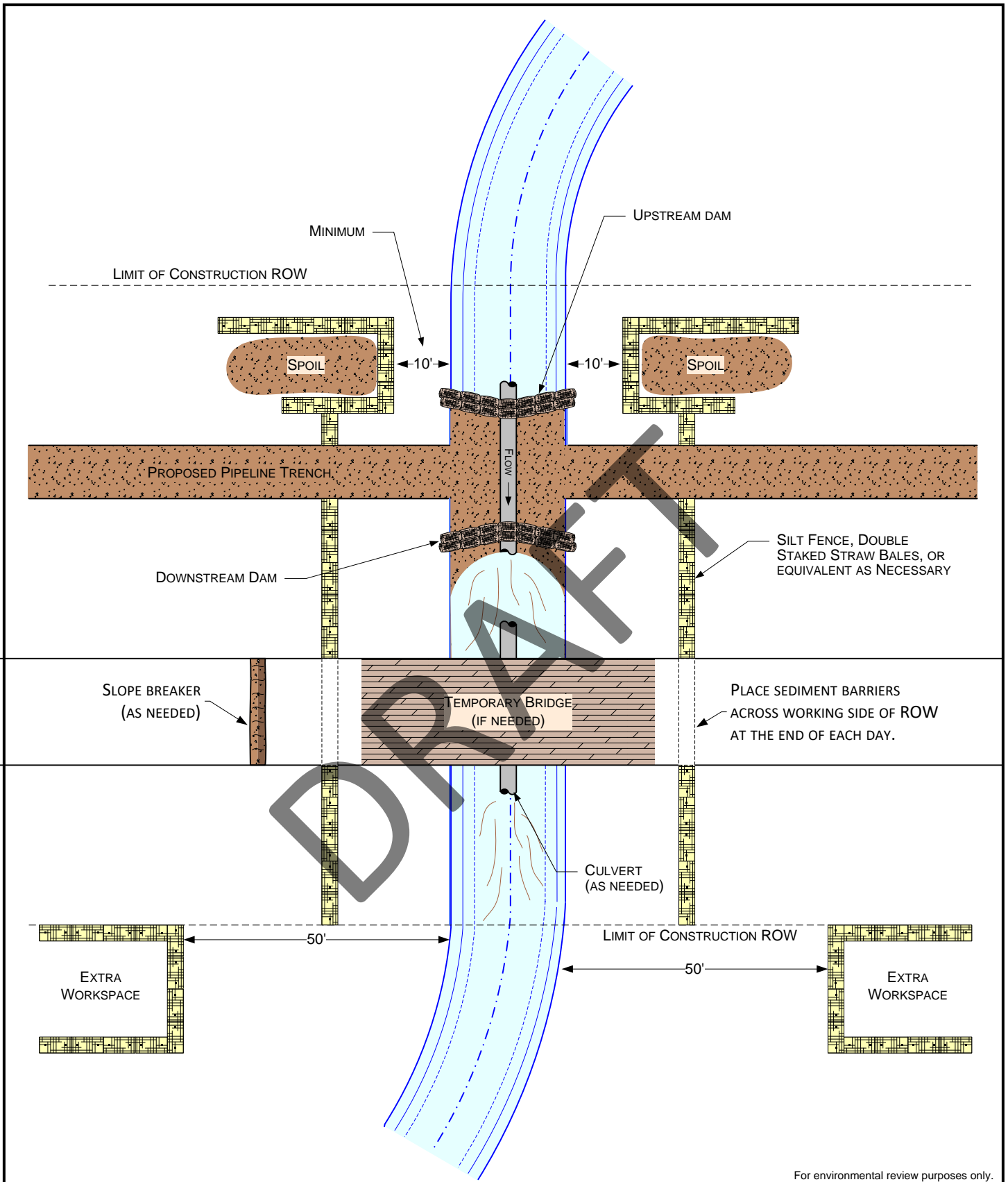


For environmental review purposes only.



North Bakken Expansion Project

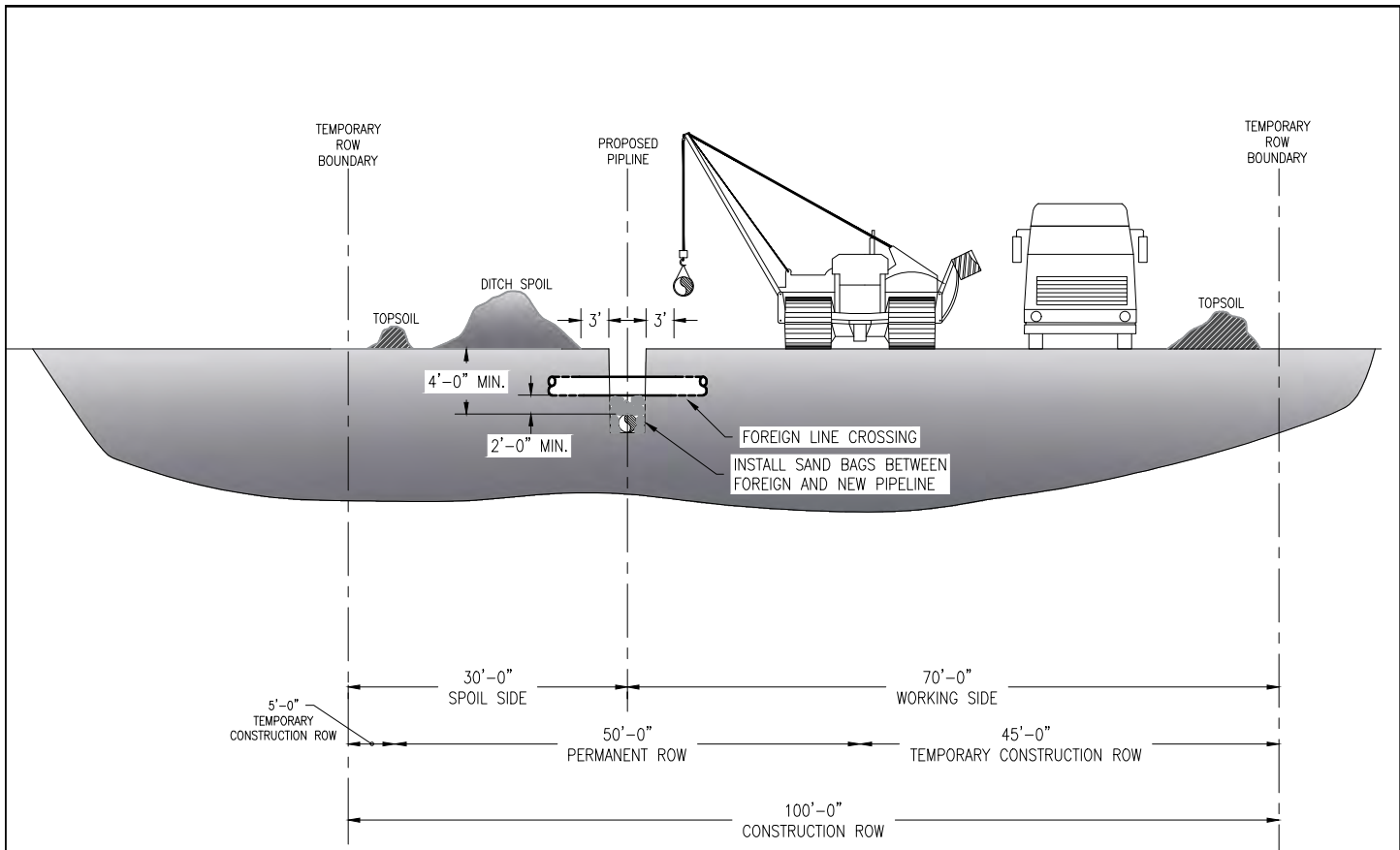
Typical Water Body Crossing Dam and Pump Method




For environmental review purposes only.

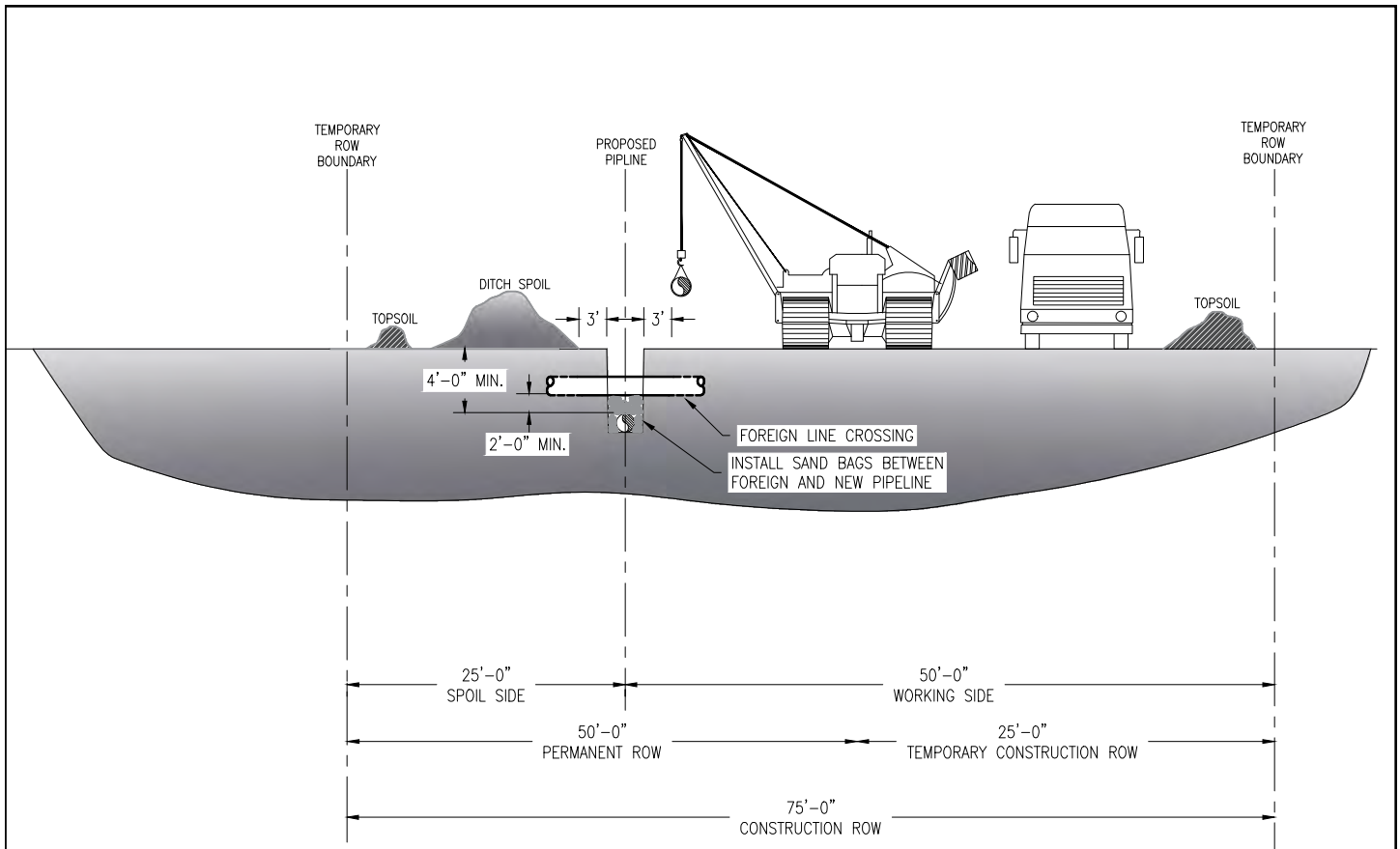
North Bakken Expansion Project

Typical Water Body Crossing Flume Method



PROFILE

2	11/30/18	GWH	JH	GWH	REMOVED PROJECT SPECIFIC INFO FROM TITLEBLOCK
1	1/12/18	TJR	J.H.	D.T.	DRAWN TO SCALE
NO.	DATE	DRWN BY	DSGN BY	CHKD BY	DESCRIPTION
APPROVED AS FINAL					 An MDU Resources Group Company
BY: <u>JOSH HELM</u> DATE: <u>2/7/18</u>					
W.O. # xxxxxxxx.xxxxx.xxxxx					TYPICAL FOREIGN LINE CROSSING
DESIGNED BY		J.H.			
DRAWN BY		TJR			
CHECKED BY		D.T.			
DATE CREATED	11/20/17	SCALE	FILE NAME	DWG. NO.	SHEET NO.
		1' = 20'-0"	A9741	A-8-9741	10 OF 11



PROFILE

NO.	DATE	DRWN BY	DSGN BY	CHKD BY	DESCRIPTION
-	-	-	-	-	-
<p>APPROVED AS FINAL</p> <p>BY: <i>KYLE STEFKA</i></p> <p>DATE: <u>1/23/20</u></p>					<p>WBI ENERGY TRANSMISSION An MDU Resources Group Company</p>
<p>W.O. # xxxxxxxx.xxxxx.xxxxx</p> <p>DESIGNED BY: K.S.</p> <p>DRAWN BY: TJR</p> <p>CHECKED BY: J.L.</p> <p>DATE CREATED: 1/23/20</p>					
<p>TYPICAL FOREIGN LINE CROSSING 75' CONSTRUCTION R.O.W.</p>					<p>SCALE: NONE</p> <p>FILE NAME: A9741</p> <p>DWG. NO.: A-8-9741</p> <p>SHEET NO.: 12 OF 12</p>



Michels Directional Crossings Typical Hole Intersect Procedure / Description

Michels uses two main pilot hole tracking systems for large scale HDDs. The first being a wireline tracking system called the Para-track system. This system requires a surface cable or solenoid. The second pilot hole tracking system is the Gyroscope which requires no surface cable or solenoid. The typical hole intersect procedure for the two systems are described separately below.

Hole Intersect using the Para-Track System

A 12-1/4" drill bit is advanced from the entry points (Rig Side Entry and Pipe Side Entry) toward the pre-designated intersect point along the proposed bore-hole path alignment using a directional jetting bottom-hole assembly or mud motor with bit and bottom-hole assembly. The pilot hole drilling from Rig Side Entry can be prior to or concurrent with pilot hole drilling from the pipe side entry as intersect procedures do not have to occur at exactly half the distance. The intersect location ± 500 feet is pre-determined prior to drilling however, conditions encountered during pilot hole drilling will dictate the approximate location of performing the intersect. The bottom-hole assembly will be advanced from the entry side toward the second pilot-hole projection which will be drilled or is being drilled from the other side. The bottom-hole assembly includes the bit (12-1/4" in diameter), drilling mud motor if required, orientation and pressure measurement sub, steering guidance tool (Vector Magnetics Para Track2 Survey and Guidance System) and non-magnetic drill collars. The drill stem added behind this bottom-hole assembly will be S-135 grade 7 5/8" FHDS (Full Hole Double Shoulder) series drill pipe or better and in random 30(\pm) foot lengths.

The location of the pilot-hole drill paths will be continuously monitored, surveyed then recorded from its respective drill rig location utilizing the data from the down-hole probe (Para Track2 Probe) as drilling proceeds. Critical tracking information to be processed includes elevation, alignment and distance away from each rig which is calculated then recorded in accordance with industry standard, once at the end of every drill stem length (approximately 30-feet).

Constant communication is maintained between the two drill crews as pilot-hole intersect operations progress. Prior to the pilot holes reaching the projected intersect location, the magnetic signal being monitored on the instrument tracking computer inside the control trailer will increase in strength. After the two pilot holes are overlapped by approximately 30', a PMR (Passive Magnetic Ranging) survey will be conducted. At this time, the Para Track2 Probe will be used to collect static magnetic field readings relative to the adjacent drill stem. To perform this operation, the 7 5/8" drill pipe positioned in the previously drilled borehole from the entry end will be retracted in predetermined distance increments, these distance retractions are sensed by the probe and recorded. The magnetic field readings collected by the Para Track2 probe will then be analyzed to verify that sufficient and accurate data has been collected and a position offset between the two boreholes can be calculated and determined. This PMR survey will be repeated once every 30' until the two boreholes are connected.



Hole Intersect using the Gyroscope System

A 12-1/4" drill bit is advanced from the entry points (Rig Side Entry and Pipe Side Entry) toward the pre-designated intersect point along the proposed bore-hole path alignment using a directional jetting bottom-hole assembly or mud motor with bit and bottom-hole assembly. The pilot hole drilling from Rig Side Entry can be prior to or concurrent with pilot hole drilling from the pipe side entry as intersect procedures do not have to occur at exactly half the distance. The intersect location (± 500 feet) is pre-determined prior to drilling however, conditions encountered during pilot hole drilling will dictate the approximate location of performing the intersect. The bottom-hole assembly will be advanced from the entry side toward the second pilot-hole projection which will be drilled or is being drilled from the other side. The bottom-hole assembly includes the bit (12-1/4" in diameter), drilling mud motor if required, orientation and pressure measurement sub, steering guidance tool (Gyroscope Guidance System). The drill stem added behind this bottom-hole assembly will be S-135 grade minimum 7 5/8" FHDS (Full Hole Double Shoulder) series drill pipe or better and in random 30(\pm) foot lengths.

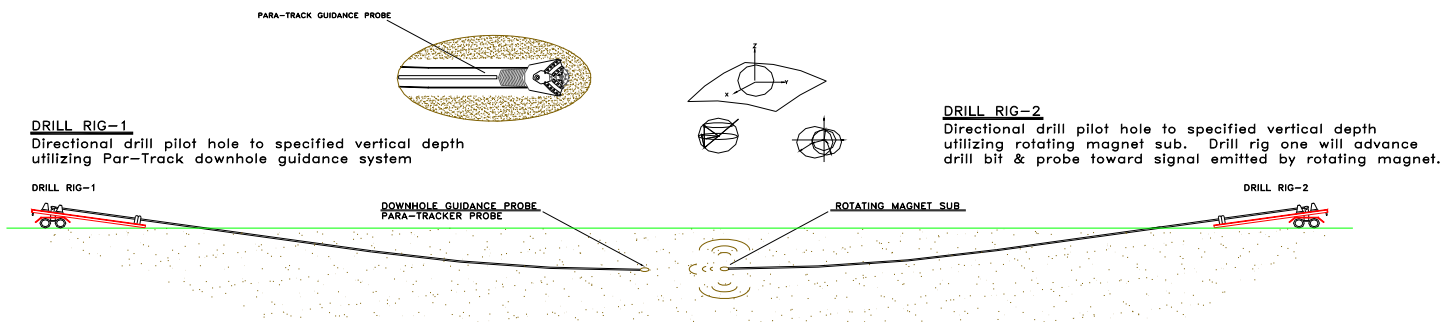
The location of the pilot-hole drill paths will be continuously monitored, surveyed then recorded from its respective drill rig location utilizing the data from the down-hole probe (Gyroscope) as drilling proceeds. Critical tracking information to be processed includes elevation, alignment and distance away from each rig which is calculated then recorded in accordance with industry standard, once at the end of every drill stem length (approximately 30-feet).

As the pilot holes approach the planned intersect area the following steps are typically followed to complete the intersect:

1. A pair of radars are placed, one behind each gyro on either side.
2. The drilling surveyors on both sides stay in contact sharing their survey data as the bore progresses.
3. When they get within 30' of the bits overlapping, one side will pull a joint of pipe to the top of the rig and wait for the opposite side to overlap their hole with the bit.
4. While the drilling side is progressing, the other side will monitor annular pressure (if annular pressure is being monitored) and watch for vibrations indicated on survey readouts.
5. If at this time the drilling side notices any changes to the push or rotation indicating they may be coming into the hole drilled from the opposite side, the side which is waiting will slowly push down and see if they bump into the other bit. If they do bump, the drilling superintendent and surveyors will then decide based on the angles at which the intersect occurred, the push and torque on the strings of pipe, and the distance from the intersect point to the ends of the hole, which side will push out of the ground. They will also decide, based on ground conditions how much space to keep between the bits as one side pulls back and the other pushes forward.
6. If the bits do no bump after the two holes are overlapped in a horizontal direction, the side which is not drilling forward will pull back drill stem and bit an appropriate distance so that the drilling side can drill far enough forward without the bits being overlapped until the side which is waiting can push down slowly while the other side monitors for vibrations until the radars are parallel to each other.
7. At this time the surveyors will take a radar survey. Based on the survey, the drilling superintendent and surveyors will determine the best option to drill from one side or the other until the holes are intersected. Usually, another radar survey will be taken in 1 to 3 drill pipes as the hole progresses to verify that the distance between the holes is matching what is expected based on the first set of data.

8. When the holes get close enough in a lateral and vertical direction that intersection is expected one side will pull back far enough that the drilling side can safely drill into the hole without causing damage to the tools. When the drilling superintendent and surveyor believe based on the pressures and survey data the holes are intersected, the other side will push down slowly until the bits are verified to have touched. Usually this is accomplished by pushing until either the push pressure rises above that in open hole, or the other side notices movement. Then one side will move a set distance and see if the other side can now push freely again.
9. When it is verified that the holes are intersected the drilling superintendent and surveyors will then decide based on the angles at which the intersect occurred, the push and torque on the strings of pipe, and the distance from the intersect point to the ends of the hole, which side will push out of the ground. They will also decide, based on ground conditions how much space to keep between the bits as one side pulls back and the other pushes forward. They will also decide, based on ground conditions how much space to keep between the bits as one side pulls back and the other pushes forward.
10. If the ground is soft, it can be necessary for both sides to bump the bits against each other and one side to push as the other side pulls back slowly maintaining contact with the bits to insure that the pushing side stays in the hole.

Pilot Hole Intersect Sketch



APPENDIX E

ADDITIONAL TEMPORARY WORKSPACE

APPENDIX E

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Tioga-Elkhorn Creek	TEC_327	0.3	Developed, Open Land	<0.1	Williams
Tioga-Elkhorn Creek	TEC_326	0.3	Open Land	0.3	Williams
Tioga-Elkhorn Creek	TEC_328	0.3	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_329	0.3	Agricultural	0.2	Williams
Tioga-Elkhorn Creek	TEC_321	0.8	Agricultural	0.4	Williams
Tioga-Elkhorn Creek	TEC_300	0.8	Agricultural, Open Land	0.8	Williams
Tioga-Elkhorn Creek	TEC_298	0.9	Agricultural	0.8	Williams
Tioga-Elkhorn Creek	TEC_299	0.9	Agricultural	0.4	Williams
Tioga-Elkhorn Creek	TEC_317	1.8	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_318	1.8	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_319	1.8	Agricultural	0.3	Williams
Tioga-Elkhorn Creek	TEC_320	1.8	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_309	1.9	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_312	2.0	Agricultural	0.3	Williams
Tioga-Elkhorn Creek	TEC_311	2.0	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_310	2.0	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_315	3.0	Agricultural	0.3	Williams
Tioga-Elkhorn Creek	TEC_316	3.0	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_314	3.1	Agricultural	0.3	Williams
Tioga-Elkhorn Creek	TEC_313	3.1	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_307	4.2	Agricultural	0.3	Williams
Tioga-Elkhorn Creek	TEC_308	4.2	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_306	4.2	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_305	4.3	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_322	5.2	Agricultural	0.2	Williams
Tioga-Elkhorn Creek	TEC_325	5.2	Agricultural	0.7	Williams
Tioga-Elkhorn Creek	TEC_323	5.3	Agricultural	0.2	Williams
Tioga-Elkhorn Creek	TEC_324	5.3	Agricultural	0.7	Williams
Tioga-Elkhorn Creek	TEC_304	6.0	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_303	6.0	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_302	6.1	Agricultural	0.3	Williams

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Tioga-Elkhorn Creek	TEC_301	6.1	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_296	7.0	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_162	7.0	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_285	7.1	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_297	7.1	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_283	7.3	Agricultural	0.3	Williams
Tioga-Elkhorn Creek	TEC_284	7.3	Agricultural	0.0	Williams
Tioga-Elkhorn Creek	TEC_282	7.4	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_281	7.4	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_290	8.3	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_291	8.4	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_293	8.4	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_292	8.4	Agricultural	0.3	Williams
Tioga-Elkhorn Creek	TEC_287	9.1	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_286	9.1	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_288	9.1	Agricultural	0.3	Williams
Tioga-Elkhorn Creek	TEC_289	9.2	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_330	12.0	Agricultural, Open Land	<0.1	Williams
Tioga-Elkhorn Creek	TEC_294	12.0	Agricultural, Open Land	0.3	Williams
Tioga-Elkhorn Creek	TEC_161	12.1	Open Land	<0.1	Williams
Tioga-Elkhorn Creek	TEC_295	12.1	Open Land	0.3	Williams
Tioga-Elkhorn Creek	TEC_272	14.1	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_273	14.1	Agricultural	0.3	Williams
Tioga-Elkhorn Creek	TEC_271	14.1	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_270	14.1	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_278	16.1	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_280	16.1	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_269	16.1	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_279	16.1	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_174	18.0	Open Land	0.2	Williams
Tioga-Elkhorn Creek	TEC_171	18.1	Agricultural, Open Land	0.2	Williams
Tioga-Elkhorn Creek	TEC_172	18.2	Agricultural	0.2	Williams

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Tioga-Elkhorn Creek	TEC_173	18.2	Agricultural	0.7	Williams
Tioga-Elkhorn Creek	TEC_277	18.3	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_275	18.3	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_274	18.4	Agricultural, Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_276	18.4	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_267	19.6	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_332	19.6	Agricultural, Developed, Open Land	<0.1	Williams
Tioga-Elkhorn Creek	TEC_265	19.7	Open Land	<0.1	Williams
Tioga-Elkhorn Creek	TEC_266	19.7	Open Land	0.4	Williams
Tioga-Elkhorn Creek	TEC_268	19.8	Developed	<0.1	Williams
Tioga-Elkhorn Creek	TEC_256	20.7	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_264	20.8	Agricultural	<0.1	Williams
Tioga-Elkhorn Creek	TEC_263	20.8	Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_254	21.0	Agricultural, Developed, Open Land	27.8	Williams
Tioga-Elkhorn Creek	TEC_262	22.3	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_261	22.3	Agricultural, Developed	0.3	Williams
Tioga-Elkhorn Creek	TEC_255	22.8	Agricultural, Open Land	<0.1	Williams
Tioga-Elkhorn Creek	TEC_260	22.9	Agricultural, Open Land	0.6	Williams
Tioga-Elkhorn Creek	TEC_259	22.9	Open Land	1.4	Williams
Tioga-Elkhorn Creek	TEC_257	25.9	Agricultural, Open Land	1.4	McKenzie
Tioga-Elkhorn Creek	TEC_258	25.9	Agricultural, Open Land	0.6	McKenzie
Tioga-Elkhorn Creek	TEC_241	26.1	Agricultural, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_238	26.1	Agricultural, Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_240	26.4	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_239	26.4	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_337	27.3	Open Land, Open Water	0.8	McKenzie
Tioga-Elkhorn Creek	TEC_341	28.1	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_340	28.4	Open Land	1.5	McKenzie
Tioga-Elkhorn Creek	TEC_338	28.7	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_157	28.7	Open Land	0.5	McKenzie
Tioga-Elkhorn Creek	TEC_158	28.7	Open Land	0.1	McKenzie

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Tioga-Elkhorn Creek	TEC_159	28.9	Open Land	0.4	McKenzie
Tioga-Elkhorn Creek	TEC_160	28.9	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_339	29.2	Developed, Open Land	2.6	McKenzie
Tioga-Elkhorn Creek	TEC_253	29.7	Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_252	29.7	Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_251	29.7	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_250	29.8	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_248	30.0	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_249	30.0	Open Land	0.2	McKenzie
Tioga-Elkhorn Creek	TEC_246	30.1	Open Land	0.4	McKenzie
Tioga-Elkhorn Creek	TEC_247	30.1	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_244	30.6	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_245	30.6	Agricultural, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_243	30.7	Developed	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_242	30.7	Agricultural, Developed	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_237	34.5	Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_236	34.5	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_235	34.5	Agricultural	0.5	McKenzie
Tioga-Elkhorn Creek	TEC_234	34.5	Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_232	36.2	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_233	36.2	Agricultural	0.1	McKenzie
Tioga-Elkhorn Creek	TEC_230	36.2	Agricultural	0.1	McKenzie
Tioga-Elkhorn Creek	TEC_231	36.3	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_228	36.7	Agricultural, Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_229	36.7	Agricultural, Developed	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_227	36.8	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_226	36.8	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_155	38.2	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_156	38.2	Agricultural, Open Land	0.2	McKenzie
Tioga-Elkhorn Creek	TEC_153	38.4	Developed, Open Land	0.4	McKenzie
Tioga-Elkhorn Creek	TEC_154	38.4	Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_225	38.6	Agricultural, Open Land	<0.1	McKenzie

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Tioga-Elkhorn Creek	TEC_224	38.6	Open Land	0.8	McKenzie
Tioga-Elkhorn Creek	TEC_222	38.7	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_223	38.7	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_220	39.1	Agricultural, Developed	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_221	39.2	Agricultural, Developed	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_219	39.2	Agricultural, Developed	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_218	39.2	Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_216	41.5	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_217	41.5	Agricultural, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_215	41.5	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_214	41.5	Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_205	42.6	Agricultural, Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_206	42.6	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_203	42.7	Agricultural, Developed	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_204	42.7	Agricultural, Developed	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_213	43.6	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_212	43.6	Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_211	43.7	Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_210	43.7	Agricultural, Developed	0.5	McKenzie
Tioga-Elkhorn Creek	TEC_208	43.7	Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_207	43.8	Agricultural, Developed	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_209	43.8	Agricultural, Developed	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_202	44.7	Agricultural, Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_201	44.7	Agricultural, Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_199	44.8	Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_200	44.8	Agricultural, Developed	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_152	46.6	Agricultural, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_196	46.7	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_198	46.7	Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_197	46.7	Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_195	46.8	Agricultural, Developed	<0.1	McKenzie

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Tioga-Elkhorn Creek	TEC_331	46.8	Agricultural, Developed	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_194	47.7	Agricultural, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_193	47.7	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_191	47.8	Agricultural, Developed	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_192	47.8	Agricultural, Developed	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_189	48.7	Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_190	48.7	Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_187	48.8	Agricultural, Developed	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_188	48.8	Agricultural, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_186	49.1	Agricultural, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_185	49.1	Agricultural	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_183	49.1	Agricultural, Developed	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_184	49.2	Agricultural, Developed	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_181	49.8	Agricultural, Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_180	49.8	Agricultural, Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_179	49.8	Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_182	49.8	Developed, Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_175	51.0	Agricultural	0.2	McKenzie
Tioga-Elkhorn Creek	TEC_178	51.0	Open Land	0.1	McKenzie
Tioga-Elkhorn Creek	TEC_177	51.1	Agricultural, Open Land	0.7	McKenzie
Tioga-Elkhorn Creek	TEC_176	51.1	Agricultural, Developed	0.2	McKenzie
Tioga-Elkhorn Creek	TEC_170	51.2	Open Land	0.5	McKenzie
Tioga-Elkhorn Creek	TEC_169	51.2	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_168	51.3	Open Land	0.2	McKenzie
Tioga-Elkhorn Creek	TEC_167	51.4	Open Land	0.7	McKenzie
Tioga-Elkhorn Creek	TEC_166	52.0	Agricultural, Open Land	0.7	McKenzie
Tioga-Elkhorn Creek	TEC_165	52.0	Open Land	0.4	McKenzie
Tioga-Elkhorn Creek	TEC_163	52.1	Agricultural, Developed, Open Land	0.4	McKenzie
Tioga-Elkhorn Creek	TEC_164	52.2	Agricultural	0.7	McKenzie
Tioga-Elkhorn Creek	TEC_336	54.8	Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_335	54.8	Developed, Open Land	0.3	McKenzie

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Tioga-Elkhorn Creek	TEC_333	54.8	Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_334	54.8	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_150	56.7	Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_149	56.7	Agricultural	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_144	56.7	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_148	56.8	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_147	56.9	Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_145	56.9	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_151	56.9	Agricultural	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_146	56.9	Agricultural	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_138	57.9	Forested, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_139	57.9	Forested, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_136	58.0	Open Land	0.4	McKenzie
Tioga-Elkhorn Creek	TEC_137	58.0	Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_142	59.7	Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_143	59.7	Developed, Open Land	<0.1	McKenzie
Tioga-Elkhorn Creek	TEC_141	59.8	Agricultural, Developed, Open Land	0.3	McKenzie
Tioga-Elkhorn Creek	TEC_140	59.8	Agricultural, Open Land	<0.1	McKenzie
Line Section 25 Loop	NOL_104	0.5	Open Land	0.1	Williams
Line Section 25 Loop	NOL_105	0.6	Developed, Open Land	0.3	Williams
Line Section 25 Loop	NOL_106	0.6	Developed, Open Land	0.1	Williams
Line Section 25 Loop	NOL_103	0.6	Open Land	0.2	Williams
Line Section 25 Loop	NOL_118	0.6	Open Land	0.1	Williams
Line Section 25 Loop	NOL_070	0.7	Open Land	1.7	Williams
Line Section 25 Loop	NOL_117	0.7	Open Land	0.1	Williams
Line Section 25 Loop	NOL_069	0.8	Open Land	0.2	Williams
Line Section 25 Loop	NOL_116	0.8	Open Land	0.1	Williams
Line Section 25 Loop	NOL_068	1.0	Developed, Open Land	0.1	Williams
Line Section 25 Loop	NOL_067	1.0	Open Land	0.2	Williams
Line Section 25 Loop	NOL_115	1.1	Open Land	0.2	Williams
Line Section 25 Loop	NOL_066	1.1	Open Land	0.2	Williams
Line Section 25 Loop	NOL_101	2.1	Agricultural, Developed	0.7	Williams
Line Section 25 Loop	NOL_102	2.2	Agricultural, Developed	1.3	Williams
Line Section 25 Loop	NOL_097	3.1	Agricultural	0.2	Williams

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Line Section 25 Loop	NOL_099	3.1	Agricultural	0.3	Williams
Line Section 25 Loop	NOL_098	3.2	Agricultural	0.5	Williams
Line Section 25 Loop	NOL_100	3.2	Agricultural	0.7	Williams
Line Section 25 Loop	NOL_079	4.1	Agricultural	0.2	Williams
Line Section 25 Loop	NOL_078	4.1	Agricultural, Open Land	0.3	Williams
Line Section 25 Loop	NOL_076	4.2	Open Land	0.3	Williams
Line Section 25 Loop	NOL_077	4.2	Open Land	0.2	Williams
Line Section 25 Loop	NOL_062	5.2	Open Land	0.2	Williams
Line Section 25 Loop	NOL_065	5.2	Open Land	0.1	Williams
Line Section 25 Loop	NOL_064	5.2	Agricultural, Open Land	<0.1	Williams
Line Section 25 Loop	NOL_063	5.2	Agricultural, Open Land	0.3	Williams
Line Section 25 Loop	NOL_114	6.2	Agricultural	0.1	Williams
Line Section 25 Loop	NOL_061	6.2	Developed, Open Land	0.2	Williams
Line Section 25 Loop	NOL_059	6.3	Agricultural	<0.1	Williams
Line Section 25 Loop	NOL_060	6.3	Agricultural	0.4	Williams
Line Section 25 Loop	NOL_075	6.6	Agricultural, Open Land	0.6	Williams
Line Section 25 Loop	NOL_072	6.6	Agricultural, Developed	0.1	Williams
Line Section 25 Loop	NOL_073	6.8	Agricultural	0.1	Mountrail
Line Section 25 Loop	NOL_074	6.8	Agricultural	0.1	Mountrail
Line Section 25 Loop	NOL_058	7.3	Agricultural	0.1	Mountrail
Line Section 25 Loop	NOL_057	7.3	Agricultural	0.3	Mountrail
Line Section 25 Loop	NOL_055	7.4	Agricultural, Open Land	0.3	Mountrail
Line Section 25 Loop	NOL_056	7.4	Agricultural	0.1	Mountrail
Line Section 25 Loop	NOL_053	8.3	Agricultural	0.3	Mountrail
Line Section 25 Loop	NOL_054	8.3	Agricultural	0.1	Mountrail
Line Section 25 Loop	NOL_052	8.4	Agricultural	0.1	Mountrail
Line Section 25 Loop	NOL_051	8.4	Agricultural	0.3	Mountrail
Line Section 25 Loop	NOL_050	9.3	Agricultural	0.1	Mountrail
Line Section 25 Loop	NOL_049	9.3	Agricultural	0.3	Mountrail
Line Section 25 Loop	NOL_048	9.4	Agricultural	0.1	Mountrail
Line Section 25 Loop	NOL_047	9.4	Agricultural	0.3	Mountrail
Line Section 25 Loop	NOL_046	10.3	Open Land	0.2	Mountrail
Line Section 25 Loop	NOL_045	10.3	Open Land	0.5	Mountrail
Line Section 25 Loop	NOL_113	10.4	Agricultural, Developed	0.2	Burke
Line Section 25 Loop	NOL_044	10.4	Agricultural	0.3	Burke
Line Section 25 Loop	NOL_043	11.3	Agricultural, Developed	1.1	Burke
Line Section 25 Loop	NOL_042	11.4	Agricultural	<0.1	Burke

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Line Section 25 Loop	NOL_040	11.5	Agricultural	0.5	Burke
Line Section 25 Loop	NOL_041	11.5	Agricultural, Developed	0.2	Burke
Line Section 25 Loop	NOL_039	11.6	Agricultural	0.1	Burke
Line Section 25 Loop	NOL_038	11.6	Agricultural, Developed	0.5	Burke
Line Section 25 Loop	NOL_037	12.5	Agricultural	0.3	Burke
Line Section 25 Loop	NOL_036	12.5	Agricultural	0.6	Burke
Line Section 25 Loop	NOL_035	12.6	Agricultural, Open Land	0.1	Burke
Line Section 25 Loop	NOL_112	12.6	Agricultural	0.3	Burke
Line Section 25 Loop	NOL_096	13.4	Open Land	0.3	Burke
Line Section 25 Loop	NOL_095	13.4	Open Land	0.3	Burke
Line Section 25 Loop	NOL_110	13.7	Agricultural, Developed	0.7	Burke
Line Section 25 Loop	NOL_111	13.7	Agricultural, Developed, Open Land	1.4	Burke
Line Section 25 Loop	NOL_091	14.8	Developed, Open Land	0.1	Burke
Line Section 25 Loop	NOL_092	14.8	Open Land	0.3	Burke
Line Section 25 Loop	NOL_093	15.0	Open Land	0.2	Burke
Line Section 25 Loop	NOL_094	15.0	Open Land	1.2	Burke
Line Section 25 Loop	NOL_089	16.3	Agricultural	0.3	Burke
Line Section 25 Loop	NOL_071	16.3	Agricultural	0.2	Burke
Line Section 25 Loop	NOL_088	16.5	Open Land	0.4	Burke
Line Section 25 Loop	NOL_090	16.5	Agricultural, Developed, Open Land	0.8	Burke
Line Section 25 Loop	NOL_087	17.1	Agricultural	0.6	Burke
Line Section 25 Loop	NOL_086	17.1	Agricultural	0.1	Burke
Line Section 25 Loop	NOL_085	17.2	Agricultural	0.3	Burke
Line Section 25 Loop	NOL_084	17.2	Agricultural	0.6	Burke
Line Section 25 Loop	NOL_083	17.4	Agricultural, Open Land	0.5	Burke
Line Section 25 Loop	NOL_082	17.4	Agricultural, Open Land	1.0	Burke
Line Section 25 Loop	NOL_081	17.6	Agricultural, Developed	0.3	Burke
Line Section 25 Loop	NOL_080	17.6	Agricultural	0.1	Burke
Line Section 25 Loop	NOL_108	19.3	Open Land	0.3	Burke
Line Section 25 Loop	NOL_109	19.3	Open Land	0.1	Burke
Line Section 25 Loop	NOL_107	19.4	Developed, Open Land	1.1	Burke
Line Section 30 Loop	NLL_007	3.1	Agricultural	0.2	Williams
Line Section 30 Loop	NLL_009	3.1	Agricultural	0.3	Williams
Line Section 30 Loop	NLL_008	3.2	Agricultural, Developed	0.3	Williams
Line Section 30 Loop	NLL_006	3.2	Agricultural, Developed	0.2	Williams

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Line Section 30 Loop	NLL_003	4.1	Agricultural, Developed	0.5	Williams
Line Section 30 Loop	NLL_005	4.1	Agricultural	0.0	Williams
Line Section 30 Loop	NLL_002	4.2	Agricultural, Developed	0.5	Williams
Line Section 30 Loop	NLL_004	4.2	Agricultural	<0.1	Williams
Line Section 30 Loop	NLL_010	5.1	Agricultural, Developed	0.1	Williams
Line Section 30 Loop	NLL_011	5.1	Agricultural, Developed	0.4	Williams
Line Section 30 Loop	NLL_013	5.2	Agricultural	0.4	Williams
Line Section 30 Loop	NLL_012	5.2	Agricultural, Developed	0.2	Williams
Line Section 30 Loop	NLL_014	6.2	Agricultural, Developed	0.2	Williams
Line Section 30 Loop	NLL_016	6.2	Agricultural, Developed, Open Land	0.3	Williams
Line Section 30 Loop	NLL_015	6.3	Agricultural	0.2	Williams
Line Section 30 Loop	NLL_017	6.3	Agricultural	0.3	Williams
Line Section 30 Loop	NLL_019	7.4	Agricultural, Developed	0.3	Williams
Line Section 30 Loop	NLL_018	7.4	Agricultural, Developed	0.2	Williams
Line Section 30 Loop	NLL_023	7.5	Agricultural	0.4	Williams
Line Section 30 Loop	NLL_020	7.5	Agricultural	0.2	Williams
Line Section 30 Loop	NLL_025	7.6	Agricultural	0.4	Williams
Line Section 30 Loop	NLL_022	7.6	Agricultural	0.3	Williams
Line Section 30 Loop	NLL_021	7.7	Agricultural, Developed	0.4	Williams
Line Section 30 Loop	NLL_024	7.7	Agricultural, Developed	0.3	Williams
Line Section 30 Loop	NLL_026	8.6	Agricultural	0.4	Williams
Line Section 30 Loop	NLL_027	8.6	Agricultural	0.6	Williams
Line Section 30 Loop	NLL_029	8.7	Agricultural, Open Land	0.8	Williams
Line Section 30 Loop	NLL_028	8.7	Agricultural, Open Land	0.4	Williams
Line Section 30 Loop	NLL_030	9.1	Agricultural	0.2	Williams
Line Section 30 Loop	NLL_031	9.1	Agricultural, Developed	0.4	Williams
Line Section 30 Loop	NLL_033	9.2	Open Land	0.2	Williams
Line Section 30 Loop	NLL_032	9.2	Developed, Open Land	0.3	Williams
Tioga Compressor Lateral	AGF_122	0.0	Open Land	<0.1	Williams
Tioga Compressor Lateral	AGF_119	0.0	Agricultural	0.1	Williams
Tioga Compressor Lateral	AGF_120	0.4	Open Land	0.2	Williams
Tioga Compressor Lateral	AGF_121	0.4	Open Land	0.1	Williams
Tioga Compressor Lateral	AGF_135	0.5	Open Land	<0.1	Williams

APPENDIX E (cont'd)

**North Bakken Expansion Project
Additional Temporary Workspaces**

Project Facility	Additional Temporary Workspaces (ATWS)	Milepost	Existing Land Uses	Area Affected by Construction (acres)	County
Uprate Line Section 25	UPR_127	0.0	Agricultural, Open Land	0.7	Burke
Uprate Line Section 25	UPR_125	0.0	Developed, Open Land	2.1	Burke
Uprate Line Section 25	UPR_131	0.0	Developed, Open Land	0.8	Burke
Uprate Line Section 25	UPR_129	0.1	Developed, Open Land	1.4	Burke
Uprate Line Section 25	UPR_123	0.1	Agricultural, Open Land	0.9	Burke
Uprate Line Section 25	UPR_130	0.1	Agricultural, Open Land	0.1	Burke
Uprate Line Section 25	UPR_128	0.1	Developed, Open Land	1.5	Burke
Uprate Line Section 25	UPR_126	0.1	Open Land	0.8	Burke
Uprate Line Section 25	UPR_124	0.2	Agricultural, Open Land	2.5	Burke
Uprate Line Section 25	UPR_342	20.3	Agricultural	0.7	Burke
Robinson Lake Tract	AGF_034	0.0	Agricultural	0.8	Mountrail
Elkhorn Creek Compressor Station	AGF_134	0.0	Agricultural, Developed	1.1	McKenzie
Northern Border Interconnect	AGF_133	0.3	Agricultural, Open Land	0.6	McKenzie
Northern Border Interconnect	AGF_132	0.3	Agricultural, Open Land	0.6	McKenzie
Springbrook Plant Receipt Station	AGF_001	0.0	Agricultural	0.6	Williams

APPENDIX F

ROAD AND RAILROAD CROSSINGS

APPENDIX F

**North Bakken Expansion Project
Road and Railroad Crossings**

Facility/Milepost	Type	Name	Crossing Method	Approximate Crossing Length (feet)
Tioga-Elkhorn Creek				
0.3	Road	68 th Street NW	Guided Bore	34
0.5	Road	Private Road	Open Cut	29
0.8	Railroad	BNSF	Guided Bore	51
1.8	Road	103 rd Ave NW	Guided Bore	29
2.0	Road	67 th Street NW	Guided Bore	24
3.1	Road	66 th Street NW	Guided Bore	28
4.2	Road	65 th Street NW	Guided Bore	25
4.9	Road	Private Road	Open Cut	19
5.2	Road	64 th Street NW/Highway 2	Guided Bore	133
5.8	Road	Private Road	Open Cut	18
6.1	Road	104 th Ave NW	Guided Bore	36
7.0	Road	105 th Ave NW	Guided Bore	25
7.4	Road	63 rd Street NW	Guided Bore	18
8.4	Road	106 th Ave NW	Guided Bore	25
9.1	Road	62 nd Street NW	Guided Bore	35
10.5	Road	61 st Street NW	Open Cut	19
12.0	Road	60 th Street NW	Guided Bore	38
13.1	Road	59 th Street NW	Open Cut	11
14.1	Road	58 th Street NW	Guided Bore	18
16.1	Road	56 th Street NW	Guided Bore	20
18.4	Road	109 th Ave NW	Guided Bore	27
19.7	Road	110 th Ave NW	Guided Bore	26
19.7	Road	54 th Street NW	Guided Bore	30
20.7	Road	53 th Street NW	Guided Bore	36
21.4	Road	Private Road	Open Cut	16
22.3	Road	51 st Street NW	Guided Bore	37
22.8	Road	Private Road	Open Cut	45
22.9	Road	51 st Street NW	HDD	10
25.5	Road	Private Road	HDD	17
25.8	Road	Private Road	HDD	18
26.2	Road	Sand Creek Road	Guided Bore	35
26.7	Road	Private Road	Open Cut	22
26.9	Road	Private Road	Guided Bore	17
27.2	Road	(FDR) 8698	Open Cut	40
27.8	Road	Private Road	Open Cut	16
28.0	Road	Private Road	Open Cut	14

APPENDIX F (cont'd)

**North Bakken Expansion Project
Road and Railroad Crossings**

Facility/Milepost	Type	Name	Crossing Method	Crossing Length (feet)
28.1	Road	Private Road	Open Cut	15
28.6	Road	(FDR) Tobacco Garden – West Sand	Open Cut	40
29.7	Road	115 th Ave NW/ (FDR) 8000C43	Guided Bore	25
30.6	Road	45 th Street NW	Guided Bore	23
32.2	Road	Private Road	Open Cut	17
33.2	Road	Private Road	Open Cut	11
33.5	Road	43 rd Street NW	Open Cut	23
34.5	Road	42 nd Street NW	Guided Bore	25
35.0	Road	Private Road	Open Cut	12
36.7	Road	40 th Street NW	Guided Bore	34
36.8	Road	Private Road	Open Cut	15
38.5	Road	Private Road	Open Cut	49
38.7	Road	121 st Ave NW	Guided Bore	20
39.2	Road	38 th Street NW	Guided Bore	24
41.0	Road	Private Road	Open Cut	15
41.5	Road	36 th Street NW	Guided Bore	26
41.7	Road	Private Road	Open Cut	12
42.6	Road	35 th Street NW	Guided Bore	8
43.6	Road	34 th Street NW	Guided Bore	59
43.7	Road	121 st Ave NW	Guided Bore	35
44.7	Road	33 rd Street NW	Guided Bore	15
45.7	Road	32 nd Street NW	Open Cut	24
46.7	Road	31 st Street NW	Guided Bore	37
47.7	Road	30 th Street NW	Guided Bore	26
48.7	Road	29 th Street NW	Guided Bore	25
49.1	Road	121 st Ave NW	Guided Bore	34
49.8	Road	28 th Street NW	Guided Bore	33
50.8	Road	Private Road	Open Cut	14
51.0	Road	State Highway 23	Guided Bore	33
51.1	Road	Private Road	Open Cut	19
51.9	Road	Private Road	Open Cut	18
52.1	Road	Private Road	Open Cut	42
54.6	Road	Private Road	Open Cut	15
54.8	Road	23 rd Street NW	Guided Bore	35
56.1	Road	Private Road	Open Cut	14
56.1	Road	Private Road	Open Cut	14
56.7	Road	122 nd Ave NW	Guided Bore	71

APPENDIX F (cont'd)

**North Bakken Expansion Project
Road and Railroad Crossings**

Facility/Milepost	Type	Name	Crossing Method	Crossing Length (feet)
56.9	Road	122 nd Ave NW	Guided Bore	38
57.2	Road	22 nd Street NW	Open Cut	24
58.1	Road	122 nd Ave NW	Open Cut	68
59.8	Road	21 st Street NW	Guided Bore	36
60.6	Road	123 rd Ave NW	Open Cut	20
Line Section 25 Loop				
0.3	Road	Private Road	Open Cut	18
0.6	Road	103 rd Ave NW	Guided Bore	34
0.8	Road	Private Road	Open Cut	23
1.0	Road	Private Road	Open Cut	23
1.0	Road	69 th Street NW	Guided Bore	29
1.4	Road	Private Road	Open Cut	19
2.1	Road	103 rd Ave NW	Guided Bore	58
2.1	Road	70 th Street NW	Guided Bore	67
3.2	Road	71 st Street NW	Guided Bore	32
4.2	Road	72 nd Street NW	Guided Bore	24
4.6	Road	Private Road	Open cut	23
5.2	Road	73 rd Street NW	Guided Bore	24
6.3	Road	74 th Street NW	Guided Bore	32
6.7	Road	102 nd Ave NW	Guided Bore	88
6.9	Road	Private Road	Open Cut	25
7.3	Road	75 th Street NW	Guided Bore	22
8.3	Road	76 th Street NW	Guided Bore	24
9.4	Road	77 th Street NW	Guided Bore	17
10.4	Road	78 th Street NW	Guided Bore	21
11.4	Road	79 th Street NW	Guided Bore	36
11.5	Road	101 st Ave NW	Guided Bore	25
12.6	Road	Highway 50	Guided Bore	33
13.7	Road	81 st Street NW	Guided Bore	29
14.3	Road	Private Road	Open Cut	19
14.9	Road	100 th Ave NW	Guided Bore	42
15.8	Road	Private Road	Open Cut	19
16.4	Road	99 th Ave NW	Guided Bore	21
17.1	Road	83 rd Street NW	Guided Bore	35
17.6	Road	98 th Ave NW	Guided Bore	39
18.3	Road	84 th Street NW	Open Cut	17
19.3	Road	County Road 16	Guided Bore	26

APPENDIX F (cont'd)

**North Bakken Expansion Project
Road and Railroad Crossings**

Facility/Milepost	Type	Name	Crossing Method	Crossing Length (feet)
Line Section 30 Loop				
1.0	Road	108 th Ave NW	Open Cut	9
3.2	Road	106 th Ave NW	Guided Bore	8
4.2	Road	105 th Ave NW	Guided Bore	27
5.2	Road	66 th Street NW	Guided Bore	24
5.7	Road	Private Road	Open Cut	10
6.3	Road	State Highway 40	Guided Bore	57
7.5	Road	67 th Street NW	Guided Bore	24
7.7	Road	103 rd Ave NW	Guided Bore	29
8.6	Railroad	BNSF	Guided Bore	51
9.1	Road	68 th Street NW	Guided Bore	34
Tioga Compressor Lateral				
0.5	Road	103 rd Ave NW	Guided Bore	25

APPENDIX G

OIL AND GAS WELLS WITHIN 0.25 MILE OF THE PROPOSED PROJECT

APPENDIX G

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
Tioga-Elkhorn Creek					
0.5	Tioga-Elkhorn Creek	818	TI-Larson-157-95 2536H-1	Hess Bakken Investments II, LLC	Active
1.4	Tioga-Elkhorn Creek	837	Tioga-Madison Unit H-108	Hess Bakken Investments II, LLC	Plugged and Abandoned
2.1	Tioga-Elkhorn Creek	588	Leroy Nelson Tract 3 2	Amerada Hess Corporation	Dry
5.1	Tioga-Elkhorn Creek	1183	Michael Douglas 8-5h	Murex Petroleum Corporation	Permitted location to drill
5.1	Tioga-Elkhorn Creek	2689	Eskeland Herfindahl 7-6h	Murex Petroleum Corporation	Active
5.1	Tioga-Elkhorn Creek	973	Beaver Lodge-Madison Unit O-29	Amerada Hess Corporation	Plugged and Abandoned
5.2	Tioga-Elkhorn Creek	719	Jacque Lisset 5-8h	Murex Petroleum Corporation	Active
5.4	Tioga-Elkhorn Creek	456	Beaver Lodge-Madison Unit P-28	Amerada Hess Corporation	Plugged and Abandoned
5.6	Tioga-Elkhorn Creek	749	Beaver Lodge-Madison Unit O-27	Amerada Hess Corporation	Plugged and Abandoned
5.6	Tioga-Elkhorn Creek	257	BLMU P-27AH	Hess Bakken Investments II, LLC	Active
5.7	Tioga-Elkhorn Creek	560	BLMU P-27H	Hess Bakken Investments II, LLC	Plugged and Abandoned
5.8	Tioga-Elkhorn Creek	858	Beaver Lodge-Madison Unit P-26	Amerada Hess Corporation	Plugged and Abandoned
5.9	Tioga-Elkhorn Creek	932	Beaver Lodge-Devonian Unit I-315	Hess Bakken Investments II, LLC	Abandoned (Shut-In > 12 months)
6.1	Tioga-Elkhorn Creek	932	BLMU O-25 BH	Hess Bakken Investments II, LLC	Active
6.1	Tioga-Elkhorn Creek	1149	Beaver Lodge-Madison Unit O-25a	Amerada Hess Corporation	Plugged and Abandoned
6.1	Tioga-Elkhorn Creek	1013	Beaver Lodge-Madison Unit O-25	Amerada Hess Corporation	Plugged and Abandoned
6.2	Tioga-Elkhorn Creek	545	Beaver Lodge-Madison Unit N-26	Amerada Hess Corporation	Plugged and Abandoned
6.4	Tioga-Elkhorn Creek	1197	BLDU H-315	Hess Bakken Investments II, LLC	Plugged and Abandoned
6.5	Tioga-Elkhorn Creek	731	Beaver Lodge-Madison Unit M-25	Amerada Hess Corporation	Plugged and Abandoned
6.7	Tioga-Elkhorn Creek	622	Beaver Lodge-Madison Unit L-26	Hess Corporation	Plugged and Abandoned
6.7	Tioga-Elkhorn Creek	145	Beaver Lodge-Devonian Unit G-315	Hess Bakken Investments II, LLC	Plugged and Abandoned
6.8	Tioga-Elkhorn Creek	606	Beaver Lodge-Ordovician Unit 7	Hess Bakken Investments II, LLC	Plugged and Abandoned
6.9	Tioga-Elkhorn Creek	691	Beaver Lodge-Madison Unit K-25	Hess Bakken Investments II, LLC	Plugged and Abandoned
7.1	Tioga-Elkhorn Creek	830	Nels Anderson 1	Amerada Hess Corporation	Dry

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
7.6	Tioga-Elkhorn Creek	249	Knutson-Walla Unit 1	Hunt Oil Company	Permit Now Cancelled
7.7	Tioga-Elkhorn Creek	1147	Josie Knutson 1	Hunt Oil Company	Dry
7.8	Tioga-Elkhorn Creek	453	Tioga-Madison Unit G-109	Amerada Hess Corporation	Plugged and Abandoned
8.4	Tioga-Elkhorn Creek	449	Tioga-Madison Unit H-110	Amerada Hess Corporation	Plugged and Abandoned
9.0	Tioga-Elkhorn Creek	83	Tioga-Madison Unit H-112	Amerada Hess Corporation	Plugged and Abandoned
12.2	Tioga-Elkhorn Creek	1844	BL-Kerbaugh-156-96- 3427h-1	Hess Bakken Investments II, LLC	Active
12.3	Tioga-Elkhorn Creek	1802	Beaver Lodge-Devonian Unit B-308i	Hess Bakken Investments II, LLC	Abandoned (Shut-In > 12 months)
13.0	Tioga-Elkhorn Creek	4433	Beaver Lodge-Madison Unit C-9	Amerada Hess Corporation	Plugged and Abandoned
13.0	Tioga-Elkhorn Creek	494	Halvor Davidson 1	C. W. Williams & O. D. Clark	Dry
13.0	Tioga-Elkhorn Creek	1792	Beaver Lodge-Devonian Unit B-307	Hess Bakken Investments II, LLC	Plugged and Abandoned
13.1	Tioga-Elkhorn Creek	3143	Beaver Lodge-Madison Unit B-8	Amerada Hess Corporation	Plugged and Abandoned
13.9	Tioga-Elkhorn Creek	174	Beaver Lodge-Devonian Unit A-305	Hess Bakken Investments II, LLC	Temporarily Abandoned Observation
14.0	Tioga-Elkhorn Creek	589	Oford Boe 1	Amerada Hess Corporation	Dry
14.1	Tioga-Elkhorn Creek	1320	BL-Olson-155-96- 1003h-1	Hess Bakken Investments II, LLC	Active
14.2	Tioga-Elkhorn Creek	823	BL-Olson- 155-96-1003h-6pnc	Hess Bakken Investments II, LLC	Permit Now Cancelled
14.2	Tioga-Elkhorn Creek	856	BL-Olson- 155-96-1003H-5PNC	Hess Bakken Investments II, LLC	Permit Now Cancelled
14.2	Tioga-Elkhorn Creek	889	BL-Olson- 155-96-1003H-4PNC	Hess Bakken Investments II, LLC	Permit Now Cancelled
14.2	Tioga-Elkhorn Creek	922	BL-Olson- 155-96-1003H-3PNC	Hess Bakken Investments II, LLC	Permit Now Cancelled
14.2	Tioga-Elkhorn Creek	955	BL-Olson- 155-96-1003H-2PNC	Hess Bakken Investments II, LLC	Permit Now Cancelled
14.2	Tioga-Elkhorn Creek	988	BL-Olson- LW-155-96-1003H-1	Hess Bakken Investments II, LLC	Permit Now Cancelled
16.5	Tioga-Elkhorn Creek	755	Hanson 27-22	Amerada Hess Corporation	Dry
16.9	Tioga-Elkhorn Creek	189	Boe 27-24	Amerada Hess Corporation	Permit Now Cancelled
17.3	Tioga-Elkhorn Creek	409	Brownell 34-11	Amerada Hess Corporation	Dry
17.8	Tioga-Elkhorn Creek	1902	Mortenson 33-44	Murex Petroleum Corporation	Plugged and Abandoned

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
19.1	Tioga-Elkhorn Creek	496	Woodrow 34x-32	XTO Energy Inc.	Active
19.5	Tioga-Elkhorn Creek	684	Helen 11x-5	XTO Energy Inc.	Active
19.7	Tioga-Elkhorn Creek	653	Woodrow N. Sveen Et Ux 1	Home-Stake Production Co.	Dry
21.8	Tioga-Elkhorn Creek	469	Kenneth 11x-17a	XTO Energy Inc.	Confidential
21.8	Tioga-Elkhorn Creek	499	Kenneth 11x-17e	XTO Energy Inc.	Confidential
21.8	Tioga-Elkhorn Creek	529	Kenneth 11x-17b	XTO Energy Inc.	Confidential
21.8	Tioga-Elkhorn Creek	559	Kenneth 11x-17f	XTO Energy Inc.	Confidential
22.3	Tioga-Elkhorn Creek	1511	Arley 21x-18b	XTO Energy Inc.	Active
22.3	Tioga-Elkhorn Creek	1581	Arley 21x-18e	XTO Energy Inc.	Active
22.3	Tioga-Elkhorn Creek	1558	Arley 21x-18a	XTO Energy Inc.	Active
22.3	Tioga-Elkhorn Creek	1534	Arley 21x-18f	XTO Energy Inc.	Active
26.1	Tioga-Elkhorn Creek	1163	Ruby State Federal 34x-36f	XTO Energy Inc.	Active
26.1	Tioga-Elkhorn Creek	1163	Ruby State Federal 34x-36b	XTO Energy Inc.	Active
26.1	Tioga-Elkhorn Creek	1163	Ruby State 34x-36g	XTO Energy Inc.	Active
26.1	Tioga-Elkhorn Creek	728	Ruby State Federal 34x-36h	XTO Energy Inc.	Confidential
26.1	Tioga-Elkhorn Creek	847	Lundstrom 44-36h	Encore Operating, L.P.	Permit Now Cancelled
26.1	Tioga-Elkhorn Creek	1163	Ruby State Federal 34x-36a	XTO Energy Inc.	Active
26.1	Tioga-Elkhorn Creek	728	Ruby State Federal 34x-36d	XTO Energy Inc.	Confidential
26.1	Tioga-Elkhorn Creek	1163	Ruby State Federal 34x-36e	XTO Energy Inc.	Active
26.1	Tioga-Elkhorn Creek	728	Ruby State Federal 34x-36gxh	XTO Energy Inc.	Confidential
26.1	Tioga-Elkhorn Creek	727	Ruby State Federal 34x-36c	XTO Energy Inc.	Confidential
26.3	Tioga-Elkhorn Creek	346	Gunslinger Federal 15-1-12f2h	Slawson Exploration Company, Inc.	Confidential
26.3	Tioga-Elkhorn Creek	386	Gunslinger Federal 4-1-12h	Slawson Exploration Company, Inc.	Active
26.3	Tioga-Elkhorn Creek	426	Gunslinger Federal 7-1-12fh	Slawson Exploration Company, Inc.	Confidential
26.3	Tioga-Elkhorn Creek	466	Gunslinger Federal 5-1-12h	Slawson Exploration Company, Inc.	Confidential

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
26.3	Tioga-Elkhorn Creek	506	Gunslinger Federal 16-1-12tf2h	Slawson Exploration Company, Inc.	Confidential
26.3	Tioga-Elkhorn Creek	546	Gunslinger Federal 6-1-12tfh	Slawson Exploration Company, Inc.	Confidential
26.6	Tioga-Elkhorn Creek	797	Wold Federal 42-1-1h	Whiting Oil And Gas Corporation	Active
26.6	Tioga-Elkhorn Creek	797	Wold Federal 42-1-1tfh	Whiting Oil And Gas Corporation	Active
26.6	Tioga-Elkhorn Creek	796	Wold Federal 42-1-2h	Whiting Oil And Gas Corporation	Active
26.6	Tioga-Elkhorn Creek	795	Wold Federal 42-1-2tfh	Whiting Oil And Gas Corporation	Active
26.6	Tioga-Elkhorn Creek	795	Wold Federal 42-1-3h	Whiting Oil And Gas Corporation	Active
26.7	Tioga-Elkhorn Creek	817	Wold Federal 43-1-1tfh	Whiting Oil And Gas Corporation	Active
26.7	Tioga-Elkhorn Creek	817	Wold Federal 43-1-1h	Whiting Oil And Gas Corporation	Active
26.7	Tioga-Elkhorn Creek	816	Wold Federal 43-1-2tfh	Whiting Oil And Gas Corporation	Active
26.7	Tioga-Elkhorn Creek	815	Wold Federal 43-1-2h	Whiting Oil And Gas Corporation	Active
27.1	Tioga-Elkhorn Creek	493	Wold Federal 44-1-4h	Whiting Oil And Gas Corporation	Drilling
27.1	Tioga-Elkhorn Creek	538	Wold Federal 44-1-3tfh	Whiting Oil And Gas Corporation	Drilling
27.1	Tioga-Elkhorn Creek	583	Wold Federal 44-1-3h	Whiting Oil And Gas Corporation	Permitted location to drill
27.1	Tioga-Elkhorn Creek	628	Wold Federal 44-1-2tfh	Whiting Oil And Gas Corporation	Permitted location to drill
27.1	Tioga-Elkhorn Creek	673	Wold Federal 44-1-2h	Whiting Oil And Gas Corporation	Permitted location to drill
27.1	Tioga-Elkhorn Creek	718	Wold Federal 44-1-1tfh	Whiting Oil And Gas Corporation	Permitted location to drill
27.1	Tioga-Elkhorn Creek	763	Wold Federal 44-1-1h	Whiting Oil And Gas Corporation	Permitted location to drill
27.1	Tioga-Elkhorn Creek	808	Wold Federal 44-1tfhu	Whiting Oil And Gas Corporation	Permitted location to drill
28.6	Tioga-Elkhorn Creek	467	Gunslinger Federal 11-12-1tfh	Slawson Exploration Company, Inc.	Confidential
28.6	Tioga-Elkhorn Creek	507	Gunslinger Federal 1-12-1h	Slawson Exploration Company, Inc.	Confidential
28.6	Tioga-Elkhorn Creek	547	Gunslinger Federal 12-12-1tf2h	Slawson Exploration Company, Inc.	Confidential
28.6	Tioga-Elkhorn Creek	588	Gunslinger Federal 10-12-1tfh	Slawson Exploration Company, Inc.	Confidential
28.6	Tioga-Elkhorn Creek	628	Gunslinger Federal 13-12-1tf2h	Slawson Exploration Company, Inc.	Confidential
28.6	Tioga-Elkhorn Creek	668	Gunslinger Federal 2-12-1h	Slawson Exploration Company, Inc.	Confidential

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
28.6	Tioga-Elkhorn Creek	708	Gunslinger Federal 9-12-1tfh	Slawson Exploration Company, Inc.	Confidential
28.6	Tioga-Elkhorn Creek	748	Gunslinger Federal 3-12-1h	Slawson Exploration Company, Inc.	Confidential
28.6	Tioga-Elkhorn Creek	788	Gunslinger Federal 14-12-1tf2h	Slawson Exploration Company, Inc.	Confidential
28.6	Tioga-Elkhorn Creek	828	Gunslinger Federal 8-12-1tfh	Slawson Exploration Company, Inc.	Confidential
28.7	Tioga-Elkhorn Creek	1005	Gladstone 4-1-13tfh	Burlington Resources Oil & Gas Company LP	Confidential
28.7	Tioga-Elkhorn Creek	1024	Gladstone 4-1-13mbh	Burlington Resources Oil & Gas Company LP	Confidential
28.7	Tioga-Elkhorn Creek	1069	Gladstone 5-1-13tfh	Burlington Resources Oil & Gas Company LP	Confidential
28.7	Tioga-Elkhorn Creek	1115	Gladstone 6-1-13mbh	Burlington Resources Oil & Gas Company LP	Confidential
28.7	Tioga-Elkhorn Creek	1315	Gladstone 7-1-13tfh	Burlington Resources Oil & Gas Company LP	Confidential
28.7	Tioga-Elkhorn Creek	1360	Gladstone 8-1-13mbh	Burlington Resources Oil & Gas Company LP	Confidential
33.6	Tioga-Elkhorn Creek	441	Joshua Tree 1-34h	Zenergy, Inc	Permit Now Cancelled
34.5	Tioga-Elkhorn Creek	394	Thelen 5297 11-6 5t ^a	Oasis Petroleum North America LLC	Permitted location to drill
34.5	Tioga-Elkhorn Creek	370	Thelen 5297 11-6 4b ^a	Oasis Petroleum North America LLC	Permitted location to drill
34.5	Tioga-Elkhorn Creek	346	Thelen 5297 11-6 3tx ^a	Oasis Petroleum North America LLC	Permitted location to drill
34.6	Tioga-Elkhorn Creek	183	Wold 1-6h	Zenergy, Inc	Permit Now Cancelled
34.6	Tioga-Elkhorn Creek	1127	Wold Federal 15-33h	Oasis Petroleum North America LLC	Active
34.7	Tioga-Elkhorn Creek	1724	A. Johnson 5397 43-33 11b	Oasis Petroleum North America LLC	Drilling
36.7	Tioga-Elkhorn Creek	388	Dennis 1-12h ^a	Zenergy, Inc	Permit Now Cancelled
36.8	Tioga-Elkhorn Creek	129	Vonnie 1-18h ^a	Zenergy, Inc	Permit Now Cancelled
36.8	Tioga-Elkhorn Creek	1220	Rolfstrud Federal 18-19h	Oasis Petroleum North America LLC	Inactive (Shut-In >= 3 months and <= 12 Months)
39.3	Tioga-Elkhorn Creek	1038	Mildred Nelson 4-25h	Oasis Petroleum North America LLC	Active
39.3	Tioga-Elkhorn Creek	599	Nelson 5298 14-26 11tx	Oasis Petroleum North America LLC	Active

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
39.3	Tioga-Elkhorn Creek	600	Nelson 5298 14-26 12bx	Oasis Petroleum North America LLC	Active
39.3	Tioga-Elkhorn Creek	602	AAGVIK 5298 14-26 13BX	Oasis Petroleum North America LLC	Active
39.3	Tioga-Elkhorn Creek	603	AAGVIK 5298 14-26 14TX	Oasis Petroleum North America LLC	Active
39.5	Tioga-Elkhorn Creek	647	Nelson 5298 13-26 10b	Oasis Petroleum North America LLC	Active
39.5	Tioga-Elkhorn Creek	647	Nelson 5298 13-26 9t	Oasis Petroleum North America LLC	Active
39.5	Tioga-Elkhorn Creek	647	Nelson 5298 13-26 8b	Oasis Petroleum North America LLC	Active
39.5	Tioga-Elkhorn Creek	649	AAGVIK 5298 13-26 12T	Oasis Petroleum North America LLC	Active
39.5	Tioga-Elkhorn Creek	649	AAGVIK 5298 13-26 11B	Oasis Petroleum North America LLC	Active
39.6	Tioga-Elkhorn Creek	649	AAGVIK 5298 13-26 10T	Oasis Petroleum North America LLC	Active
41.4	Tioga-Elkhorn Creek	1920	AAGVIK 5298 41-35 6T	Oasis Petroleum North America LLC	Active
41.4	Tioga-Elkhorn Creek	1953	AAGVIK 5298 41-35 5B	Oasis Petroleum North America LLC	Active
41.4	Tioga-Elkhorn Creek	1986	AAGVIK 5298 41-35 4T	Oasis Petroleum North America LLC	Plugged and Abandoned
41.4	Tioga-Elkhorn Creek	2019	AAGVIK 5298 41-35 3BX	Oasis Petroleum North America LLC	Active
41.4	Tioga-Elkhorn Creek	2052	AAGVIK 5298 41-35 2TX	Oasis Petroleum North America LLC	Active
41.4	Tioga-Elkhorn Creek	2085	AAGVIK 5298 41-35 15T	Oasis Petroleum North America LLC	Active
41.4	Tioga-Elkhorn Creek	3061	Johnsrud 1-34h	Zenergy, Inc	Permit Now Cancelled
41.6	Tioga-Elkhorn Creek	526	Berquist 31x-2d	XTO Energy Inc.	Active
41.6	Tioga-Elkhorn Creek	509	Berquist 31x-2g	XTO Energy Inc.	Active
41.6	Tioga-Elkhorn Creek	492	Berquist 31x-2c	XTO Energy Inc.	Active
43.5	Tioga-Elkhorn Creek	453	Abercrombie 1-8-12 Mbh	Burlington Resources Oil & Gas Company LP	Confidential
43.6	Tioga-Elkhorn Creek	453	Abersom 1-8-12 Utfh -Ulw ^a	Burlington Resources Oil & Gas Company LP	Confidential
43.6	Tioga-Elkhorn Creek	454	Abercrombie 2-8-12 Utfh ^a	Burlington Resources Oil & Gas Company LP	Confidential
43.8	Tioga-Elkhorn Creek	1287	Johnsrud 21-13seh	XTO Energy Inc.	Active
43.8	Tioga-Elkhorn Creek	1281	Johnsrud 21x-13e	XTO Energy Inc.	Confidential

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
43.8	Tioga-Elkhorn Creek	1284	Johnsrud 21x-13a	XTO Energy Inc.	Confidential
43.8	Tioga-Elkhorn Creek	1201	Rink 13-24h	Zenergy, Inc	Permit Now Cancelled
43.8	Tioga-Elkhorn Creek	1285	Johnsrud 21x-13axd	XTO Energy Inc.	Permit Now Cancelled
45.6	Tioga-Elkhorn Creek	1478	Mccoy 44x-23g2	XTO Energy Inc.	Active
45.7	Tioga-Elkhorn Creek	1478	Mccoy 44x-23d	XTO Energy Inc.	Active
45.7	Tioga-Elkhorn Creek	1479	Mccoy 44-23nwh	XTO Energy Inc.	Active
45.7	Tioga-Elkhorn Creek	1479	Mccoy 44x-23h	XTO Energy Inc.	Active
45.8	Tioga-Elkhorn Creek	1362	Sax 41x-26c	XTO Energy Inc.	Active
45.8	Tioga-Elkhorn Creek	1317	Sax 41x-26h	XTO Energy Inc.	Active
45.8	Tioga-Elkhorn Creek	1272	Sax 41x-26d	XTO Energy Inc.	Active
49.7	Tioga-Elkhorn Creek	323	Lundin 44x-11d ^a	XTO Energy Inc.	Active
49.7	Tioga-Elkhorn Creek	323	Lundin 44x-11h ^a	XTO Energy Inc.	Active
49.7	Tioga-Elkhorn Creek	323	Lundin 44x-11c ^a	XTO Energy Inc.	Active
49.9	Tioga-Elkhorn Creek	537	Lundin 41x-14c	XTO Energy Inc.	Active
49.9	Tioga-Elkhorn Creek	507	Lundin 41x-14g	XTO Energy Inc.	Active
49.9	Tioga-Elkhorn Creek	477	Lundin 41-14swh ^a	XTO Energy Inc.	Active
49.9	Tioga-Elkhorn Creek	447	Lundin 41x-14d ^a	XTO Energy Inc.	Active
50.2	Tioga-Elkhorn Creek	730	Lundin 11-13seh	XTO Energy Inc.	Active
52.0	Tioga-Elkhorn Creek	572	Shafer State 1-23-3b	Gulf Oil Corp.	Dry
52.5	Tioga-Elkhorn Creek	263	Hartel 1-26hb	Oasis Petroleum North America LLC	Active
52.5	Tioga-Elkhorn Creek	286	Hartel 1x-26h	Oasis Petroleum North America LLC	Active
52.5	Tioga-Elkhorn Creek	310	Hartel 1-26ha	Oasis Petroleum North America LLC	Active
52.9	Tioga-Elkhorn Creek	640	Koeser 3x-26hb	Oasis Petroleum North America LLC	Active
52.9	Tioga-Elkhorn Creek	663	Koeser 3-26h	Oasis Petroleum North America LLC	Active
52.9	Tioga-Elkhorn Creek	687	Koeser 3x-26ha	Oasis Petroleum North America LLC	Active

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
53.2	Tioga-Elkhorn Creek	1170	Koeser 4x-26h	Oasis Petroleum North America LLC	Active
55.0	Tioga-Elkhorn Creek	901	Johnson 16-34h	Oasis Petroleum North America LLC	Active
55.1	Tioga-Elkhorn Creek	1170	Broderson 13-35h	Oasis Petroleum North America LLC	Active
56.1	Tioga-Elkhorn Creek	562	Johnsrud 1-3	Pogo Producing Co.	Plugged and Abandoned
56.3	Tioga-Elkhorn Creek	1164	Betty Berg 1-11	Pogo Producing Co.	Dry
57.1	Tioga-Elkhorn Creek	967	Malm 149-98-11-2-1h	Newfield Production Company	Active
57.2	Tioga-Elkhorn Creek	972	Malm 149-98-14-23-1h	Newfield Production Company	Active
57.3	Tioga-Elkhorn Creek	375	Malm 149-98-14-23-4h	Newfield Production Company	Active
57.3	Tioga-Elkhorn Creek	330	Malm 149-98-14-23-5h	Newfield Production Company	Active
57.3	Tioga-Elkhorn Creek	305	Malm 149-98-11-2-6h	Newfield Production Company	Active
57.3	Tioga-Elkhorn Creek	280	Malm 149-98-11-2-7hlw	Newfield Production Company	Active
59.9	Tioga-Elkhorn Creek	909	Smokey 16-21 Swd	Mckenzie Energy Partners, LLC	Active
60.0	Tioga-Elkhorn Creek	948	Knut Berg Trust 41-28hu	Whiting Oil And Gas Corporation	Active
60.0	Tioga-Elkhorn Creek	993	Knut Berg Trust 41-28h	Whiting Oil And Gas Corporation	Active
60.0	Tioga-Elkhorn Creek	1039	Knut Berg Trust 41-28-2h	Whiting Oil And Gas Corporation	Active
Line Section 25 Loop					
0.1	Line Section 25 Loop	1019	Tioga-Madison Unit F-114	Amerada Hess Corporation	Plugged and Abandoned
0.5	Line Section 25 Loop	288	Tioga-Madison Unit G-115	Amerada Hess Corporation	Plugged and Abandoned
0.8	Line Section 25 Loop	1368	Tioga-Madison Unit E-115	Hess Bakken Investments II, LLC	Plugged and Abandoned
0.9	Line Section 25 Loop	432	Tioga-Madison Unit F-116	Amerada Hess Corporation	Plugged and Abandoned
0.9	Line Section 25 Loop	804	Rehak 1 Swd	Landtech Enterprises, LLC	Active
1.2	Line Section 25 Loop	585	Tioga-Madison Unit E-117	Amerada Hess Corporation	Plugged and Abandoned
1.4	Line Section 25 Loop	744	Pederson 14-33	Hess Bakken Investments II, LLC	Plugged and Abandoned
1.5	Line Section 25 Loop	363	Pederson Fresh Water Facility 1	Hess Bakken Investments II, LLC	Plugged and Abandoned
1.6	Line Section 25 Loop	1278	Tioga-Madison Unit E-119	Amerada Hess Corporation	Plugged and Abandoned

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
1.7	Line Section 25 Loop	910	TI-Syverson-157-95 1318H-1	Hess Bakken Investments II, LLC	Inactive (Shut-In >= 3 months and <= 12 Months)
1.8	Line Section 25 Loop	1270	Tioga-Madison Unit G-119	Hess Bakken Investments II, LLC	Plugged and Abandoned
1.9	Line Section 25 Loop	360	Tioga-Madison Unit F-120	Amerada Hess Corporation	Plugged and Abandoned
2.3	Line Section 25 Loop	505	Tioga-Madison Unit G-121	Amerada Hess Corporation	Plugged and Abandoned
2.4	Line Section 25 Loop	1131	Tioga-Madison Unit F-122	Amerada Hess Corporation	Plugged and Abandoned
2.6	Line Section 25 Loop	1331	Tioga-Madison Unit H-122	Amerada Hess Corporation	Plugged and Abandoned
2.6	Line Section 25 Loop	410	H. Bakken 12-07h	Hess Bakken Investments II, LLC	Active
2.7	Line Section 25 Loop	285	Tioga-Madison Unit G-123	Amerada Hess Corporation	Plugged and Abandoned
3.0	Line Section 25 Loop	1672	Tioga-Madison Unit F-124	Hess Corporation	Plugged and Abandoned
3.0	Line Section 25 Loop	814	Tioga-Madison Unit H-124	Amerada Hess Corporation	Plugged and Abandoned
3.3	Line Section 25 Loop	696	Tioga-Madison Unit G-125	Hess Bakken Investments II, LLC	Plugged and Abandoned
3.5	Line Section 25 Loop	1305	Ti-Ives-157-95 0106h-1	Hess Bakken Investments II, LLC	Active
3.5	Line Section 25 Loop	347	Tioga-Madison Unit H-126	Amerada Hess Corporation	Plugged and Abandoned
3.8	Line Section 25 Loop	1078	Tioga-Madison Unit G-127	Hess Bakken Investments II, LLC	Plugged and Abandoned
4.0	Line Section 25 Loop	160	Tioga-Madison Unit H-128	Amerada Hess Corporation	Plugged and Abandoned
4.3	Line Section 25 Loop	889	Tioga-Madison Unit I-129	Hess Corporation	Plugged and Abandoned
4.5	Line Section 25 Loop	696	Tioga-Madison Unit H-130i	Hess Bakken Investments II, LLC	Plugged and Abandoned
4.8	Line Section 25 Loop	263	Tioga-Madison Unit I-131 HR	Hess Bakken Investments II, LLC	Active
5.0	Line Section 25 Loop	1310	Tioga-Madison Unit H-132	Hess Bakken Investments II, LLC	Abandoned (Shut-In > 12 months)
5.1	Line Section 25 Loop	1210	Tioga-Madison Unit J-132	Hess Bakken Investments II, LLC	Plugged and Abandoned
5.3	Line Section 25 Loop	547	Tioga-Madison Unit I-133	Amerada Hess Corporation	Plugged and Abandoned
5.5	Line Section 25 Loop	751	TI-Stenbak- 158-95-2526H-7	Hess Bakken Investments II, LLC	Drilling
5.5	Line Section 25 Loop	732	TI-Stenbak- 158-95-2526H-6	Hess Bakken Investments II, LLC	Drilling
5.5	Line Section 25 Loop	712	TI-Stenbak- 158-95-2526H-5	Hess Bakken Investments II, LLC	Drilling
5.5	Line Section 25 Loop	656	TI-Stenbak- 158-95-2526H-2	Hess Bakken Investments II, LLC	Drilling

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
5.5	Line Section 25 Loop	674	TI-Stenbak- 158-95-2526H-3	Hess Bakken Investments II, LLC	Drilling
5.5	Line Section 25 Loop	692	TI-Stenbak- 158-95-2526H-4	Hess Bakken Investments II, LLC	Drilling
5.6	Line Section 25 Loop	197	Tioga-Madison Unit J-134	Amerada Hess Corporation	Plugged and Abandoned
5.7	Line Section 25 Loop	466	TI-Blestrud-158-94- 3029H-3	Hess Bakken Investments II, LLC	Permit Now Cancelled
5.7	Line Section 25 Loop	464	TI-Hilleren-158-95- 2526H-3	Hess Bakken Investments II, LLC	Permit Now Cancelled
5.8	Line Section 25 Loop	462	TI-Blestrud-158-94- 3029H-2	Hess Bakken Investments II, LLC	Permit Now Cancelled
5.8	Line Section 25 Loop	460	TI-Hilleren-158-95- 2526H-2	Hess Bakken Investments II, LLC	Permit Now Cancelled
5.8	Line Section 25 Loop	458	TI-Blestrud-158-94- 3029H-1	Hess Bakken Investments II, LLC	Permit Now Cancelled
5.8	Line Section 25 Loop	416	TI-Stenbak-158-95- 2526H-1	Hess Bakken Investments II, LLC	Active
5.9	Line Section 25 Loop	1177	Tioga-Madison Unit I-135	Amerada Hess Corporation	Plugged and Abandoned
6.1	Line Section 25 Loop	52	Tioga-Madison Unit J-136	Hess Bakken Investments II, LLC	Plugged and Abandoned
6.3	Line Section 25 Loop	1681	TMU I-137AH	Hess Bakken Investments II, LLC	Abandoned (Shut-In > 12 months)
6.3	Line Section 25 Loop	1498	Tioga-Madison Unit I-137	Amerada Hess Corporation	Plugged and Abandoned
6.5	Line Section 25 Loop	998	Tioga-Madison Unit K-137	Amerada Hess Corporation	Plugged and Abandoned
6.6	Line Section 25 Loop	579	Tioga-Madison Unit J-138	Amerada Hess Corporation	Plugged and Abandoned
6.9	Line Section 25 Loop	245	Tioga-Madison Unit K-139	Amerada Hess Corporation	Plugged and Abandoned
7.1	Line Section 25 Loop	1285	Tioga-Madison Unit J-140	Hess Bakken Investments II, LLC	Abandoned (Shut-In > 12 months)
7.2	Line Section 25 Loop	1200	Tioga-Madison Unit L-140	Amerada Hess Corporation	Plugged and Abandoned
7.4	Line Section 25 Loop	248	Tioga-Madison Unit K-141	Hess Bakken Investments II, LLC	Abandoned (Shut-In > 12 months)
7.6	Line Section 25 Loop	1725	Tioga-Madison Unit J-142	Amerada Hess Corporation	Plugged and Abandoned
7.7	Line Section 25 Loop	769	Tioga-Madison Unit L-142	Amerada Hess Corporation	Plugged and Abandoned
7.9	Line Section 25 Loop	690	Tioga-Madison Unit K-143hr	Hess Bakken Investments II, LLC	Plugged and Abandoned
8.2	Line Section 25 Loop	308	Tioga-Madison Unit L-144	Hess Bakken Investments II, LLC	Plugged and Abandoned
8.4	Line Section 25 Loop	1153	Tioga-Madison Unit K-145	Amerada Hess Corporation	Plugged and Abandoned
8.5	Line Section 25 Loop	1403	Tioga-Madison Unit M-145	Amerada Hess Corporation	Plugged and Abandoned

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
8.7	Line Section 25 Loop	13	Tioga-Madison Unit L-146	Amerada Hess Corporation	Plugged and Abandoned
8.8	Line Section 25 Loop	431	Tioga-Madison Unit L-146xhr	Hess Bakken Investments II, LLC	Active
9.0	Line Section 25 Loop	861	Tioga-Madison Unit M-147	Amerada Hess Corporation	Plugged and Abandoned
9.2	Line Section 25 Loop	706	Tioga-Madison Unit L-148	Amerada Hess Corporation	Plugged and Abandoned
9.5	Line Section 25 Loop	254	Tioga-Madison Unit M-149	Amerada Hess Corporation	Plugged and Abandoned
9.7	Line Section 25 Loop	1315	Tioga-Madison Unit L-150hr	Hess Bakken Investments II, LLC	Plugged and Abandoned
9.8	Line Section 25 Loop	1231	Tioga-Madison Unit N-150	Amerada Hess Corporation	Plugged and Abandoned
10.0	Line Section 25 Loop	370	Tioga-Madison Unit M-151	Hess Bakken Investments II, LLC	Plugged and Abandoned
10.2	Line Section 25 Loop	1942	Tioga-Madison Unit L-152	Amerada Hess Corporation	Plugged and Abandoned
10.3	Line Section 25 Loop	611	Tioga-Madison Unit N-152	Hess Bakken Investments II, LLC	Plugged and Abandoned
10.5	Line Section 25 Loop	433	Tioga-Madison Unit N-153	Amerada Hess Corporation	Plugged and Abandoned
11.0	Line Section 25 Loop	1724	Tioga-Madison Unit O-155	Amerada Hess Corporation	Plugged and Abandoned
11.3	Line Section 25 Loop	795	L. Hoiby 159-94-30d-19-4h	Petro-Hunt, L.L.C.	Active
11.3	Line Section 25 Loop	722	L. Hoiby 159-94-30d-19-5h	Petro-Hunt, L.L.C.	Active
11.4	Line Section 25 Loop	597	Clair Marie 1-30	Badger Oil Co.	DRY
11.6	Line Section 25 Loop	988	Tande 159-94-29c-20-3h	Petro-Hunt, L.L.C.	Active
12.0	Line Section 25 Loop	1356	Pollard A 1	Phillips Petroleum Company	Dry
12.2	Line Section 25 Loop	112	North Tioga-Madison Unit K-3	Prosper Energy Corp.	Plugged and Abandoned
12.5	Line Section 25 Loop	768	Ole Tande 3	Murex Petroleum Corporation	Plugged and Abandoned
12.7	Line Section 25 Loop	823	North Tioga-Madison Unit K-5	Prosper Energy Corp.	Plugged and Abandoned
13.0	Line Section 25 Loop	137	North Tioga-Madison Unit L-6	Prosper Energy Corp.	Plugged and Abandoned
13.2	Line Section 25 Loop	1193	North Tioga-Madison Unit K-7	Prosper Energy Corp.	Plugged and Abandoned
13.4	Line Section 25 Loop	3234	North Tioga-Madison Unit O-7	Prosper Energy Corp.	Dry
13.4	Line Section 25 Loop	558	North Tioga-Madison Unit M-7	Prosper Energy Corp.	Plugged and Abandoned
13.6	Line Section 25 Loop	919	Arlo Moberg 2	Phoenix Petroleum LLC	Active

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
13.7	Line Section 25 Loop	2203	Moberg 159-94-20a-28-1hs	Petro-Hunt, L.L.C.	Permit Now Cancelled
13.7	Line Section 25 Loop	2278	Moberg 159-94-20a-19-1hs	Petro-Hunt, L.L.C.	Permit Now Cancelled
13.8	Line Section 25 Loop	1076	Producer's Corporation 159-94-17c-8-2h	Petro-Hunt, L.L.C.	Active
13.8	Line Section 25 Loop	566	State Moberg 1-17 1	Phoenix Petroleum LLC	Active
14.3	Line Section 25 Loop	544	North Tioga-Madison Unit M-11	Prosper Energy Corp.	Plugged and Abandoned
Line Section 30 Loop					
0.1	Line Section 30 Loop	213	Justin Swd 1	Bosque Disposal Systems, LLC	Inactive (Shut-In >= 3 months and <= 12 Months)
0.7	Line Section 30 Loop	833	Tioga-Madison Unit I-111	Amerada Hess Corporation	Plugged and Abandoned
1.2	Line Section 30 Loop	829	Tioga-Madison Unit I-109	Amerada Hess Corporation	Plugged and Abandoned
2.3	Line Section 30 Loop	754	Moe 2-1	Donald C. Slawson	Plugged and Abandoned
5.2	Line Section 30 Loop	365	Davidson 14x-34 ^a	XTO Energy Inc.	Active
8.8	Line Section 30 Loop	1027	Plant Disposal 2	Hess Tioga Gas Plant LLC	Active
9.4	Line Section 30 Loop	20	Tioga-Madison Unit G-113	Amerada Hess Corporation	Plugged and Abandoned
Tioga Compressor Lateral					
0.0	Tioga Compressor Lateral	126	Tioga-Madison Unit E-113	Amerada Hess Corporation	Plugged and Abandoned
Staging Areas					
N/A	Weflen Staging Yard	6144	Tioga-Madison Unit B-122	Amerada Hess Corporation	Plugged and Abandoned
N/A	Weflen Staging Yard	5310	Tioga-Madison Unit C-123	Amerada Hess Corporation	Plugged and Abandoned
N/A	Weflen Staging Yard	6951	Tioga-Madison Unit B-124	Hess Corporation	Plugged and Abandoned
N/A	Weflen Staging Yard	4447	Tioga-Madison Unit D-124	Amerada Hess Corporation	Plugged and Abandoned
N/A	Weflen Staging Yard	5963	H. Bakken 11-11h	Hess Corporation	Permit Now Cancelled
N/A	Schmidt Yard	9003	State 1	Calvert Drilling & Producing Co.	Dry
N/A	Flatlands Yard 1	7598	Flatland 43-9-1h	Whiting Oil And Gas Corporation	Active
N/A	Flatlands Yard 1	7636	Flatland 43-9-1xh	Whiting Oil And Gas Corporation	Active

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
N/A	Flatlands Yard 1	7476	TG-Flatland SWD	Tobacco Garden SWD LLC	Active
N/A	Flatlands Yard 1	7520	Flatland 43-9hu	Whiting Oil And Gas Corporation	Active
N/A	Flatlands Yard 1	7559	Flatland 43-9-2h	Whiting Oil And Gas Corporation	Active
N/A	Flatlands Yard 1	7679	Flatland 9-9h	Whiting Oil And Gas Corporation	Plugged and Abandoned
N/A	Flatlands Yard 2	2658	Outlaw Wagon 14-23mbh-Ulw-A	Burlington Resources Oil & Gas Company LP	Active
N/A	Flatlands Yard 2	2687	Outlaw Gap 14-23tfh-A	Burlington Resources Oil & Gas Company LP	Active
N/A	Flatlands Yard 2	2716	Outlaw Gap 14-23mbh-A	Burlington Resources Oil & Gas Company LP	Active
N/A	Flatlands Yard 2	2745	Outlaw Gap 24-23tfh-A	Burlington Resources Oil & Gas Company LP	Active
N/A	Flatlands Yard 2	2775	Outlaw Gap 24-23mbh-A	Burlington Resources Oil & Gas Company LP	Active
N/A	Lobell Yard	8785	Kristin Denise 16-21h	Murex Petroleum Corporation	Active
N/A	68th Street Yard	7723	Olson 32-28	Williams Exploration Co.	Dry
N/A	68th Street Yard	9312	Hove 12-28	Ranch Oil Company	Plugged and Abandoned
N/A	68th Street Yard	10466	Hove 24-21	Tiger Oil Company	Permit Now Cancelled
N/A	Boehm Staging Yard	2057	Flatland 24x-11	XTO Energy Inc.	Permit Now Cancelled
N/A	Delta Contractors Yard	19618	Watford Swd 1	Secure Energy Services USA, LLC	Active
Aboveground Facilities					
N/A	Elkhorn Creek Compressor Station	1476	Wilson 31-6h	Burlington Resources Oil & Gas Company LP	Active
N/A	Elkhorn Creek Compressor Station	1024	Pembroke Swd #1	E-Source Energy SWD, LLC	Active
N/A	Lignite Tract	46399	Anderson 1	Phoenix Petroleum LLC	Active
N/A	Lignite Tract	47139	Lignite-Madison Unit 30	MCOR Oil & Gas Corp.	Plugged and Abandoned
N/A	Lignite Tract	47883	Lignite Gas Plant Swd Well 1	Citco	Plugged and Abandoned

APPENDIX G (cont'd)

**North Bakken Expansion Project
Summary of Oil and Gas Wells Within 0.25 Mile of the Proposed Project**

Facility/Milepost	Nearest Project Workspace	Distance From Workspace (feet)	Well Name	Well Operator/ Owner	Well Status
<p>Source: North Dakota Department of Mineral Resources. 2019. Oil and Gas Division – Oil and Gas GIS Shapefiles. Available online at https://www.dmr.nd.gov/OaGIMS/viewer.htm. Downloaded September 2019.</p>					
<p>^a These wells are also located within 500 feet of a proposed guided bore roadway crossing. The distance from the guided bores to the oil and gas wells ranges from 240 to 500 feet and, in all cases, is greater than the distance to the nearest Project workspace shown in this table.</p>					
<p>Notes: NA = Not available.</p>					

APPENDIX H
SEED MIX RECOMMENDATIONS

U.S. Forest Service Seed Mix

#37-28A Seed Mixture (Revised 07/18/2013)

Company:
Well ID:
Date:

Seeding Rate Guidelines Scenario #13 All Sites

Species	Preferred Cultivar, Ecotype, or Germplasm	Common Name	A % of Mix	B Number Seed per lb.	C Number Seed per ft ²	D Number Seed per acre	E Drilled PLS lb./acre
Cool Season Grasses:							
<i>Elymus canadensis</i>	Mandan	Canada wildrye	0.15	115,000	7.5	326,700	2.8
<i>Nassella viridula</i>	Lodorm	Green needlegrass	0.20	180,000	10.0	435,600	2.4
<i>Pascopyrum smithii</i>	Rodan	Western wheatgrass	0.25	112,000	12.5	544,500	4.9
Warm Season Grasses							
<i>Bouteloua gracilis</i>	Bad River	Blue grama	0.10	750,000	5.0	217,800	0.3
<i>Calamovilfa longifolia</i>	Goshen	Prairie sandreed	0.10	275,000	5.0	217,800	0.8
<i>Schizachyrium scoparium</i>	Badlands	Little bluestem	0.10	286,000	5.0	217,800	0.8
Alternate Warm Season (for one of above species)							
<i>Bouteloua curtipendula</i>	Pierre	Sideoats grama	0.10	180,000	5.0	217,800	1.2
Forbs							
<i>Dalea purpurea</i> OR <i>Dalea candida</i>	Local ¹ Antelope ¹	Purple prairieclover White prairieclover	0.04 0.04	290,000 278,000	1.8 1.8	78,408 78,408	0.25 0.3
<i>Helianthus pauciflorus</i> OR <i>Solidago rigida</i>	Bismarck ¹ Local ¹	Stiff sunflower Stiff goldenrod	0.03 0.03	85,000 656,000	1.4 1.4	60,984 60,984	0.7 0.1
<i>Echinacea angustifolia</i> OR <i>Ratibida columnifera</i>	Bismarck ¹ Local ¹	Purple coneflower Prairie coneflower	0.03 0.03	120,000 737,000	1.4 1.4	60,984 60,984	0.5 0.1
Totals			100%		49.6	Forbs Alternate Forbs	13.4 (12.5)

Seeding Rates Formulas

- A - % of Mix
 B - Number of seeds per lb.
 C - Number of seeds per ft² (C = A x 50)
 D - Number of seeds per acre (D = C x 43560)
 E - Drilled Pure Live Seed (PLS) lb./acre (E = D / B)

(See page 2 for additional information)

- ❖ Use of Pure Live Seed (PLS) for calculating seed mixtures.
 - Planting is based on approximately 50 seed per square foot and/or 12-16 pounds PLS per acre.
 - All of the seed mixtures in this guide give the rate of PLS for each species per acre. These rates were derived using three basic figures: percent of each species desired by composition, number of seeds per pound according to species, and total number of PLS per square foot.
 - The following equation should be used to calculate how much seed is needed to provide the required pounds of PLS needed.

$$\% \text{ Purity} \times \text{Germination Rate } \% = \% \text{ PLS}$$

$$\text{Pounds of PLS Desired divided by } \% \text{ PLS} = \text{Pounds of Seed Required}$$

An example of this is: 10 lbs. of PLS is required. The given seed lot for this species has a purity of 95% and a germination rate of 85%. How many pounds of seed will be necessary to have 10 PLS?

$$.95 \text{ (Purity)} \times .85 \text{ (germination rate)} = .81 \text{ (\% PLS)}$$

$$10 \text{ (required poundage) divided by } .81 \text{ (\%PLS)} = 12.3$$

12.3 pounds of seed will be necessary to provide 10 lbs PLS of seed.

- ❖ Cultivars listed in the second column are preferred, but local seed collections grown for harvest are acceptable if performance and origin are certified or documented. All seed sources should be derived from local collections or a general area extending 300 miles north and 200 miles south of the area to be reclaimed, and within similar elevation and precipitation zones as western North Dakota, ie from Jamestown on the east to Billings, MT on the west.
- ❖ A local source for forbs is Prairies Diversified located in Bismarck, ND (Roger Rostvet, 701-258-0181). Other sources may be used but they must be verified as local collections and not obtained from a distant source that are distributed by a local dealer.
- ❖ Seeding depth should be one-half inch or less for drilled seed.
- ❖ For broadcast seeding, multiply pounds of each species seeded by 1.5. Seed bed should be thoroughly worked and firm.
- ❖ Best average seeding dates for cool and warm season mixes is May – June. Earlier or later (fall dormant) seeding is likely to result in poor establishment of warm season species and is therefore discouraged.
- ❖ Seed mix may need to be adjusted due to site characteristics and/or lack of available seed for some species. In the latter case, adjust species seeding rates by formulas below table to obtain approximately 50 seed per square foot and/or 12-16 lbs. of PLS per acre for drilled seed and 18-24 lbs. per acre for broadcast seeding.
- ❖ Note: The following are required as per Conditions of Approval #28 B, Certification & Reporting
 1. Report of Seeding (#37-28B)
 2. Certification of Seed Mixture from Seed Company and seed tags from bags or copy of seed tags for all planted material must be submitted to the appropriate Medora or McKenzie Ranger Districts.
- ❖ Call the appropriate Medora or McKenzie Ranger Districts if there are any questions.
 - Medora Ranger District: 701-227-7800.
 - McKenzie Ranger District: 701-842-2393.

Natural Resources Conservation Service Seed Mix Recommendations

Andrea Thornton

From: Crosby, Mark - NRCS, Bowbells, ND <mark.crosby@usda.gov>
Sent: Wednesday, October 2, 2019 7:14 AM
To: Mike Buckless
Cc: Andrea Thornton; Destiny Kerr
Subject: RE: WBI Energy Seed Mix Review - Burke County
Attachments: ND_CPA_9_WBI_Grassand.xlsm; ND_CPA_9_WBI_Pasture.xlsm

Follow Up Flag: Follow up
Flag Status: Completed

Hello Mike,

I've modified the Grassland and Pasture mixes to species that are proven in Burke County, see attached. We are dominated by cool season species in this region, so I removed the warm season grasses like the bluestems, sideoats grama, and switchgrass. Our specifications don't recommend seeding warm season grasses in the fall/dormant windows. If your plans changed, and seeding took place in May or June, you could add the warm season grasses into the mix.

I also removed Smooth Bromegrass, Crested Wheatgrass, and Kentucky Bluegrass from the mixes. These species are considered invasive. If present adjacent to the restoration area, these species will eventually encroach on to the disturbed sites.

I would recommend including a nurse crop, up to ten pounds per acre of oats or barley with the grass seed. If possible, drill the seed rather than broadcast. It is cheap insurance putting the seed in the soil rather than hoping it stays in place with a broadcast operation. Ensure the seedbed is firm, packed so that an adult footprint is barely visible. Loose soil creates poor seed to soil contact and will reduce germination and establishment of the small seeded grasses.

For the DOT mix, I recommend removing the switchgrass and adding 3 lbs of green wheatgrass. Again, if restoration took place in the spring, the switchgrass could be added.

Let me know if you have any other questions.

Thanks,
Mark Crosby
District Conservationist
NRCS - Bowbells FO
701-377-2831, ext. 110

From: Mike Buckless <Mike.Buckless@erm.com>
Sent: Wednesday, October 2, 2019 7:56 AM
To: Crosby, Mark - NRCS, Bowbells, ND <mark.crosby@usda.gov>
Cc: Andrea Thornton <Andrea.Thornton@erm.com>; Destiny Kerr <Destiny.Kerr@erm.com>
Subject: WBI Energy Seed Mix Review - Burke County

Good morning Mr. Crosby,

ERM is preparing environmental review documents on behalf of WBI Energy Transmission, Inc. for a development project affecting land in Burke County, ND. We respectfully request your review and comments on the proposed seed-

mixes for use during restoration of the construction work area. Please see the attached document for the proposed seed-mixes and additional background information.

Your time and assistance is greatly appreciated. Please feel free to reach out to myself or Andrea Thornton (cc'd) if you have any questions.

Mike Buckless

ERM

15 Park Row West | Suite 104 | Providence, RI 02903

M +1 (401) 447-5391

E mike.buckless@erm.com | **W** www.erm.com



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Planned Seed Mixture Information Worksheet

Seed Mix Information for:	WBI Energy	Date Prepared:	10/2/2019
Address:			
Phone Number:			
Designed By:	M. Crosby		
NRCS Office Phone #:			
Field Information:		Acres to be seeded with this mix:	1.0

Species ¹	Variety ¹	Percent of Mix	Lbs/Acre PLS*	Total Lbs PLS
Wildrye, Canada		10.0%	0.98	1.0
Wheatgrass, Intermediate		15.0%	1.91	1.9
Wheatgrass, Slender awned & bearded		10.0%	0.75	0.8
Wheatgrass, Pubescent		15.0%	1.91	1.9
Cicer Milkvetch		20.0%	2.40	2.4
Wheatgrass, Green		30.0%	4.50	4.5
		100.0%	Total	12.5
Companion Crop:				
Lbs/Acre	= Total		Lbs.	

Notes/comments: * PLS = Pure Live Seed

Plant only the amount of seed that is noted on the plan, planting too much or too little will not meet NRCS planting specifications and may affect potential cost-share, if available.

Seed germination test needs to be current, within 12 months of planting.

When a specific variety is required, enter the variety in the column above.

1/ Any substitution of planned species or variety must be approved by NRCS.

Use approved, named varieties of grass, forbs and legumes from the following approved sources:

- Common grass seed originating from ND, SD, NE, MT, WY, MN, Alberta, Saskatchewan or Manitoba
- Common forb and legume seed originating from ND, SD, NE, MT, WA, OR, ID, WI, IA, CO, WY, MN, Alberta, Saskatchewan or Manitoba
- Common alfalfa originating from ND, SD, MN, MT, Alberta, Saskatchewan or Manitoba

APPENDIX I

WETLANDS CROSSED OR OTHERWISE AFFECTED BY THE PROJECT

APPENDIX I

**North Bakken Expansion Project
Wetlands Crossed or Otherwise Affected by the Project ^{a, b}**

Wetland ID	Cowardin Classification	Milepost	Centerline Distance Crossed (feet)	Construction Impact (acres)	Operation Impact (acres)	Proposed Crossing Method
PIPELINE FACILITIES						
Tioga-Elkhorn Creek						
w-wm-ea-008e	PEM	0.7	38.7	0.1	0.0	Open Cut
w-wm-ee-001e	PEM	12.7	23.4	<0.1	0.0	Open Cut
w-wm-eb-008e	PEM	17.8	76.8	0.1	0.0	Open Cut
w-mk-ea-001e	PEM	27.9	17.7	<0.1	0.0	Open Cut
w-mk-ea-002e	PEM	28.8	3.6	<0.1	0.0	Guided Bore
w-mk-eb-002e	PEM	29.1	158.3	0.3	0.0	Open Cut
w-mk-ea-003e	PEM	38.2	19.0	<0.1	0.0	Guided Bore
w-mk-eb-003e	PEM	41.2	321.1	0.6	0.0	Open Cut
DSK_NWI_7	PEM	44.6	41.4	0.1	0.0	Open Cut
w-mk-ea-004e	PEM	46.7	26.3	0.1	0.0	Guided Bore
w-mk-eb-004e	PEM	50.8	109.9	0.2	0.0	Open Cut
DSK_NWI_1	PEM	55.3	19.9	<0.1	0.0	Open Cut
w-mk-eb-005e	PEM	60.1	101.7	0.2	0.0	Open Cut
			Subtotal	1.8	0.0	
Line Section 25 Loop						
w-wm-eb-002e	PEM	0.7	140.1	0.2	0.0	Guided Bore
w-wm-ea-002e	PEM	4.7	363.9	0.3	0.0	Open Cut
w-wm-ea-001e	PEM	4.9	0	<0.1	0.0	Open Cut
w-mt-ea-001e	PEM	9.9	4.9	<0.1	0.0	Open Cut
w-bk-ea-013	PEM	11.1	98.2	0.2	0.0	Open Cut
w-bk-ea-005e	PEM	11.9	48.6	0.1	0.0	Open Cut
w-bk-ea-006e	PEM	12.0	68.5	0.1	0.0	Open Cut
w-bk-eb-002e	PEM	13.3	29.2	<0.1	0.0	Open Cut
w-bk-eb-001e	PEM	13.5	590.8	1.0	0.0	Guided Bore
w-bk-ea-003e	PEM	16.1	0.0	<0.1	0.0	Open Cut
w-bk-ea-002e	PEM	16.1	0.0	<0.1	0.0	Open Cut
w-bk-ea-001e	PEM	16.3	22.9	<0.1	0.0	Guided Bore
			Subtotal	2.1	0.0	
Line Section 30 Loop						
w-wm-ee-002e	PEM	0.0	0.0	<0.1	0.0	Open Cut
w-wm-ec-004e	PEM	0.2	0.0	<0.1	0.0	Open Cut
w-wm-ec-005e	PEM	0.3	196.6	0.3	0.0	Open Cut
w-wm-ec-003e	PEM	5.8	40.9	0.1	0.0	Open Cut
w-wm-ea-008e ^c	PEM	8.7	36.4	0.1	0.0	Open Cut
			Subtotal	0.6	0.0	
Uprate Line Section 25						
w-bk-ea-010e	PEM	N/A	394	0.6	0.0	Guided Bore
			Subtotal	0.6	0.0	

APPENDIX I (cont'd)

**North Bakken Expansion Project
Wetlands Crossed or Otherwise Affected by the Project ^{a, b}**

Wetland ID	Cowardin Classification	Milepost	Centerline Distance Crossed (feet)	Construction Impact (acres)	Operation Impact (acres)	Proposed Crossing Method
ACCESS ROADS						
w-wm-eb-009e	PEM	NA	NA	<0.1	0.0	N/A - Matting
DSK_NWI_14	PEM	NA	NA	<0.1	0.0	N/A - Matting
			Subtotal	0.1	0.0	
YARDS						
DSK_NWI_15	PEM	NA	NA	0.1	0.0	N/A - Matting
DSK_NWI_16	PEM	NA	NA	0.1	0.0	N/A - Matting
			Subtotal	0.2	0.0	
			TOTAL	5.2	0.0 ^d	

^a The numbers in this table have been rounded for presentation purposes. As a result, the subtotals and totals may not reflect the exact sum of the addends in all cases.

^b PEM = Palustrine emergent wetland

^c Wetland is crossed by both the Tioga-Elkhorn Creek Pipeline and Line Section 30 Loop. As construction of the pipelines will be staggered, impacts are presented for each pipeline route.

^d In wetlands, WBI Energy will not need to maintain a 10-foot strip over the pipeline in an herbaceous condition since all of the wetlands affected by operation of the Project are emergent, and therefore already in an herbaceous state. All wetlands will be able to revert to pre-existing conditions, therefore, no permanent operational impacts on wetlands will occur from the Project.

APPENDIX J

CONSTRUCTION EMISSION CALCULATIONS



Project: North Bakken Expansion Project
 Subject: Construction Emissions
 Task: Construction Emission Totals for Entire Project

Prepared by: PCB
 Reviewed by: AMC
 Date: 16-Oct-19

Total Emissions	Pollutant (Tons)							
	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	HAP	CO _{2e}
Elkhorn Creek Compressor Station								
Diesel Non-Road Equipment	1.01	1.17	0.09	0.08	0.00	0.17	0.05	5.00
Diesel and Gas On-Road Equipment	0.55	0.05	0.00	0.00	0.00	0.04	0.00	50.45
Construction Activity Fugitive Dust	---	---	1.29	0.19	---	---	---	---
Unpaved Roadway Fugitive Dust	---	---	0.00	0.00	---	---	---	---
Emissions Total:	1.57	1.22	1.38	0.28	0.00	0.21	0.05	55.45
Tioga Compressor Station								
Diesel Non-Road Equipment	1.14	1.34	0.10	0.09	0.00	0.20	0.05	5.74
Diesel and Gas On-Road Equipment	0.40	0.04	0.00	0.00	0.00	0.03	0.00	35.62
Construction Activity Fugitive Dust	---	---	1.04	0.16	---	---	---	---
Unpaved Roadway Fugitive Dust	---	---	0.00	0.00	---	---	---	---
Emissions Total:	1.54	1.37	1.14	0.25	0.00	0.23	0.05	41.36
Tioga-Elkhorn Creek Pipeline Segment								
Diesel Non-Road Equipment	12.76	17.94	1.22	1.18	0.06	1.82	1.01	335.79
Diesel and Gas On-Road Equipment	1.47	0.24	0.01	0.01	0.00	0.11	0.01	155.07
Construction Activity Fugitive Dust	---	---	122.70	17.04	---	---	---	---
Unpaved Roadway Fugitive Dust	---	---	19.45	1.95	---	---	---	---
Emissions Total:	14.23	18.18	143.38	20.18	0.06	1.94	1.01	490.86
Line Section 25 Loop Pipeline Segment								
Diesel Non-Road Equipment	2.89	4.88	0.31	0.25	0.02	0.42	0.16	66.24
Diesel and Gas On-Road Equipment	1.11	0.18	0.01	0.01	0.00	0.09	0.01	115.52
Construction Activity Fugitive Dust	---	---	33.32	4.61	---	---	---	---
Unpaved Roadway Fugitive Dust	---	---	3.46	0.35	---	---	---	---
Emissions Total:	4.00	5.06	37.10	5.21	0.02	0.51	0.17	181.76

Line Section 30 Loop Pipeline Segment								
Diesel Non-Road Equipment	2.12	3.45	0.21	0.21	0.01	0.29	0.17	38.33
Diesel and Gas On-Road Equipment	0.15	0.04	0.00	0.00	0.00	0.01	0.00	17.71
Construction Activity Fugitive Dust	---	---	15.32	2.11	---	---	---	---
Unpaved Roadway Fugitive Dust	---	---	0.27	0.03	---	---	---	---
Emissions Total:	2.27	3.48	15.80	2.35	0.01	0.30	0.17	56.04
Tioga Compressor Lateral Pipeline Segment								
Diesel Non-Road Equipment	1.05	1.07	0.07	0.07	0.00	0.14	0.06	7.84
Diesel and Gas On-Road Equipment	0.07	0.02	0.00	0.00	0.00	0.01	0.00	8.86
Construction Activity Fugitive Dust	---	---	0.78	0.11	---	---	---	---
Unpaved Roadway Fugitive Dust	---	---	0.01	0.00	---	---	---	---
Emissions Total:	1.12	1.09	0.86	0.18	0.00	0.14	0.06	16.70
Uprate Line Section 25 Pipeline Segment								
Diesel Non-Road Equipment	1.04	0.98	0.07	0.07	0.00	0.13	0.04	7.42
Diesel and Gas On-Road Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45
Construction Activity Fugitive Dust	---	---	1.89	0.28	---	---	---	---
Unpaved Roadway Fugitive Dust	---	---	0.11	0.01	---	---	---	---
Emissions Total:	1.04	0.98	2.07	0.36	0.00	0.13	0.04	7.87
McKenzie and Williams Information - Lake Sakakawea HDD								
Diesel Non-Road Equipment	0.93	3.46	0.15	0.14	0.01	0.15	0.15	13.91
Diesel and Gas On-Road Equipment	0.01	0.02	0.00	0.00	0.00	0.00	0.00	5.67
Construction Activity Fugitive Dust	---	---	0.93	0.14	---	---	---	---
Unpaved Roadway Fugitive Dust	---	---	0.00	0.00	---	---	---	---
Emissions Total:	0.93	3.49	1.08	0.28	0.01	0.16	0.15	19.58
Project Emission Totals:	26.70	34.88	202.82	29.09	0.11	3.62	1.71	869.62

1 CO₂e is the sum of CO₂, CH₄, and N₂O multiplied by the applicable global warming potential expressed in tons.



Project: North Bakken Expansion Project
 Subject: Construction Emissions
 Task: Off-Road Construction Equipment Information

Prepared by: PCB
 Reviewed by: AMC
 Date: 16-Oct-19

Equipment Type	SCC	Fuel Type ¹	Hours/week ¹	Load Factor ¹	Engine Rating ¹ (hp)	Quantity ¹	Total Weeks ¹	Total Hours for Project ¹	hp-hrs	Estimated Fuel Consumption (gallons/hr)	Estimated Fuel Consumption (MMBtu/hr)	NONROAD Emission Factors									
												CO ²	NO _x ²	PM ₁₀ ²	PM _{2.5} ²	SO ₂ ²	VOC ²	HAP	CO ₂ ³	CH ₄ ³	N ₂ O ³
												lb/hp-hr	lb/hp-hr	lb/hp-hr	lb/hp-hr	lb/hp-hr	lb/hp-hr	lb/hp-hr	kg/MMBtu	kg/MMBtu	kg/MMBtu
McKenzie County Information - Elkhorn Creek Compressor Station (new)																					
Scraper		Diesel	40	0.59	350	1	2	80	16,520	4	0.52	0.00111	0.00253	0.00019	0.00018	0.00001	0.00015	0.00008	1.18	0.003	0.0006
Dozers		Diesel	40	0.59	200	1	2	80	9,440	2	0.30	0.00039	0.00111	0.00008	0.00008	0.00001	0.00007	0.00004	1.18	0.003	0.0006
Grader		Gasoline	50	0.59	200	1	4	200	23,600	2	0.30	0.00037	0.00107	0.00008	0.00007	0.00001	0.00007	0.00004	1.18	0.003	0.0006
Trackhoes		Diesel	40	0.59	200	2	5	400	47,200	4	0.59	0.00030	0.00085	0.00006	0.00006	0.00001	0.00006	0.00003	1.18	0.003	0.0006
Generators		Diesel	60	0.50	100	2	18	2,160	108,000	2	0.25	0.00304	0.00634	0.00050	0.00049	0.00001	0.00149	0.00019	1.30	0.003	0.0006
Air Compressors		Diesel	40	0.50	100	1	18	720	36,000	1	0.13	0.02894	0.00747	0.00052	0.00050	0.00002	0.00171	0.00019	2.85	0.003	0.0006
Concrete Mixer Truck		Diesel	10	0.59	250	1	12	120	17,700	3	0.37	0.00098	0.00401	0.00017	0.00016	0.00001	0.00028	0.00014	1.17	0.003	0.0006
Skid Steer Loader		Diesel	20	0.59	50	2	12	480	14,160	1	0.15	0.00278	0.00750	0.00041	0.00040	0.00001	0.00075	0.00041	1.53	0.003	0.0006
Large Crane		Diesel	40	0.59	350	2	1	80	16,520	8	1.04	0.00090	0.00295	0.00014	0.00013	0.00001	0.00018	0.00010	1.17	0.003	0.0006
Truck mounted Crane		Diesel	30	0.59	250	2	18	1,080	159,300	5	0.74	0.00047	0.00182	0.00009	0.00008	0.00001	0.00011	0.00006	1.17	0.003	0.0006
Rubber tire Backhoe		Diesel	20	0.59	100	2	14	560	33,040	2	0.30	0.00667	0.00594	0.00095	0.00093	0.00001	0.00071	0.00036	1.53	0.003	0.0006
Fork Lift		Diesel	10	0.59	120	1	18	180	12,744	1	0.18	0.00287	0.00519	0.00064	0.00062	0.00001	0.00068	0.00034	1.38	0.003	0.0006
Front End Loader		Diesel	40	0.59	200	1	3	120	14,160	2	0.30	0.00215	0.00397	0.00041	0.00040	0.00001	0.00054	0.00004	1.38	0.003	0.0006
Welding Rigs		Diesel	40	0.59	25	5	18	3,600	53,100	1	0.19	0.00334	0.00831	0.00038	0.00037	0.00001	0.00079	0.00044	1.31	0.003	0.0006
Williams County Information - Tioga Compressor Station (existing)																					
Scraper		Diesel	40	0.59	350	1	2	80	16,520	4	0.52	0.00111	0.00253	0.00019	0.00018	0.00001	0.00015	0.00008	1.18	0.003	0.0006
Dozers		Diesel	40	0.59	200	1	2	80	9,440	2	0.30	0.00039	0.00111	0.00008	0.00008	0.00001	0.00007	0.00004	1.18	0.003	0.0006
Grader		Gasoline	50	0.59	200	1	4	200	23,600	2	0.30	0.00037	0.00107	0.00008	0.00007	0.00001	0.00007	0.00004	1.18	0.003	0.0006
Trackhoes		Diesel	50	0.59	200	2	5	500	59,000	4	0.59	0.00030	0.00085	0.00006	0.00006	0.00001	0.00006	0.00003	1.18	0.003	0.0006
Generators		Diesel	60	0.50	100	2	20	2,400	120,000	2	0.25	0.00304	0.00634	0.00050	0.00049	0.00001	0.00149	0.00019	1.30	0.003	0.0006
Air Compressors		Diesel	40	0.50	100	1	20	800	40,000	1	0.13	0.02894	0.00747	0.00052	0.00050	0.00002	0.00171	0.00019	2.85	0.003	0.0006
Concrete Mixer Truck		Diesel	10	0.59	250	1	14	140	20,650	3	0.37	0.00098	0.00401	0.00017	0.00016	0.00001	0.00028	0.00014	1.17	0.003	0.0006
Skid Steer Loader		Diesel	20	0.59	50	2	14	560	16,520	1	0.15	0.00278	0.00750	0.00041	0.00040	0.00001	0.00075	0.00041	1.53	0.003	0.0006
Large Crane		Diesel	40	0.59	350	2	2	160	33,040	8	1.04	0.00090	0.00295	0.00014	0.00013	0.00001	0.00018	0.00010	1.17	0.003	0.0006
Truck mounted Crane		Diesel	30	0.59	250	2	20	1,200	177,000	5	0.74	0.00047	0.00182	0.00009	0.00008	0.00001	0.00011	0.00006	1.17	0.003	0.0006
Rubber tire Backhoe		Diesel	20	0.59	100	2	16	640	37,760	2	0.30	0.00667	0.00594	0.00095	0.00093	0.00001	0.00071	0.00036	1.53	0.003	0.0006
Fork Lift		Diesel	10	0.59	120	1	20	200	14,160	1	0.18	0.00287	0.00519	0.00064	0.00062	0.00001	0.00068	0.00034	1.38	0.003	0.0006
Front End Loader		Diesel	40	0.59	200	1	4	160	18,880	2	0.30	0.00215	0.00397	0.00041	0.00040	0.00001	0.00054	0.00004	1.38	0.003	0.0006
Welding Rigs		Diesel	40	0.59	25	5	20	4,000	59,000	1	0.19	0.00334	0.00831	0.00038	0.00037	0.00001	0.00079	0.00044	1.31	0.003	0.0006
McKenzie County Information - Tioga-Elkhorn Creek Pipeline Segment																					
Air Compressor		Diesel	40	0.80	80	2	8	640	40,960	2	0.32	0.02894	0.00747	0.00052	0.00050	0.00002	0.00171	0.00019	2.85	0.003	0.0006
ATV		Gasoline	30	0.50	40	4	25	3,000	60,000	1	0.20	0.08158	0.00092	0.00019	0.00017	0.00000	0.00002	0.00044	0.52	0.003	0.0006
Tractors/loaders/backhoe		Diesel	60	0.80	75	1	4	240	14,400	1	0.15	0.00358	0.00721	0.00049	0.00047	0.00001	0.00067	0.00062	1.53	0.003	0.0006
Concrete Mixer Truck		Diesel	30	1.00	325	1	6	180	58,500	6	0.82	0.00111	0.00395	0.00014	0.00014	0.00001	0.00024	0.00022	1.17	0.003	0.0006
Crane, wheeled		Diesel	25	0.80	350	1	4	100	28,000	5	0.70	0.00090	0.00295	0.00014	0.00013	0.00001	0.00018	0.00018	1.17	0.003	0.0006
Dozers		Diesel	60	1.00	410	3	12	2,160	885,600	23	3.09	0.00107	0.00245	0.00018	0.00018	0.00001	0.00015	0.00015	1.18	0.003	0.0006
Dozers		Diesel	20	1.00	150	1	25	500	75,000	3	0.38	0.00049	0.00162	0.00012	0.00012	0.00001	0.00007	0.00007	1.18	0.003	0.0006
Dump Truck		Diesel	40	0.80	325	2	8	640	166,400	10	1.31	0.00271	0.00518	0.00060	0.00058	0.00001	0.00065	0.00061	1.38	0.003	0.0006
Generators		Diesel	60	1.00	250	2	25	3,000	750,000	9	1.26	0.00107	0.00434	0.00019	0.00019	0.00001	0.00012	0.00012	1.17	0.003	0.0006
Grader		Diesel	60	1.00	255	2	14	1,680	428,400	9	1.28	0.00037	0.00107	0.00008	0.00007	0.00001	0.00007	0.00006	1.18	0.003	0.0006
Guided Bore Machine		Diesel	60	0.60	150	1	12	720	64,800	2	0.23	0.00112	0.00447	0.00026	0.00026	0.00001	0.00028	0.00026	1.17	0.003	0.0006
Pickup Truck		Gasoline	30	0.25	300	20	25	15,000	1,125,000	27	3.77	0.00101	0.00261	0.00020	0.00019	0.00001	0.00018	0.00018	1.18	0.003	0.0006
Sideboom		Diesel	60	0.50	240	3	20	3,600	432,000	7	0.90	0.00047	0.00182	0.00009	0.00008	0.00001	0.00011	0.00005	1.17	0.003	0.0006
Skid Steer Loader		Diesel	20	0.80	50	1	25	500	20,000	1	0.10	0.00278	0.00750	0.00041	0.00040	0.00001	0.00075	0.00075	1.53	0.003	0.0006
Trackhoe		Diesel	60	1.00	320	4	25	6,000	1,920,000	23	3.21	0.00072	0.00180	0.00012	0.00012	0.00001	0.00010	0.00010	1.18	0.003	0.0006
Welding Machine		Diesel	60	0.80	35	12	20	14,400	403,200	6	0.84	0.00396	0.00821	0.00061	0.00059	0.00001	0.00103	0.00045	1.53	0.003	0.0006
Williams County Information - Tioga-Elkhorn Creek Pipeline Segment																					
Air Compressor		Diesel	40	0.80	80	2	8	640	40,960	2	0.32	0.02894	0.00747	0.00052	0.00050	0.00002	0.00171	0.00019	2.85	0.003	0.0006
ATV		Gasoline	30	0.50	40	4	25	3,000	60,000	1	0.20	0.08158	0.00092	0.00019	0.00017	0.00000	0.00002	0.00044	0.52	0.003	0.0006
Tractors/loaders/backhoe		Diesel	60	0.80	75	1	4	240	14,400	1	0.15	0.00358	0.00721	0.00049	0.00047	0.00001	0.00067	0.00062	1.53	0.003	0.0006
Concrete Mixer Truck		Diesel	30	1.00	325	1	6	180	58,500	6	0.82	0.00111	0.00395	0.00014	0.00014	0.00001	0.00024	0.00022	1.17	0.003	0.0006
Crane, wheeled		Diesel	25	0.80	350	1	4	100	28,000	5	0.70	0.00090	0.00295	0.00014	0.00013	0.00001	0.00018	0.00018	1.17	0.003	0.0006
Dozers		Diesel	60	1.00	410	3	12	2,160	885,600	23	3.09	0.00107	0.00245	0.00018							

Equipment Type	SCC	Fuel Type ¹	Hours/week ¹	Load Factor ¹	Engine Rating ¹ (hp)	Quantity ¹	Total Weeks ¹	Total Hours for Project ¹	hp-hrs	Estimated Fuel Consumption (gallons/hr)	Estimated Fuel Consumption (MMBtu/hr)	NONROAD Emission Factors									
												CO ² lb/hp-hr	NO _x ² lb/hp-hr	PM ₁₀ ² lb/hp-hr	PM _{2.5} ² lb/hp-hr	SO ₂ ² lb/hp-hr	VOC ² lb/hp-hr	HAP lb/hp-hr	CO ₂ ² lb/hp-hr	CH ₄ ³ kg/MMBtu	N ₂ O ³ kg/MMBtu
Burke, Montrail, and Williams County Information - Line Section 25 Loop Pipeline Segment																					
Air Compressor		Diesel	40	0.80	80	1	6	240	15,360	1	0.16	0.02894	0.00747	0.00052	0.00050	0.00002	0.00171	0.00019	2.85	0.003	0.0006
ATV		Gasoline	35	0.50	40	2	17	1,190	23,800	1	0.10	0.08158	0.00092	0.00019	0.00017	0.00000	0.00902	0.00044	0.52	0.003	0.0006
Tractors/loaders/backhoe		Diesel	60	0.80	75	1	8	480	28,800	1	0.15	0.00358	0.00721	0.00049	0.00047	0.00001	0.00067	0.00015	1.53	0.003	0.0006
Concrete Mixer Truck		Diesel	20	0.80	150	1	2	40	4,800	2	0.30	0.00114	0.00462	0.00025	0.00024	0.00001	0.00029	0.00012	1.17	0.003	0.0006
Crane, wheeled		Diesel	20	1.00	350	1	2	40	14,000	6	0.88	0.00090	0.00295	0.00014	0.00013	0.00001	0.00018	0.00008	1.17	0.003	0.0006
Dozers		Diesel	60	1.00	410	2	6	720	295,200	15	2.06	0.00107	0.00245	0.00018	0.00018	0.00001	0.00015	0.00007	1.18	0.003	0.0006
Dump Truck		Diesel	20	0.80	325	1	4	80	20,800	5	0.65	0.00271	0.00518	0.00060	0.00058	0.00001	0.00065	0.00028	1.38	0.003	0.0006
Generators		Diesel	60	0.50	250	3	17	3,060	382,500	7	0.94	0.00107	0.00434	0.00019	0.00019	0.00001	0.00012	0.00012	1.17	0.003	0.0006
Grader		Diesel	60	1.00	140	2	12	1,440	201,600	5	0.70	0.00047	0.00157	0.00012	0.00012	0.00001	0.00007	0.00003	1.18	0.003	0.0006
Guided Bore Machine		Diesel	60	0.80	150	2	14	1,680	201,600	4	0.60	0.00112	0.00447	0.00026	0.00026	0.00001	0.00028	0.00012	1.17	0.003	0.0006
Pickup Truck		Gasoline	30	0.25	150	12	17	6,120	229,500	8	1.13	0.00101	0.00261	0.00020	0.00019	0.00001	0.00018	0.00018	1.18	0.003	0.0006
Sideboom		Diesel	60	1.00	240	3	14	2,520	604,800	13	1.81	0.00047	0.00182	0.00009	0.00008	0.00001	0.00011	0.00005	1.17	0.003	0.0006
Skid Steer Loader		Diesel	30	1.00	50	1	17	510	25,500	1	0.13	0.00278	0.00750	0.00013	0.00040	0.00001	0.00075	0.00034	1.31	0.003	0.0006
Trackhoe		Diesel	60	1.00	320	5	17	5,100	1,632,000	29	4.02	0.00072	0.00180	0.00012	0.00006	0.00001	0.00010	0.00004	1.18	0.003	0.0006
Welding Machine		Diesel	60	0.80	35	10	6	3,600	100,800	5	0.70	0.00396	0.00821	0.00061	0.00059	0.00001	0.00103	0.00045	1.53	0.003	0.0006
Williams County Information - Line Section 30 Loop Pipeline Segment																					
Air Compressor		Diesel	40	0.80	80	1	3	120	7,680	1	0.16	0.02894	0.00747	0.00052	0.00050	0.00002	0.00171	0.00019	2.85	0.003	0.0006
ATV		Gasoline	30	0.50	40	2	17	1,020	20,400	1	0.10	0.08158	0.00092	0.00019	0.00017	0.00000	0.00902	0.00044	0.52	0.003	0.0006
Tractors/loaders/backhoe		Diesel	60	0.80	75	1	4	240	14,400	1	0.15	0.00358	0.00721	0.00049	0.00047	0.00001	0.00067	0.00062	1.53	0.003	0.0006
Concrete Mixer Truck		Diesel	20	0.80	150	1	2	40	4,800	2	0.30	0.00114	0.00462	0.00025	0.00024	0.00001	0.00029	0.00027	1.17	0.003	0.0006
Crane, wheeled		Diesel	20	0.80	350	1	2	40	11,200	5	0.70	0.00090	0.00295	0.00014	0.00013	0.00001	0.00018	0.00018	1.17	0.003	0.0006
Dozers		Diesel	60	1.00	410	2	4	480	196,800	15	2.06	0.00107	0.00245	0.00018	0.00018	0.00001	0.00015	0.00015	1.18	0.003	0.0006
Dump Truck		Diesel	20	0.80	325	1	2	40	10,400	5	0.65	0.00271	0.00518	0.00060	0.00058	0.00001	0.00065	0.00061	1.38	0.003	0.0006
Generators		Diesel	60	1.00	250	2	17	2,040	510,000	9	1.26	0.00107	0.00434	0.00019	0.00019	0.00001	0.00012	0.00012	1.17	0.003	0.0006
Grader		Diesel	60	1.00	255	2	10	1,200	306,000	9	1.28	0.00037	0.00107	0.00008	0.00007	0.00001	0.00007	0.00006	1.18	0.003	0.0006
Guided Bore Machine		Diesel	60	0.60	150	1	3	180	16,200	2	0.23	0.00112	0.00447	0.00026	0.00026	0.00001	0.00028	0.00018	1.17	0.003	0.0006
Pickup Truck		Gasoline	30	0.25	300	10	17	5,100	382,500	14	1.88	0.00101	0.00261	0.00020	0.00019	0.00001	0.00018	0.00018	1.18	0.003	0.0006
Sideboom		Diesel	60	0.50	240	2	12	1,440	172,800	4	0.60	0.00047	0.00182	0.00009	0.00008	0.00001	0.00011	0.00005	1.17	0.003	0.0006
Skid Steer Loader		Diesel	20	0.80	50	1	17	340	13,600	1	0.10	0.00278	0.00750	0.00041	0.00040	0.00001	0.00075	0.00075	1.53	0.003	0.0006
Trackhoe		Diesel	60	1.00	320	3	17	3,060	979,200	18	2.41	0.00072	0.00180	0.00012	0.00012	0.00001	0.00010	0.00010	1.18	0.003	0.0006
Welding Machine		Diesel	60	0.80	35	8	3	1,440	40,320	4	0.56	0.00396	0.00821	0.00061	0.00059	0.00001	0.00103	0.00045	1.53	0.003	0.0006
Williams County Information - Tioga Compressor Lateral Pipeline Segment																					
Air Compressor		Diesel	40	0.80	80	1	2	80	5,120	1	0.16	0.02894	0.00747	0.00052	0.00050	0.00002	0.00171	0.00019	2.85	0.003	0.0006
ATV		Gasoline	30	0.50	40	2	12	720	14,400	1	0.10	0.08158	0.00092	0.00019	0.00017	0.00000	0.00902	0.00044	0.52	0.003	0.0006
Tractors/loaders/backhoe		Diesel	60	0.80	75	1	2	120	7,200	1	0.15	0.00358	0.00721	0.00049	0.00047	0.00001	0.00067	0.00062	1.53	0.003	0.0006
Concrete Mixer Truck		Diesel	20	0.80	150	1	1	40	4,800	2	0.30	0.00114	0.00462	0.00025	0.00024	0.00001	0.00029	0.00027	1.17	0.003	0.0006
Crane, wheeled		Diesel	20	0.80	350	1	1	40	11,200	5	0.70	0.00090	0.00295	0.00014	0.00013	0.00001	0.00018	0.00018	1.17	0.003	0.0006
Dozers		Diesel	60	1.00	410	1	2	120	49,200	8	1.03	0.00107	0.00245	0.00018	0.00018	0.00001	0.00015	0.00015	1.18	0.003	0.0006
Generators		Diesel	60	1.00	250	1	4	240	60,000	5	0.63	0.00107	0.00434	0.00019	0.00019	0.00001	0.00012	0.00012	1.17	0.003	0.0006
Grader		Diesel	30	1.00	255	1	2	60	15,300	5	0.64	0.00037	0.00107	0.00008	0.00007	0.00001	0.00007	0.00006	1.18	0.003	0.0006
Guided Bore Machine		Diesel	20	0.60	150	1	1	20	1,800	2	0.23	0.00112	0.00447	0.00026	0.00026	0.00001	0.00028	0.00026	1.17	0.003	0.0006
Pickup Truck		Gasoline	30	0.25	300	5	12	1,800	135,000	7	0.94	0.00101	0.00261	0.00020	0.00019	0.00001	0.00018	0.00018	1.18	0.003	0.0006
Sideboom		Diesel	60	0.50	240	1	12	720	86,400	2	0.30	0.00047	0.00182	0.00009	0.00008	0.00001	0.00011	0.00005	1.17	0.003	0.0006
Skid Steer Loader		Diesel	20	0.80	50	1	12	240	9,600	1	0.10	0.00278	0.00750	0.00041	0.00040	0.00001	0.00075	0.00075	1.53	0.003	0.0006
Trackhoe		Diesel	60	1.00	320	2	12	1,440	460,800	12	1.61	0.00072	0.00180	0.00012	0.00012	0.00001	0.00010	0.00010	1.18	0.003	0.0006
Welding Machine		Diesel	60	0.80	35	4	3	720	20,160	2	0.28	0.00396	0.00821	0.00061	0.00059	0.00001	0.00103	0.00045	1.53	0.003	0.0006
Burke County Information - Uprate Line Section 25 Pipeline Segment																					
Air Compressor		Diesel	40	0.80	80	1	2	80	5,120	1	0.16	0.02894	0.00747	0.00052	0.00050	0.00002	0.00171	0.00019	2.85	0.003	0.0006
ATV		Gasoline	30	0.50	40	2	12	720	14,400	1	0.10	0.08158	0.00092	0.00019	0.00017	0.00000	0.00902	0.00044	0.52	0.003	0.0006
Tractors/loaders/backhoe		Diesel	60	0.80	75	1	2	120	7,200	1	0.15	0.00358	0.00721	0.00049	0.00047	0.00001	0.00067	0.00062	1.53	0.003	0.0006
Concrete Mixer Truck		Diesel	20	0.80	150	1	1	40	4,800	2	0.30	0.00114	0.00462	0.00025	0.00024	0.00001	0.00029	0.00027	1.17	0.003	0.0006
Dozers		Diesel	60	1.00	410	1	2	120	49,200	8	1.03	0.00107	0.00245	0.00018	0.00018	0.00001	0.00015	0.00015	1.18	0.003	0.0006
Dump Truck		Diesel	20	0.80	325	1	2	40	10,400	5	0.65	0.00271	0.00518	0.00060	0.00058	0.00001	0.00065	0.00028	1.38	0.003	0.0006
Generators		Diesel	60	1.00	250	1	4	240	60,000	5	0.63	0.00107	0.00434	0.00019	0						



Project: North Bakken Expansion Project
 Subject: Construction Emissions
 Task: Off-Road Construction Equipment Emissions

Prepared by: PCB
 Reviewed by: AMC
 Date: 16-Oct-19

Equipment Type	Pollutant (Tons)										
	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	HAP	CO ₂	CH ₄	N ₂ O	CO _{2e}
McKenzie County Information - Elkhorn Creek Compressor Station (new)											
Scraper	9.18E-03	2.09E-02	1.56E-03	1.52E-03	7.24E-05	1.26E-03	6.76E-04	0.05	1.37E-04	2.74E-05	0.07
Dozers	1.83E-03	5.25E-03	3.69E-04	3.58E-04	3.84E-05	3.45E-04	1.75E-04	0.03	7.84E-05	1.57E-05	0.04
Grader	4.37E-03	1.26E-02	8.89E-04	8.62E-04	9.58E-05	8.33E-04	4.20E-04	0.08	1.96E-04	3.92E-05	0.09
Trackhoes	7.00E-03	1.99E-02	1.49E-03	1.44E-03	1.90E-04	1.42E-03	7.00E-04	0.31	7.84E-04	1.57E-04	0.38
Concrete Mixer Truck	8.71E-03	3.55E-02	1.47E-03	1.43E-03	8.07E-05	2.48E-03	1.25E-03	0.06	1.47E-04	2.94E-05	0.07
Skid Steer Loader	1.97E-02	5.31E-02	2.91E-03	2.83E-03	8.63E-05	5.33E-03	2.87E-03	0.12	2.35E-04	4.70E-05	0.14
Large Crane	7.41E-03	2.44E-02	1.15E-03	1.11E-03	7.33E-05	1.52E-03	8.13E-04	0.11	2.74E-04	5.49E-05	0.13
Truck mounted Crane	3.73E-02	1.45E-01	6.82E-03	6.61E-03	6.63E-04	9.02E-03	4.73E-03	1.03	2.64E-03	5.29E-04	1.26
Rubber tire Backhoe	1.10E-01	9.81E-02	1.58E-02	1.53E-02	1.96E-04	1.17E-02	5.98E-03	0.28	5.49E-04	1.10E-04	0.33
Fork Lift	1.83E-02	3.31E-02	4.08E-03	3.96E-03	6.86E-05	4.35E-03	2.20E-03	0.05	1.06E-04	2.12E-05	0.06
Front End Loader	1.52E-02	2.81E-02	2.94E-03	2.85E-03	7.51E-05	3.85E-03	2.62E-04	0.05	1.18E-04	2.35E-05	0.06
Welding Rigs	8.87E-02	2.21E-01	1.01E-02	9.80E-03	3.20E-04	2.10E-02	1.16E-02	0.96	2.20E-03	4.41E-04	1.15
Elkhorn Creek Compressor Station Total	1.01E+00	1.17E+00	8.60E-02	8.33E-02	2.85E-03	1.74E-01	4.53E-02	4.19	9.56E-03	1.91E-03	5.00
Williams County Information - Tioga Compressor Station (existing)											
Scraper	9.18E-03	2.09E-02	1.56E-03	1.52E-03	7.24E-05	1.26E-03	6.76E-04	0.05	1.37E-04	2.74E-05	0.07
Dozers	1.83E-03	5.25E-03	3.69E-04	3.58E-04	3.84E-05	3.45E-04	1.75E-04	0.03	7.84E-05	1.57E-05	0.04
Grader	4.37E-03	1.26E-02	8.89E-04	8.62E-04	9.58E-05	8.33E-04	4.20E-04	0.08	1.96E-04	3.92E-05	0.09
Trackhoes	8.75E-03	2.49E-02	1.86E-03	1.80E-03	2.37E-04	1.65E-03	8.75E-04	0.39	9.79E-04	1.96E-04	0.47
Concrete Mixer Truck	1.02E-02	4.14E-02	1.72E-03	1.67E-03	9.42E-05	2.89E-03	1.46E-03	0.07	1.71E-04	3.43E-05	0.08
Skid Steer Loader	2.30E-02	6.20E-02	3.40E-03	3.30E-03	1.01E-04	6.22E-03	3.35E-03	0.14	2.74E-04	5.49E-05	0.16
Large Crane	1.48E-02	4.88E-02	2.30E-03	2.23E-03	1.47E-04	3.04E-03	1.63E-03	0.21	5.49E-04	1.10E-04	0.26
Truck mounted Crane	4.15E-02	1.61E-01	7.58E-03	7.35E-03	7.37E-04	1.00E-02	5.26E-03	1.15	2.94E-03	5.88E-04	1.40
Rubber tire Backhoe	1.26E-01	1.12E-01	1.80E-02	1.75E-02	2.24E-04	1.34E-02	6.84E-03	0.32	6.27E-04	1.25E-04	0.37
Fork Lift	2.03E-02	3.67E-02	4.53E-03	4.40E-03	7.63E-05	4.83E-03	2.44E-03	0.05	1.18E-04	2.35E-05	0.06
Front End Loader	2.03E-02	3.75E-02	3.92E-03	3.80E-03	1.00E-04	5.13E-03	3.49E-04	0.07	1.57E-04	3.13E-05	0.09
Welding Rigs	9.85E-02	2.45E-01	1.12E-02	1.09E-02	3.56E-04	2.33E-02	1.29E-02	1.07	2.45E-03	4.90E-04	1.28
Tioga Compressor Station Total	1.14E+00	1.34E+00	9.79E-02	9.48E-02	3.27E-03	1.97E-01	5.15E-02	4.81	1.10E-02	2.20E-03	5.74
McKenzie County Information - Tioga-Elkhorn Creek Pipeline Segment											
Air Compressor	5.93E-01	1.53E-01	1.06E-02	1.02E-02	3.90E-04	3.49E-02	3.93E-03	0.64	6.80E-04	1.36E-04	0.70
ATV	2.45E+00	2.76E-02	5.66E-03	5.20E-03	9.40E-05	2.71E-01	1.32E-02	0.34	1.99E-03	3.98E-04	0.51
Tractors/loaders/backhoe	2.58E-02	5.19E-02	3.52E-03	3.42E-03	8.96E-05	4.79E-03	4.46E-03	0.06	1.20E-04	2.39E-05	0.07
Concrete Mixer Truck	3.24E-02	1.16E-01	4.15E-03	4.03E-03	2.67E-04	6.93E-03	6.57E-03	0.19	4.86E-04	9.71E-05	0.23
Crane, wheeled	1.26E-02	4.13E-02	1.95E-03	1.89E-03	1.24E-04	2.57E-03	2.54E-03	0.09	2.32E-04	4.65E-05	0.11
Dozers	4.75E-01	1.09E+00	8.11E-02	7.86E-02	3.86E-03	6.53E-02	6.44E-02	8.70	2.21E-02	4.41E-03	10.56
Dozers	1.83E-02	6.08E-02	4.68E-03	4.54E-03	3.05E-04	2.74E-03	2.70E-03	0.25	6.23E-04	1.25E-04	0.30
Dump Truck	2.25E-01	4.31E-01	4.98E-02	4.83E-02	8.96E-04	5.45E-02	5.10E-02	1.27	2.76E-03	5.52E-04	1.50
Generators	4.01E-01	1.63E+00	7.15E-02	6.94E-02	3.40E-03	4.61E-02	4.67E-02	4.86	1.25E-02	2.49E-03	5.91
Grader	7.93E-02	2.28E-01	1.61E-02	1.56E-02	1.74E-03	1.51E-02	1.39E-02	2.81	7.11E-03	1.42E-03	3.41
Guided Bore Machine	3.63E-02	1.45E-01	8.53E-03	8.27E-03	2.95E-04	9.13E-03	8.58E-03	0.21	5.38E-04	1.08E-04	0.26
Pickup Truck	5.69E-01	1.47E+00	1.12E-01	1.09E-01	4.95E-03	1.01E-01	9.94E-02	73.65	1.87E-01	3.74E-02	89.45
Sideboom	1.01E-01	3.92E-01	1.85E-02	1.79E-02	1.80E-03	2.44E-02	1.07E-02	4.20	1.08E-02	2.15E-03	5.11
Skid Steer Loader	2.78E-02	7.50E-02	4.12E-03	3.99E-03	1.22E-04	7.53E-03	7.49E-03	0.08	1.66E-04	3.32E-05	0.10
Trackhoe	6.91E-01	1.73E+00	1.18E-01	1.15E-01	8.05E-03	9.77E-02	9.42E-02	25.14	6.37E-02	1.27E-02	30.54
Welding Machine	7.97E-01	1.65E+00	1.23E-01	1.20E-01	2.55E-03	2.09E-01	9.00E-02	20.50	4.02E-02	8.03E-03	23.90
McKenzie Tioga-Elkhorn Creek Total	6.53E+00	9.29E+00	6.34E-01	6.15E-01	2.89E-02	9.52E-01	5.20E-01	142.99	3.51E-01	7.01E-02	172.65



Project: North Bakken Expansion Project
 Subject: Construction Emissions
 Task: Off-Road Construction Equipment Emissions

Prepared by: PCB
 Reviewed by: AMC
 Date: 16-Oct-19

Williams County Information - Tioga-Elkhorn Creek Pipeline Segment											
Air Compressor	5.93E-01	1.53E-01	1.06E-02	1.02E-02	3.90E-04	3.49E-02	3.93E-03	0.64	6.80E-04	1.36E-04	0.70
ATV	2.45E+00	2.76E-02	5.66E-03	5.20E-03	9.40E-05	2.71E-01	1.32E-02	0.34	1.99E-03	3.98E-04	0.51
Tractors/loaders/backhoe	3.86E-02	7.78E-02	5.29E-03	5.13E-03	1.34E-04	7.19E-03	6.69E-03	0.09	1.79E-04	3.59E-05	0.11
Concrete Mixer Truck	3.24E-02	1.16E-01	4.15E-03	4.03E-03	2.67E-04	6.93E-03	6.57E-03	0.19	4.86E-04	9.71E-05	0.23
Crane, wheeled	1.26E-02	4.13E-02	1.95E-03	1.89E-03	1.24E-04	2.57E-03	2.54E-03	0.09	2.32E-04	4.65E-05	0.11
Dozers	4.75E-01	1.09E+00	8.11E-02	7.86E-02	3.86E-03	6.53E-02	6.44E-02	8.70	2.21E-02	4.41E-03	10.56
Dozers	1.83E-02	6.08E-02	4.68E-03	4.54E-03	3.05E-04	2.74E-03	2.70E-03	0.25	6.23E-04	1.25E-04	0.30
Dump Truck	2.25E-01	4.31E-01	4.98E-02	4.83E-02	8.96E-04	5.45E-02	5.10E-02	1.27	2.76E-03	5.52E-04	1.50
Generators	4.01E-01	1.63E+00	7.15E-02	6.94E-02	3.40E-03	4.61E-02	4.67E-02	4.86	1.25E-02	2.49E-03	5.91
Grader	7.93E-02	2.28E-01	1.61E-02	1.56E-02	1.74E-03	1.51E-02	1.39E-02	2.81	7.11E-03	1.42E-03	3.41
Guided Bore Machine	3.63E-02	1.45E-01	8.53E-03	8.27E-03	2.95E-04	9.13E-03	8.58E-03	0.21	5.38E-04	1.08E-04	0.26
Pickup Truck	5.69E-01	1.47E+00	1.12E-01	1.09E-01	4.95E-03	1.01E-01	9.94E-02	73.66	1.87E-01	3.74E-02	89.46
Sideboom	1.01E-01	3.92E-01	1.85E-02	1.79E-02	1.80E-03	2.44E-02	1.07E-02	4.20	1.08E-02	2.15E-03	5.11
Skid Steer Loader	2.78E-02	7.50E-02	4.12E-03	3.99E-03	1.22E-04	7.53E-03	7.49E-03	0.08	1.66E-04	3.32E-05	0.10
Trackhoe	6.91E-01	1.73E+00	1.18E-01	1.15E-01	8.05E-03	9.77E-02	9.42E-02	25.14	6.37E-02	1.27E-02	30.54
Welding Machine	4.78E-01	9.93E-01	7.41E-02	7.19E-02	1.53E-03	1.25E-01	5.40E-02	12.30	2.41E-02	4.82E-03	14.34
Williams Tioga-Elkhorn Creek Total	6.23E+00	8.65E+00	5.86E-01	5.68E-01	2.80E-02	8.71E-01	4.86E-01	134.83	3.35E-01	6.69E-02	163.14
Burke, Montrail, and Williams County Information - Line Section 25 Loop Pipeline Segment											
Air Compressor	2.22E-01	5.74E-02	3.98E-03	3.81E-03	1.46E-04	1.31E-02	1.47E-03	0.12	1.27E-04	2.55E-05	0.13
ATV	9.71E-01	1.10E-02	2.24E-03	2.06E-03	3.73E-05	1.07E-01	5.25E-03	0.07	3.95E-04	7.90E-05	0.10
Tractors/loaders/backhoe	5.15E-02	1.04E-01	7.05E-03	6.84E-03	1.79E-04	9.59E-03	2.20E-03	0.12	2.39E-04	4.78E-05	0.14
Concrete Mixer Truck	2.73E-03	1.11E-02	5.90E-04	5.72E-04	2.19E-05	7.03E-04	2.98E-04	0.02	3.98E-05	7.97E-06	0.02
Crane, wheeled	6.28E-03	2.07E-02	9.73E-04	9.43E-04	6.21E-05	1.29E-03	5.80E-04	0.05	1.16E-04	2.32E-05	0.06
Dozers	1.58E-01	3.62E-01	2.70E-02	2.62E-02	1.29E-03	2.18E-02	9.81E-03	1.93	4.90E-03	9.80E-04	2.35
Dump Truck	2.82E-02	5.38E-02	6.22E-03	6.03E-03	1.12E-04	6.81E-03	2.90E-03	0.08	1.73E-04	3.45E-05	0.09
Generators	2.04E-01	8.30E-01	3.65E-02	3.54E-02	1.73E-03	2.35E-02	2.38E-02	3.71	9.53E-03	1.91E-03	4.52
Grader	4.74E-02	1.58E-01	1.21E-02	1.18E-02	8.19E-04	7.10E-03	3.19E-03	1.32	3.35E-03	6.69E-04	1.60
Guided Bore Machine	1.13E-01	4.51E-01	2.65E-02	2.57E-02	9.18E-04	2.84E-02	1.22E-02	1.31	3.35E-03	6.69E-04	1.59
Pickup Truck	1.16E-01	3.00E-01	2.28E-02	2.22E-02	1.01E-03	2.06E-02	2.03E-02	9.02	2.29E-02	4.57E-03	10.95
Sideboom	1.42E-01	5.49E-01	2.59E-02	2.51E-02	2.52E-03	3.42E-02	1.50E-02	5.88	1.51E-02	3.01E-03	7.15
Skid Steer Loader	3.55E-02	9.56E-02	1.66E-03	5.09E-03	1.55E-04	9.60E-03	4.38E-03	0.09	2.12E-04	4.23E-05	0.11
Trackhoe	5.88E-01	1.47E+00	1.01E-01	4.99E-02	6.85E-03	8.30E-02	3.65E-02	26.71	6.77E-02	1.35E-02	32.44
Welding Machine	1.99E-01	4.14E-01	3.09E-02	2.99E-02	6.38E-04	5.21E-02	2.25E-02	4.27	8.37E-03	1.67E-03	4.98
Line Section 25 Loop Total	2.89E+00	4.88E+00	3.05E-01	2.51E-01	1.65E-02	4.19E-01	1.60E-01	54.69	1.36E-01	2.73E-02	66.24
Williams County Information - Line Section 30 Loop Pipeline Segment											
Air Compressor	1.11E-01	2.87E-02	1.99E-03	1.90E-03	7.32E-05	6.55E-03	7.37E-04	0.06	6.37E-05	1.27E-05	0.07
ATV	8.32E-01	9.39E-03	1.92E-03	1.77E-03	3.19E-05	9.20E-02	4.50E-03	0.06	3.39E-04	6.77E-05	0.09
Tractors/loaders/backhoe	2.58E-02	5.19E-02	3.52E-03	3.42E-03	8.96E-05	4.79E-03	4.46E-03	0.06	1.20E-04	2.39E-05	0.07
Concrete Mixer Truck	2.73E-03	1.11E-02	5.90E-04	5.72E-04	2.19E-05	7.03E-04	6.55E-04	0.02	3.98E-05	7.97E-06	0.02
Crane, wheeled	5.02E-03	1.65E-02	7.78E-04	7.55E-04	4.97E-05	1.03E-03	1.01E-03	0.04	9.30E-05	1.86E-05	0.04
Dozers	1.05E-01	2.41E-01	1.80E-02	1.75E-02	8.59E-04	1.45E-02	1.43E-02	1.29	3.27E-03	6.53E-04	1.56
Dump Truck	1.41E-02	2.69E-02	3.11E-03	3.02E-03	5.60E-05	3.40E-03	3.19E-03	0.04	8.63E-05	1.73E-05	0.05
Generators	2.73E-01	1.11E+00	4.86E-02	4.72E-02	2.31E-03	3.13E-02	3.18E-02	3.30	8.47E-03	1.69E-03	4.02
Grader	5.67E-02	1.63E-01	1.15E-02	1.12E-02	1.24E-03	1.08E-02	9.92E-03	2.00	5.08E-03	1.02E-03	2.43
Guided Bore Machine	9.08E-03	3.62E-02	2.13E-03	2.07E-03	7.37E-05	2.28E-03	2.15E-03	0.05	1.34E-04	2.69E-05	0.06
Pickup Truck	1.93E-01	5.00E-01	3.81E-02	3.69E-02	1.68E-03	3.44E-02	3.38E-02	12.52	3.18E-02	6.35E-03	15.21
Sideboom	4.05E-02	1.57E-01	7.40E-03	7.17E-03	7.19E-04	9.78E-03	4.29E-03	1.12	2.87E-03	5.74E-04	1.36
Skid Steer Loader	1.89E-02	5.10E-02	2.80E-03	2.72E-03	8.29E-05	5.12E-03	5.09E-03	0.06	1.13E-04	2.26E-05	0.07
Trackhoe	3.53E-01	8.80E-01	6.04E-02	5.86E-02	4.11E-03	4.98E-02	4.81E-02	9.62	2.44E-02	4.88E-03	11.68
Welding Machine	7.97E-02	1.65E-01	1.23E-02	1.20E-02	2.55E-04	2.09E-02	9.00E-03	1.37	2.68E-03	5.35E-04	1.59
Line Section 30 Loop Total	2.12E+00	3.45E+00	2.13E-01	2.07E-01	1.17E-02	2.87E-01	1.73E-01	31.60	7.95E-02	1.59E-02	38.33



Project: North Bakken Expansion Project
 Subject: Construction Emissions
 Task: Off-Road Construction Equipment Emissions

Prepared by: PCB
 Reviewed by: AMC
 Date: 16-Oct-19

Williams County Information - Tioga Compressor Lateral Pipeline Segment											
Air Compressor	7.41E-02	1.91E-02	1.33E-03	1.27E-03	4.88E-05	4.36E-03	4.91E-04	0.04	4.25E-05	8.50E-06	0.04
ATV	5.87E-01	6.63E-03	1.36E-03	1.25E-03	2.25E-05	6.50E-02	3.17E-03	0.04	2.39E-04	4.78E-05	0.06
Tractors/loaders/backhoe	1.29E-02	2.59E-02	1.76E-03	1.71E-03	4.48E-05	2.40E-03	2.23E-03	0.03	5.98E-05	1.20E-05	0.04
Concrete Mixer Truck	2.73E-03	1.11E-02	5.90E-04	5.72E-04	2.19E-05	7.03E-04	6.55E-04	0.02	3.98E-05	7.97E-06	0.02
Crane, wheeled	5.02E-03	1.65E-02	7.78E-04	7.55E-04	4.97E-05	1.03E-03	1.01E-03	0.04	9.30E-05	1.86E-05	0.04
Dozers	2.64E-02	6.03E-02	4.50E-03	4.37E-03	2.15E-04	3.63E-03	3.58E-03	0.16	4.08E-04	8.17E-05	0.20
Generators	3.21E-02	1.30E-01	5.72E-03	5.55E-03	2.72E-04	3.69E-03	3.74E-03	0.19	4.98E-04	9.96E-05	0.24
Grader	2.83E-03	8.16E-03	5.76E-04	5.59E-04	6.21E-05	5.40E-04	4.96E-04	0.05	1.27E-04	2.54E-05	0.06
Guided Bore Machine	1.01E-03	4.03E-03	2.37E-04	2.30E-04	8.19E-06	2.54E-04	2.38E-04	0.01	1.49E-05	2.99E-06	0.01
Pickup Truck	6.83E-02	1.76E-01	1.34E-02	1.30E-02	5.94E-04	1.21E-02	1.19E-02	2.21	5.60E-03	1.12E-03	2.68
Sideboom	2.02E-02	7.85E-02	3.70E-03	3.59E-03	3.60E-04	4.89E-03	2.14E-03	0.28	7.17E-04	1.43E-04	0.34
Skid Steer Loader	1.34E-02	3.60E-02	1.98E-03	1.92E-03	5.85E-05	3.62E-03	3.60E-03	0.04	7.97E-05	1.59E-05	0.05
Trackhoe	1.66E-01	4.14E-01	2.84E-02	2.76E-02	1.93E-03	2.34E-02	2.26E-02	3.02	7.65E-03	1.53E-03	3.66
Welding Machine	3.99E-02	8.27E-02	6.17E-03	5.99E-03	1.28E-04	1.04E-02	4.50E-03	0.34	6.69E-04	1.34E-04	0.40
Tioga Compressor Lateral Total	1.05E+00	1.07E+00	7.06E-02	6.84E-02	3.82E-03	1.36E-01	6.04E-02	6.46	1.62E-02	3.25E-03	7.84
Burke County Information - Uprate Line Section 25 Pipeline Segment											
Air Compressor	7.41E-02	1.91E-02	1.33E-03	1.27E-03	4.88E-05	4.36E-03	4.91E-04	0.04	2.39E-04	8.50E-06	0.05
ATV	5.87E-01	6.63E-03	1.36E-03	1.25E-03	2.25E-05	6.50E-02	3.17E-03	0.04	5.98E-05	4.78E-05	0.06
Tractors/loaders/backhoe	1.29E-02	2.59E-02	1.76E-03	1.71E-03	4.48E-05	2.40E-03	1.01E-03	0.03	4.08E-04	1.20E-05	0.04
Dozers	2.64E-02	6.03E-02	4.50E-03	4.37E-03	2.15E-04	3.63E-03	1.63E-03	0.16	8.63E-05	8.17E-05	0.19
Dump Truck	1.41E-02	2.69E-02	3.11E-03	3.02E-03	5.60E-05	3.40E-03	1.45E-03	0.04	4.98E-04	1.73E-05	0.06
Generators	3.21E-02	1.30E-01	5.72E-03	5.55E-03	2.72E-04	3.69E-03	3.74E-03	0.19	1.49E-05	9.96E-05	0.22
Guided Bore Machine	1.01E-03	4.03E-03	2.37E-04	2.30E-04	8.22E-06	2.54E-04	1.09E-04	0.01	5.60E-03	2.99E-06	0.15
Pickup Truck	6.83E-02	1.76E-01	1.34E-02	1.30E-02	5.94E-04	1.21E-02	1.19E-02	2.21	7.97E-05	1.12E-03	2.55
Skid Steer Loader	1.34E-02	3.60E-02	1.98E-03	1.92E-03	5.85E-05	3.62E-03	1.65E-03	0.04	7.65E-03	1.59E-05	0.24
Trackhoe	1.66E-01	4.14E-01	2.84E-02	2.76E-02	1.93E-03	2.34E-02	1.03E-02	3.02	6.69E-04	1.53E-03	3.49
Welding Machine	3.99E-02	8.27E-02	6.17E-03	5.99E-03	1.28E-04	1.04E-02	4.50E-03	0.34	0.00E+00	1.34E-04	0.38
Uprate Line Section 25 Total	1.04E+00	9.83E-01	6.80E-02	6.59E-02	3.38E-03	1.32E-01	4.00E-02	6.12	1.53E-02	3.07E-03	7.42
McKenzie and Williams Information - Lake Sakakawea HDD											
Drill Rig	4.90E-01	1.71E+00	6.79E-02	6.59E-02	3.94E-03	1.03E-01	9.76E-02	5.59	1.43E-02	2.87E-03	6.81
Mudd Unit	2.05E-01	8.33E-01	3.66E-02	3.55E-02	1.74E-03	2.36E-02	2.39E-02	2.49	6.37E-03	1.27E-03	3.03
Cleaner	2.05E-01	8.33E-01	3.66E-02	3.55E-02	1.74E-03	2.36E-02	2.39E-02	2.49	6.37E-03	1.27E-03	3.03
Trackhoe	2.66E-02	8.53E-02	6.82E-03	6.61E-03	5.34E-04	3.98E-03	3.89E-03	0.87	2.20E-03	4.40E-04	1.05
Lake Sakakawea HDD Total	9.27E-01	3.46E+00	1.48E-01	1.44E-01	7.95E-03	1.54E-01	1.49E-01	11.43	0.03	0.01	13.91

Conversion Factors	
lb/ton	2,000
Global Warming Potential	
CO ₂	1
CH ₄	25
N ₂ O	298



Project: North Bakken Expansion Project
 Subject: Construction Emissions
 Task: On-Road Vehicle Information

Prepared by: PCB
 Reviewed by: AMC
 Date: 16-Oct-19

Equipment Type	Fuel	Quantity ¹	Total Days	Miles per Day ²	Total Miles per Project	Fuel Usage MMBtu	MOVES Emission Factors ³									
							CO	NO _x	PM10	PM _{2.5}	SO ₂	VOC	HAP	CO ₂ ⁴	CH ₄ ⁵	N ₂ O ⁵
							(g/VMT)	(g/VMT)	(g/VMT)	(g/VMT)	(g/VMT)	(g/VMT)	(g/VMT)	(lb/MMBtu)	(kg/MMBtu)	(kg/MMBtu)
McKenzie County Information - Elkhorn Creek Compressor Station (new)																
Construction & Delivery/Removal Vehicles	Diesel	2	60	30	3,600	33	1.02	2.88	0.12	0.11	0.01	0.24	0.04	164.	3.00E-03	6.00E-04
Workers Commuter Vehicles	Gasoline	16	198	30	95,040	618	5.25	0.37	0.02	0.01	0.00	0.38	0.02	154.	3.00E-03	6.00E-04
Williams County Information - Tioga Compressor Station (existing)																
Construction & Delivery/Removal Vehicles	Diesel	2	60	20	2,400	22	1.04	2.89	0.12	0.11	0.01	0.24	0.04	164.	3.00E-03	6.00E-04
Workers Commuter Vehicles	Gasoline	17	198	20	67,320	438	5.37	0.38	0.02	0.02	0.00	0.40	0.03	154.	3.00E-03	6.00E-04
McKenzie County Information - Tioga-Elkhorn Creek Pipeline Segment South																
Construction & Delivery/Removal Vehicles	Diesel	2	156	36	11,232	103	1.04	2.89	0.12	0.11	0.01	0.24	0.04	164.	3.00E-03	6.00E-04
Piping Truck	Diesel	3	156	36	16,848	154	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Water Truck	Diesel	3	156	36	16,848	154	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Workers Commuter Vehicles	Gasoline	43	156	36	241,488	1,570	5.37	0.38	0.02	0.02	0.00	0.40	0.03	154.	3.00E-03	6.00E-04
Williams County Information - Tioga-Elkhorn Creek Pipeline Segment North Pipeline																
Construction & Delivery/Removal Vehicles	Diesel	2	156	25	7,800	71	1.04	2.89	0.12	0.11	0.01	0.24	0.04	164.	3.00E-03	6.00E-04
Piping Truck	Diesel	3	156	25	11,700	107	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Water Truck	Diesel	3	156	25	11,700	107	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Workers Commuter Vehicles	Gasoline	47	156	25	183,300	1,191	5.37	0.38	0.02	0.02	0.00	0.40	0.03	154.	3.00E-03	6.00E-04
Burke, Montrail, and Williams County Information - Line Section 25 Loop Pipeline Segment																
Construction & Delivery/Removal Vehicles	Diesel	2	99	10	1,989	18	1.04	2.89	0.12	0.11	0.01	0.24	0.04	164.	3.00E-03	6.00E-04
Piping Truck	Diesel	3	99	10	2,983	27	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Water Truck	Diesel	3	99	10	2,983	27	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Workers Commuter Vehicles	Gasoline	24	99	10	23,366	152	5.37	0.38	0.02	0.02	0.00	0.40	0.03	154.	3.00E-03	6.00E-04
Williams County Information - Line Section 30 Loop Pipeline Segment																
Construction & Delivery/Removal Vehicles	Diesel	2	99	5	994	9	1.04	2.89	0.12	0.11	0.01	0.24	0.04	164.	3.00E-03	6.00E-04
Piping Truck	Diesel	3	99	5	1,491	14	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Water Truck	Diesel	3	99	5	1,491	14	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Workers Commuter Vehicles	Gasoline	24	99	5	11,683	76	5.37	0.38	0.02	0.02	0.00	0.40	0.03	154.	3.00E-03	6.00E-04
Williams County Information - Tioga Compressor Lateral Pipeline Segment																
Construction & Delivery/Removal Vehicles	Diesel	2	75	1	75	1	1.04	2.89	0.12	0.11	0.01	0.24	0.04	164.	3.00E-03	6.00E-04
Piping Truck	Diesel	3	75	1	113	1	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Water Truck	Diesel	3	75	1	113	1	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Workers Commuter Vehicles	Gasoline	12	75	1	453	3	5.37	0.38	0.02	0.02	0.00	0.40	0.03	154.	3.00E-03	6.00E-04

Equipment Type	Fuel	Quantity ¹	Total Days	Miles per Day ²	Total Miles per Project	Fuel Usage MMBtu	MOVES Emission Factors ³									
							CO	NO _x	PM10	PM _{2.5}	SO ₂	VOC	HAP	CO ₂ ⁴	CH ₄ ⁵	N ₂ O ⁵
							(g/VMT)	(g/VMT)	(g/VMT)	(g/VMT)	(g/VMT)	(g/VMT)	(g/VMT)	(lb/MMBtu)	(kg/MMBtu)	(kg/MMBtu)
Burke County Information - Uprate Line Section 25 Pipeline Segment																
Construction & Delivery/Removal Vehicles	Diesel	2	75	20	3,017	28	1.04	2.89	0.12	0.11	0.01	0.24	0.04	164.	3.00E-03	6.00E-04
Piping Truck	Diesel	3	75	20	4,526	41	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Water Truck	Diesel	3	75	20	4,526	41	0.74	2.93	0.10	0.09	0.01	0.18	0.02	164.	3.00E-03	6.00E-04
Workers Commuter Vehicles	Gasoline	12	75	20	18,103	118	5.37	0.38	0.02	0.02	0.00	0.40	0.03	154.	3.00E-03	6.00E-04
McKenzie and Williams County Information - Lake Sakawea HDD																
Construction & Delivery/Removal Vehicles	Diesel	2	129	30	7,766	71	1.02	2.88	0.12	0.11	0.01	0.24	0.04	164.	3.00E-03	6.00E-04
Workers Commuter Vehicles	Gasoline	15	129	30	56,301	366	5.25	0.37	0.02	0.01	0.00	0.38	0.02	154.	3.00E-03	6.00E-04

Conversion Factors	
construction & delivery vehicle, hp	400
piping truck hp	250
water truck hp	200
hp to gallon of diesel	55
Btu/gallon diesel ⁶	137,000
construction & delivery vehicle, miles/gal	15
worker commuter vehicle, hp	150
hp to gallon of gasoline	49
commuter vehicles, miles/gal	20
Btu/gallon gasoline ⁶	130,000
lb/kg	2.20
g/lb	453.59
lb/ton	2,000
Btu/hp-hour ⁷	7,000
Btu/MMBtu	1,000,000

Notes

- 1 Commuter vehicle quantities estimated from workforce schedule, based on the average workforce throughout the project and assuming 2 workers per commuter vehicle.
- 2 Miles per day based on the average distance between the pipeline section and Watford City or Tioga, whichever was closer.
- 3 Emission factors based on EPA MOVES2014 Model for McKenzie County, ND.
- 4 Emission Factor Comes from USEPA AP-42 Table 3.3-1
- 5 Emission Factor Comes from 40 CFR Part 98 Table C-.2, CH₄ 3.0 10-2 kg/MMBtu, N₂O 6.0 x 10-4 kg/MMBtu.
- 6 Btu/gallon from USEPA AP-42 Appendix A Typical Parameters of Various Fuels.
- 7 Conversion from USEPA AP-42 Table 3.3-1 footnotes.



Project: North Bakken Expansion Project
 Subject: Construction Emissions
 Task: On-Road Vehicle Emissions

Prepared by: PCB
 Reviewed by: AMC
 Date: 16-Oct-19

Equipment Type	Emissions (Tons)										
	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	HAP	CO ₂	CH ₄	N ₂ O	CO _{2e}
McKenzie County Information - Elkhorn Creek Compressor Station (new)											
Construction & Delivery/Removal Vehicles	4.06E-03	1.14E-02	4.82E-04	4.44E-04	4.64E-05	9.46E-04	1.54E-04	2.70	1.09E-04	2.17E-05	2.71
Workers Commuter Vehicles	5.50E-01	3.89E-02	1.69E-03	1.49E-03	2.92E-04	3.94E-02	2.53E-03	47.57	2.04E-03	4.09E-04	47.74
Elkhorn Creek Compressor Station Total	5.54E-01	5.04E-02	2.17E-03	1.93E-03	3.38E-04	4.04E-02	2.69E-03	50.26	2.15E-03	4.30E-04	50.45
Williams County Information - Tioga Compressor Station (existing)											
Construction & Delivery/Removal Vehicles	2.74E-03	7.66E-03	3.21E-04	2.96E-04	3.09E-05	6.39E-04	1.05E-04	1.80	7.25E-05	1.45E-05	1.80
Workers Commuter Vehicles	3.98E-01	2.79E-02	1.29E-03	1.14E-03	2.07E-04	2.94E-02	1.91E-03	33.69	1.45E-03	2.89E-04	33.82
Tioga Compressor Station Total	4.01E-01	3.55E-02	1.61E-03	1.44E-03	2.38E-04	3.00E-02	2.01E-03	35.49	1.52E-03	3.04E-04	35.62
Williams and McKenzie County Information - Tioga-Elkhorn Creek Pipeline Segment											
Construction & Delivery/Removal Vehicles	1.28E-02	3.58E-02	1.50E-03	1.38E-03	1.44E-04	2.99E-03	4.90E-04	8.41	3.39E-04	6.78E-05	8.44
Piping Truck	1.38E-02	5.44E-02	1.90E-03	1.75E-03	2.56E-04	3.26E-03	4.32E-04	12.62	5.09E-04	1.02E-04	12.66
Water Truck	1.38E-02	5.44E-02	1.90E-03	1.75E-03	2.56E-04	3.26E-03	4.32E-04	12.62	5.09E-04	1.02E-04	12.66
Workers Commuter Vehicles	1.43E+00	1.00E-01	4.63E-03	4.10E-03	7.42E-04	1.05E-01	6.84E-03	120.86	5.19E-03	1.04E-03	121.30
Tioga - Elkhorn Creek Total	1.47E+00	2.45E-01	9.93E-03	8.97E-03	1.40E-03	1.15E-01	8.19E-03	154.51	6.55E-03	1.31E-03	155.07
Burke, Montrail, and Williams County Information - Line Section 25 Loop Pipeline Segment											
Construction & Delivery/Removal Vehicles	8.91E-03	2.49E-02	1.04E-03	9.61E-04	1.00E-04	2.08E-03	3.40E-04	5.84	2.36E-04	4.71E-05	5.86
Piping Truck	9.58E-03	3.78E-02	1.32E-03	1.21E-03	1.78E-04	2.27E-03	3.00E-04	8.76	3.53E-04	7.07E-05	8.79
Water Truck	9.58E-03	3.78E-02	1.32E-03	1.21E-03	1.78E-04	2.27E-03	3.00E-04	8.76	3.53E-04	7.07E-05	8.79
Workers Commuter Vehicles	1.08E+00	7.59E-02	3.52E-03	3.11E-03	5.64E-04	8.00E-02	5.19E-03	91.74	3.94E-03	7.88E-04	92.07
Line Section 25 Loop Total	1.11E+00	1.76E-01	7.19E-03	6.49E-03	1.02E-03	8.66E-02	6.13E-03	115.11	4.88E-03	9.76E-04	115.52
Williams County Information - Line Section 30 Loop Pipeline Segment											
Construction & Delivery/Removal Vehicles	2.27E-03	6.34E-03	2.66E-04	2.45E-04	2.56E-05	5.30E-04	8.68E-05	1.49	6.01E-05	1.20E-05	1.49
Piping Truck	2.44E-03	9.63E-03	3.36E-04	3.09E-04	4.54E-05	5.78E-04	7.65E-05	2.23	9.01E-05	1.80E-05	2.24
Water Truck	2.44E-03	9.63E-03	3.36E-04	3.09E-04	4.54E-05	5.78E-04	7.65E-05	2.23	9.01E-05	1.80E-05	2.24
Workers Commuter Vehicles	1.38E-01	9.68E-03	4.48E-04	3.96E-04	7.18E-05	1.02E-02	6.62E-04	11.69	5.02E-04	1.00E-04	11.74
Line Section 30 Loop Total	1.45E-01	3.53E-02	1.39E-03	1.26E-03	1.88E-04	1.19E-02	9.02E-04	17.65	7.42E-04	1.48E-04	17.71
Williams County Information - Tioga Compressor Lateral Pipeline Segment											
Construction & Delivery/Removal Vehicles	1.14E-03	3.17E-03	1.33E-04	1.23E-04	1.28E-05	2.65E-04	4.34E-05	0.74	3.00E-05	6.01E-06	0.75
Piping Truck	1.22E-03	4.81E-03	1.68E-04	1.54E-04	2.27E-05	2.89E-04	3.83E-05	1.12	4.50E-05	9.01E-06	1.12
Water Truck	1.22E-03	4.81E-03	1.68E-04	1.54E-04	2.27E-05	2.89E-04	3.83E-05	1.12	4.50E-05	9.01E-06	1.12
Workers Commuter Vehicles	6.91E-02	4.84E-03	2.24E-04	1.98E-04	3.59E-05	5.10E-03	3.31E-04	5.85	2.51E-04	5.02E-05	5.87
Tioga Compressor Lateral Total	7.27E-02	1.76E-02	6.93E-04	6.30E-04	9.41E-05	5.94E-03	4.51E-04	8.83	3.71E-04	7.42E-05	8.86
Burke County Information - Uprate Line Section 25 Pipeline Segment											
Construction & Delivery/Removal Vehicles	8.62E-05	2.41E-04	1.01E-05	9.30E-06	9.70E-07	2.01E-05	3.29E-06	0.06	2.28E-06	4.56E-07	0.06
Piping Truck	9.27E-05	3.65E-04	1.27E-05	1.17E-05	1.72E-06	2.19E-05	2.90E-06	0.08	3.42E-06	6.83E-07	0.09
Water Truck	9.27E-05	3.65E-04	1.27E-05	1.17E-05	1.72E-06	2.19E-05	2.90E-06	0.08	3.42E-06	6.83E-07	0.09
Workers Commuter Vehicles	2.68E-03	1.87E-04	8.68E-06	7.68E-06	1.39E-06	1.97E-04	1.28E-05	0.23	9.73E-06	1.95E-06	0.23
Uprate Line Section 25	2.95E-03	1.16E-03	4.43E-05	4.04E-05	5.81E-06	2.61E-04	2.19E-05	0.45	1.88E-05	3.77E-06	0.45
McKenzie and Williams Information - Lake Sakakawea HDD											
Construction & Delivery/Removal Vehicles	3.45E-03	9.63E-03	4.04E-04	3.72E-04	3.88E-05	8.04E-04	1.32E-04	2.26	9.11E-05	1.82E-05	2.27
Workers Commuter Vehicles	3.71E-03	1.46E-02	5.10E-04	4.69E-04	6.89E-05	8.76E-04	1.16E-04	3.39	1.37E-04	2.73E-05	3.40
Lake Sakakawea HDD Total	7.15E-03	2.42E-02	9.14E-04	8.41E-04	1.08E-04	1.68E-03	2.48E-04	5.65	2.28E-04	4.56E-05	5.67

Conversion Factors	
g/lb	453.59
lb/kg	2.20
lb/ton	2,000
Global Warming Potential	
CO ₂	1
CH ₄	25
N ₂ O	298



Project: North Bakken Expansion Project
 Subject: Construction Emissions
 Task: Construction Activity Fugitive Dust Emissions

Prepared by: PCB
 Reviewed by: AMC
 Date: 16-Oct-19

	Elkhorn Creek Compressor Station	Tioga Compressor Station	Tioga-Elkhorn Creek Pipeline Segment	Line Section 25 Loop Pipeline Segment	Line Section 30 Loop Pipeline Segment	Tioga Compressor Lateral Pipeline Segment	Uprate Line Section 25 Pipeline Segment	Lake Sakakawea HDD
Construction Activities	McKenzie County	Williams County	McKenzie and Williams Counties	Burke, Montrail, and Williams Counties	Williams County	Williams County	Burke County	McKenzie and Williams Counties
Assumptions:								
Approximate Pipeline Installation Length ¹ , ft	0	0	326,832	106,656	50,160	2,640	1,056	0
Approximate Pipeline Diameter, in	N/A	N/A	20	12	12	20	12	NA
Total Project Area, acres	10.80	8.70	797.50	212.70	97.10	4.70	15.10	7.81
Construction Start Date	Mar-21	Apr-21	May-21	May-21	May-21	May-21	May-21	May-21
Construction End Date	Oct-21	Oct-21	Nov-21	Aug-21	Aug-21	Jul-21	Jul-21	Oct-21
Construction Duration, days	198	198	156	99	99	75	75	129
PM _{2.5} /PM ₁₀ Ratio ² (construction and demolition)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PM _{2.5} /PM ₁₀ Ratio ² (industrial wind erosion)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Average Excavation Width at Surface, ft	NA	NA	23.00	22.33	22.33	23.00	22.33	NA
Average Excavation Width at Bottom of Trench, ft	NA	NA	3.00	2.33	2.33	3.00	2.33	NA
Average Excavation Depth, ft	NA	NA	6.00	5.25	5.25	6.00	5.25	NA
Soil Density, lb/cf	100	100	100	100	100	100	100	100
Excavation, tons	0	0	784,397	225,311	105,963	6,336	2,231	0
Backfilling, tons	0	0	748,745	221,122	103,993	6,048	2,189	0

Conversion Factors	
lb/ton	2000
in/ft	12
days/yr	365

Construction Emissions	Excavation		Backfilling		Windblown Dust			Total Emissions (Tons)
	Emission Factor ³	Emissions	Emission Factor ³	Emissions	Emission Factor ³	Control Efficiency ⁴	Emissions	
	(lb/ton)	(Tons)	(lb/ton)	(Tons)	(ton/acre)	(%)	(Tons)	
McKenzie County - Elkhorn Creek Compressor Station								
Construction Activity PM ₁₀ Emissions	0.058	0.00	0.012	0.00	0.38	69%	1.29	1.29
Construction Activity PM _{2.5} Emissions	0.0058	0.00	0.0012	0.00	0.057	69%	0.19	0.19
Williams County - Tioga Compressor Station								
Construction Activity PM ₁₀ Emissions	0.058	0.00	0.012	0.00	0.38	69%	1.04	1.04
Construction Activity PM _{2.5} Emissions	0.0058	0.00	0.0012	0.00	0.057	69%	0.16	0.16
McKenzie and Williams Counties - Tioga-Elkhorn Creek Pipeline Segment								
Construction Activity PM ₁₀ Emissions	0.058	22.75	0.012	4.49	0.38	69%	95.46	122.70
Construction Activity PM _{2.5} Emissions	0.0058	2.27	0.0012	0.45	0.057	69%	14.32	17.04
Burke, Montrail, and Williams Counties - Line Section 25 Loop Pipeline Segment								
Construction Activity PM ₁₀ Emissions	0.058	6.53	0.012	1.33	0.38	69%	25.46	33.32
Construction Activity PM _{2.5} Emissions	0.0058	0.65	0.0012	0.13	0.057	69%	3.82	4.61
Williams County - Line Section 30 Loop Pipeline Segment								
Construction Activity PM ₁₀ Emissions	0.058	3.07	0.012	0.62	0.38	69%	11.62	15.32
Construction Activity PM _{2.5} Emissions	0.0058	0.31	0.0012	0.06	0.057	69%	1.74	2.11
Williams County - Tioga Compressor Lateral Pipeline Segment								
Construction Activity PM ₁₀ Emissions	0.058	0.18	0.012	0.04	0.38	69%	0.56	0.78
Construction Activity PM _{2.5} Emissions	0.0058	0.02	0.0012	0.00	0.057	69%	0.08	0.11
Burke County - Uprate Line Section 25 Pipeline Segment								
Construction Activity PM ₁₀ Emissions	0.058	0.06	0.012	0.01	0.38	69%	1.81	1.89
Construction Activity PM _{2.5} Emissions	0.0058	0.01	0.0012	0.00	0.057	69%	0.27	0.28
McKenzie and Williams Counties - Lake Sakakawea HDD								
Construction Activity PM ₁₀ Emissions	0.058	0.00	0.012	0.00	0.38	69%	0.93	0.93
Construction Activity PM _{2.5} Emissions	0.0058	0.00	0.0012	0.00	0.057	69%	0.14	0.14

1 The pipeline length as measured.

2 PM_{2.5}/PM₁₀ ratios based on USEPA AP-42 Chapter 13.2.2 Background Document for Revisions to Fine Fraction Ratios Used for USEPA AP-42 Fugitive Dust Emission Factors, Table 1, November 2006.

3 Emission factors are based on topsoil removal, overburden replacement and wind erosion assuming TSP=PM₁₀, USEPA AP-42 Chapter 11.9 Western Surface Coal Mining, Table 11.9-4, October 1998.

4 Control efficiency based on project measures to minimize dust utilizing water truck to dampen the material handling and storage locations under dry-dusty conditions, "Control of Open Fugitive Dust Sources", USEPA EPA-450/3-38-008, Section 5.3.2.1, September 1988.



Project: North Bakken Expansion Project
 Subject: Construction Emissions
 Task: Unpaved Roadway Fugitive Dust Emissions

Prepared by: PCB
 Reviewed by: AMC
 Date: 16-Oct-19

Equipment Type	Average Vehicle Weight (tons)	Quantity ¹	Total Days ²	Unpaved Access Road Round Trip (Miles) ³	Total Miles per Project	PM ₁₀ Emission Factor (lb/VMT)	PM _{2.5} Emission Factor (lb/VMT)	PM ₁₀ Uncontrolled Emissions (Tons)	PM ₁₀ Controlled Emissions ⁴ (Tons)	PM _{2.5} Uncontrolled Emissions (Tons)	PM _{2.5} Controlled Emissions ⁴ (Tons)
McKenzie County Information - Elkhorn Creek Compressor Station (new) (no travel on unpaved roads)											
2 Ton Flat Beds	2.0	1	44	0	0	0.69	0.07	0.00	0.00	0.00	0.00
Crane Trucks	20.0	1	21	0	0	1.95	0.19	0.00	0.00	0.00	0.00
Pickup Trucks	0.5	16	198	0	0	0.37	0.04	0.00	0.00	0.00	0.00
Dump Trucks	25.0	2	41	0	0	2.15	0.22	0.00	0.00	0.00	0.00
TDW ⁵ Trucks	1.0	2	39	0	0	0.51	0.05	0.00	0.00	0.00	0.00
Tractor Trailers	25.0	4	115	0	0	2.15	0.22	0.00	0.00	0.00	0.00
Elkhorn Creek Compressor Station Total								0.00	0.00	0.00	0.00
Williams County Information - Tioga Compressor Station (existing) (no travel on unpaved roads)											
2 Ton Flat Beds	2.0	1	44	0	0	0.69	0.07	0.00	0.00	0.00	0.00
Crane Trucks	20.0	1	21	0	0	1.95	0.19	0.00	0.00	0.00	0.00
Pickup Trucks	0.5	17	198	0	0	0.37	0.04	0.00	0.00	0.00	0.00
Dump Trucks	25.0	2	41	0	0	2.15	0.22	0.00	0.00	0.00	0.00
TDW ⁵ Trucks	1.0	2	39	0	0	0.51	0.05	0.00	0.00	0.00	0.00
Tractor Trailers	25.0	4	115	0	0	2.15	0.22	0.00	0.00	0.00	0.00
Tioga Compressor Station Total								0.00	0.00	0.00	0.00
Williams and McKenzie County Information - Tioga-Elkhorn Creek Pipeline Segment											
2 Ton Flat Beds	2.0	1	35	19.9	698	0.69	0.07	0.24	0.08	0.02	0.01
Crane Trucks	20.0	1	17	19.9	339	1.95	0.19	0.33	0.10	0.03	0.01
Pickup Trucks	0.5	90	156	19.9	279,939	0.37	0.04	51.79	16.31	5.18	1.63
Dump Trucks	25.0	2	32	19.9	1,276	2.15	0.22	1.37	0.43	0.14	0.04
TDW ⁵ Trucks	1.0	2	30	19.9	1,196	0.51	0.05	0.30	0.10	0.03	0.01
Tractor Trailers	25.0	4	90	19.9	7,178	2.15	0.22	7.72	2.43	0.77	0.24
Tioga - Elkhorn Creek Total								61.75	19.45	6.18	1.95
Burke, Montrail, and Williams County Information - Line Section 25 Loop Pipeline Segment											
2 Ton Flat Beds	2.0	1	22	14.7	323	0.69	0.07	0.11	0.04	0.01	0.00
Crane Trucks	20.0	1	11	14.7	162	1.95	0.19	0.16	0.05	0.02	0.00
Pickup Trucks	0.5	24	99	14.7	34,176	0.37	0.04	6.32	1.99	0.63	0.20
Dump Trucks	25.0	2	21	14.7	617	2.15	0.22	0.66	0.21	0.07	0.02
TDW ⁵ Trucks	1.0	2	19	14.7	558	0.51	0.05	0.14	0.04	0.01	0.00
Tractor Trailers	25.0	4	57	14.7	3,349	2.15	0.22	3.60	1.13	0.36	0.11
Line Section 25 Loop Total								11.00	3.46	1.10	0.35
Williams County Information - Line Section 30 Loop Pipeline Segment											
2 Ton Flat Beds	2.0	1	22	1.1	25	0.69	0.07	0.01	0.00	0.00	0.00
Crane Trucks	20.0	1	11	1.1	12	1.95	0.19	0.01	0.00	0.00	0.00
Pickup Trucks	0.5	24	99	1.1	2,631	0.37	0.04	0.49	0.15	0.05	0.02
Dump Trucks	25.0	2	21	1.1	47	2.15	0.22	0.05	0.02	0.01	0.00
TDW ⁵ Trucks	1.0	2	19	1.1	43	0.51	0.05	0.01	0.00	0.00	0.00
Tractor Trailers	25.0	4	57	1.1	258	2.15	0.22	0.28	0.09	0.03	0.01
Line Section 30 Loop Total								0.85	0.27	0.08	0.03

Equipment Type	Average Vehicle Weight (tons)	Quantity ¹	Total Days ²	Unpaved Access Road Round Trip (Miles) ³	Total Miles per Project	PM ₁₀ Emission Factor (lb/VMT)	PM _{2.5} Emission Factor (lb/VMT)	PM ₁₀ Uncontrolled Emissions (Tons)	PM ₁₀ Controlled Emissions ⁴ (Tons)	PM _{2.5} Uncontrolled Emissions (Tons)	PM _{2.5} Controlled Emissions ⁴ (Tons)
Williams County Information - Tioga Compressor Lateral Pipeline Segment											
2 Ton Flat Beds	2.0	1	17	0.1	1	0.69	0.07	0.00	0.00	0.00	0.00
Crane Trucks	20.0	1	8	0.1	1	1.95	0.19	0.00	0.00	0.00	0.00
Pickup Trucks	0.5	12	75	0.1	72	0.37	0.04	0.01	0.00	0.00	0.00
Dump Trucks	25.0	2	16	0.1	3	2.15	0.22	0.00	0.00	0.00	0.00
TDW ⁵ Trucks	1.0	2	15	0.1	2	0.51	0.05	0.00	0.00	0.00	0.00
Tractor Trailers	25.0	4	43	0.1	14	2.15	0.22	0.01	0.00	0.00	0.00
Tioga Compressor Lateral Total								0.03	0.01	0.00	0.00
Burke County Information - Uprate Line Section 25 Pipeline Segment											
2 Ton Flat Beds	2.0	1	17	0.9	15	0.69	0.07	0.01	0.00	0.00	0.00
Crane Trucks	20.0	1	8	0.9	7	1.95	0.19	0.01	0.00	0.00	0.00
Pickup Trucks	0.5	12	75	0.9	800	0.37	0.04	0.15	0.05	0.01	0.00
Dump Trucks	25.0	2	16	0.9	28	2.15	0.22	0.03	0.01	0.00	0.00
TDW ⁵ Trucks	1.0	2	15	0.9	27	0.51	0.05	0.01	0.00	0.00	0.00
Tractor Trailers	25.0	4	43	0.9	153	2.15	0.22	0.16	0.05	0.02	0.01
Uprate Line Section 25								0.36	0.11	0.04	0.01
McKenzie and Williams Counties Information - Lake Sakakawea HDD (no travel on unpaved roads)											
2 Ton Flat Beds	2.0	1	28	0	0	0.69	0.07	0.00	0.00	0.00	0.00
Crane Trucks	20.0	1	14	0	0	1.95	0.19	0.00	0.00	0.00	0.00
Pickup Trucks	0.5	15	126	0	0	0.37	0.04	0.00	0.00	0.00	0.00
Dump Trucks	25.0	2	26	0	0	2.15	0.22	0.00	0.00	0.00	0.00
TDW ⁵ Trucks	1.0	2	25	0	0	0.51	0.05	0.00	0.00	0.00	0.00
Tractor Trailers	25.0	4	73	0	0	2.15	0.22	0.00	0.00	0.00	0.00
Lake Sakakawea HDD Total								0.00	0.00	0.00	0.00

Emission Factor Equation ⁶	
$E = k * (s/12)^a * (W/3)^b * [(365-P)/365]$	
Constant, k (PM ₁₀) ⁷ , lb/VMT	1.5
Constant, k (PM _{2.5}) ⁷ , lb/VMT	0.15
Silt Content of Road Surface ⁸ , s, %	8.5
Empirical Constant ⁷ , a	0.9
Mean Vehicle Weight, W, tons	---
Empirical Constant ⁴ , b	0.45
Number of Wet Days (≥0.01" precip) ⁹ , P	90

Conversion Factors	
lb/ton	2,000

1 Vehicle quantities estimated from a similar pipeline project. Pickup truck quantities estimated from workforce schedule, based on the average workforce throughout the project and assuming 2 workers per vehicle.

2 Total days estimated from a similar pipeline project, adjusted for the total expected working days for each project segment.

3 TWD - Two wheel drive.

4 Unpaved access road length for Tioga-Elkhorn Creek is 10.0 miles, Line Section 25 is 7.3 miles, Line Section 30 is 0.6 miles, Tioga Plant Lateral is 0.04 miles, and Norse Loop uprate is 0.4 miles. Elkhorn Creek Compressor Station, Tioga Compressor Station, and Lake Sakakawea HDD have no unpaved access roads.

5 Control efficiency based on project measures to minimize dust utilizing water truck to dampen the ROW under dry-dusty conditions, "Control of Open Fugitive Dust Sources", EPA-450/3-38-008, Section 5.3.1.1, September 1988.

6 Emission factor equation based on industrial sites from AP-42 Chapter 13.2.2 Unpaved Roads, Equations 1a and 2, November 2006.

Equipment Type	Average Vehicle Weight (tons)	Quantity ¹	Total Days ²	Unpaved Access Road Round Trip (Miles) ³	Total Miles per Project	PM ₁₀ Emission Factor (lb/VMT)	PM _{2.5} Emission Factor (lb/VMT)	PM ₁₀ Uncontrolled Emissions (Tons)	PM ₁₀ Controlled Emissions ⁴ (Tons)	PM _{2.5} Uncontrolled Emissions (Tons)	PM _{2.5} Controlled Emissions ⁴ (Tons)
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7 Constant based on industrial roads from AP-42 Chapter 13.2.2 Unpaved Roads, Table 13.2.2-2, November 2006.

8 Silt content based on construction sites from AP-42 Chapter 13.2.2 Unpaved Roads, Table 13.2.2-1, November 2006.

9 Number of wet days based on site location from AP-42 Chapter 13.2.2 Unpaved Roads, Figure 13.2.2-1, November 2006.

APPENDIX K

PRE-CONSTRUCTION NOISE SURVEY AND ACOUSTICAL ANALYSIS



WBI ENERGY TRANSMISSION, INC.

North Bakken Expansion Project

Pre-Construction Noise Survey and Acoustical Analysis

December 2019

December 2019

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**WBI Energy Transmission, Inc.
North Bakken Expansion Project
Pre-Construction Noise Survey and Noise Impact Analysis
McKenzie and Williams Counties, North Dakota**

1.0 INTRODUCTION

Between July 22, and 25, 2019, Environmental Resources Management, Inc. (ERM) conducted pre-construction noise surveys at select sites located near Noise Sensitive Areas (NSAs) adjacent to the proposed WBI Energy Transmission, Inc. (WBI Energy) North Bakken Expansion Project (Project) located in northwest North Dakota (see figure 1 in Appendix A). This report presents the results of the pre-construction noise surveys and ERM's acoustical analysis of the noise impact to nearby NSAs.

The proposed Project would involve the construction and operation of approximately 60 miles of a 20-inch-diameter steel natural gas pipeline from WBI Energy's existing Tioga Compressor Station near Tioga, North Dakota, to a new interconnect with Northern Border Pipeline Company's mainline pipeline south of Watford City, North Dakota. The proposed pipeline route crosses portions of McKenzie and Williams Counties. In addition to the pipeline, the Project will include construction and operation of a new 3,750 horsepower compressor station (Elkhorn Creek Compressor Station) at the new interconnect in McKenzie County; as well as the addition of 18,750 horsepower to the existing compressor station (Tioga Compressor Station) in Williams County.

The purpose of the noise survey was to measure ambient noise levels at existing NSAs near the proposed compressor station and existing Tioga compressor station and at locations where construction is planned to be conducted using the horizontal directional drilling (HDD) methodology. An acoustical analysis was also completed to evaluate whether the contribution of Project-related noise would comply with a day/night (L_{dn}) sound pressure level of 55 A-weighted decibels (dBA) noise guidance set forth by the Federal Energy Regulatory Commission (FERC).

2.0 NOISE SURVEY METHODS AND LOCATIONS

2.1 Noise Measurement Equipment and Methodology

Sound pressure levels were measured using two Bruel & Kjaer Type 2250-S hand-held analyzers (Serial Numbers 3011887 and 3011939) equipped with a Bruel & Kjaer preamplifier (Serial Numbers 27164 and 27012), and a Bruel & Kjaer Type 4189 1/2 inch free field microphone (Serial Numbers 3130964 and 3130955) with a windscreen. Field calibration was performed before and after monitoring using a Bruel & Kjaer Type 4231 calibrator. All equipment has current certificate of calibration from the manufacturer. Sound measurements were recorded at 1-second intervals for a period of one hour during daytime (7:00 am to 10:00 pm) measurements and 15 minutes during nighttime (10:00 pm to 7:00 am) measurements. For quality control purposes, instantaneous sound pressure levels were also recorded manually every 15 minutes. Unweighted octave band center and an A-weighted time-equivalent sound pressure levels (L_{eq}) were measured on both slow and fast response with the sound level meter set at a height of approximately 4 feet above ground level.

2.2 Location Descriptions

2.2.1 Compressor Stations

The Elkhorn Creek Compressor Station is proposed to be located at the south end of the proposed pipeline route (approximate milepost (MP) 61.9) in McKenzie County, North Dakota approximately 9 miles southeast of Watford City. The nearest NSAs to the approximate center of the compressor station site are:

NSA #1: Residence located on County Road 34, approximately 4,253 feet to the southwest;

NSA #2: Residence located on 125th Avenue Northwest, approximately 3,465 feet to the east;

NSA #3: Residence located on 125th Avenue Northwest, approximately 3,895 feet to the northeast.

There are additional buildings located within a 1-mile radius of the proposed compressor. These buildings were confirmed to be industrial facilities during the field survey and, as such, are not considered NSAs. The locations of the NSAs associated with the Elkhorn Creek Compressor Station are provided on Figure 1.

The Tioga Compressor station is located at the north end of the proposed pipeline route (approximate MP 0.0) in Williams County, North Dakota, approximately one mile east of Tioga and one mile north of the Tioga Municipal Airport. The nearest NSAs to the approximate center of the existing Tioga compressor station site are:

NSA #1: Residence located on 69th Street Northwest, approximately 3,974 feet to the north;

NSA #2: Residence located on 102nd Avenue Northwest, approximately 4,076 feet to the northeast;

NSA #3: Residence located on 102nd Avenue Northwest, approximately 4,920 feet to the east;

NSA #4: Residence located on County Highway 10, approximately 2,221 feet to the east;

NSA #5: Residence located on County Highway 10, approximately 4,940 feet to the southeast;

NSA #6: Residence located on State Highway 40, approximately 5,229 feet to the west;

NSA #7: Residence located on State Highway 40, approximately 4,862 feet to the northwest; and

There are additional buildings within a one-mile radius of the compressor. These buildings were confirmed to be office buildings and industrial facilities during the field survey and, as such, are

not considered NSAs. The locations of the NSAs associated with the Tioga Compressor Station are provided on Figure 2.

2.2.2 HDD Sites

The following are descriptions of the nearest NSAs to the proposed HDD locations.

The proposed Lake Sakakawea HDD crossing (MP 23 to 26) will be approximately at the border of McKenzie and Williams Counties. The HDD crossing is proposed to use the “Intersect” method in which drilling (entry) occurs from both ends of the crossing and intersects near the middle of Lake Sakakawea. An “exit” noise evaluation is not applicable when using the Intersect method. The nearest NSAs to the approximate centers of the proposed north and south HDD entry sites are:

North HDD Entry

NSA #1: Approximately 13 residences located on 51st Street Northwest, with the closest residence approximately 492 feet southeast of the north entry of the HDD crossing;

NSA #2: Residence located on the 111th Avenue Northwest, approximately 2,597 feet northwest of the north entry of the HDD crossing.

South HDD Entry

NSA #1: Residence located on County Road 2, approximately 2,240 feet southwest of the south entry of the HDD crossing.

There are additional buildings within a 0.5-mile radius of the HDD entry sites. These buildings were confirmed to be industrial facilities during the field survey and, as such, are not considered NSAs. The locations of the NSAs associated with the north and south HDD entry sites are provided on Figures 3 and 4, respectively.

2.3 Weather Conditions During the Noise Survey

The weather conditions for the survey period are summarized in table 1 and included on the Field Monitoring Forms attached as Appendix B.

TABLE 1			
Summary of Weather Conditions during Field Survey			
Condition	Minimum	Maximum	Average
Temperature °F	59	88	74
Relative Humidity %	27	85	65
Wind Direction	--	--	S
Wind Speed (miles per hour)	1	10	4
Barometric Pressure inches. Hg	29.9	30.3	30.0

3.0 NOISE REGULATIONS

In 1974, the U.S. Environmental Protection Agency (EPA) published its document entitled “Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin on Safety.” This publication evaluated the effects of environmental noise with respect to health and safety. As set forth in that publication, the EPA has determined that noise levels should not exceed an L_{dn} of 55 dBA, which is the level that protects the public from outdoor activity interference. This noise level has been useful for state and federal agencies to establish noise limitations for various noise sources. A 55 dBA L_{dn} noise level equates to a L_{eq} of 48.6 dBA (i.e., a facility that does not exceed a continuous noise impact of 48.6 dBA will not exceed 55 dBA L_{dn}).

WBI’s proposed compressor stations must comply with the FERC’s noise regulations for interstate pipelines. These regulations state:

- 1) The noise attributable to any new compressor station, compression added to an existing station, or any modification, upgrade or update of an existing station, must not exceed an L_{dn} of 55 dBA at any pre-existing NSAs such as schools, hospitals, or residences.
- 2) New compressor stations or modifications of existing stations shall not result in a perceptible increase in vibration at any NSA (18 CFR § 380.12(k)(4)(v)).

HDD activities must also comply with FERC’s noise guidance for construction activity performed during nighttime hours. This guidance states:

- 1) Construction activity that would or may occur during nighttime hours should be performed with the goal that the activity contribute noise levels below 55 dBA L_{dn} and 48.6 L_{eq} , or no more than 10 dBA over background if ambient noise levels are above 55 dBA L_{dn} (FERC, 2017).

North Dakota does not have noise regulations regarding the proposed compressor station or HDD activities. The state regulates noise using public nuisance laws, but does not impose NSA property-line decibel noise limits for new facilities.

McKenzie County does not have any pertinent noise regulations regarding the proposed compressor station or HDD activities.

Williams County maintains the following general noise regulations:

- 1) Maximum Noise Standards by District

Zone of Property Receiving Noise	Maximum Noise Level dB
Residential Districts: Urban Residential (UR), Rural Residential (UR)	60
Commercial Districts: Urban Commercial (UC), Rural Residential (RC)	65
Industrial Districts: Light Industrial (LI), Heavy Industrial (HI)	70
Planned Development:	PUD In accordance with base district

- 2) Duration and Timing

The noise standards above shall be modified as follows to account for the effects of time and duration on the impact of noise levels:

- a. In the UR and RR districts, the noise standards shall be 5 dB lower between 10:00 p.m. and 7:00 a.m.
- b. Noise that is produced for no more than a cumulative period of five minutes in any hour may exceed the standards above by 10 dB (Williams County, 2015).

Zoning designations are not shown at NSAs in Williams County’s zoning maps. However, as identified NSAs are houses, it is assumed that the “Residential Districts” regulation of a 60 dB maximum noise level applies. Williams County’s noise regulations are less strict than FERC regulations; therefore meeting FERC’s regulations will be sufficient to meet Williams County regulations.

4.0 NOISE SURVEY RESULTS AND ACOUSTICAL ANALYSIS

Compressor Stations

Proposed Elkhorn Creek Compression Station

The significant noise-producing equipment associated with the proposed compressor station will include:

- One Ariel KBZ-4 compressor and 3,750 horsepower Caterpillar 3612 reciprocating natural gas driven engine,
- after gas and auxiliary coolers, and
- piping.

To mitigate noise impacts at the nearby NSAs, the following noise control measures will be implemented:

- The compressor engine will be fitted with a catalyst silencer.
- The compressor and engine will be housed inside a building with 26-gauge steel walls and a 24-gauge steel roof, both with 6-inches of fiberglass insulation and a vapor barrier.

The results of the baseline sound level analysis for the Elkhorn Creek Compressor Station are summarized in Table 2

Station and Closest NSA(s)	Distance and Direction of NSA	Surveyed Ambient L _{dn} (dBA)	Estimated L _{dn} of Station (dBA) at NSA	Station L _{dn} Plus Ambient L _{dn} (dBA)	Potential Increase Above Ambient (dB)
NSA 1 (House)	4,253 feet SW	55.6	41.1	55.7	0.1
NSA 2 (House)	3,465 feet E	41.0	42.9	45.1	4.1
NSA 3 (House)	3,895 feet NE	41.0	41.9	44.5	3.5

Existing Tioga Compressor Station Upgrade

The significant noise-producing equipment associated with the compressor station upgrade will include the addition of:

- Six Ariel KBZ-4 compressors and 3,750 horsepower Caterpillar 3612 reciprocating natural gas driven engines,
- after gas and auxiliary coolers
- piping.

To mitigate noise impacts at the nearby NSAs, the following noise control measures will be implemented:

- The six compressor engines will be fitted with catalyst silencers.
- The compressors and engines will be housed inside a building with 26-gauge steel walls and a 24-gauge steel roof, both with 6-inches of fiberglass insulation and a vapor barrier.

The results of the baseline sound level analysis are summarized in Table 3. The surveyed ambient sound level represents the existing station at approximately 81% load.

Station and Closest NSA(s)	Distance and Direction of NSA	Surveyed Ambient L _{dn} (dBA)	Estimated L _{dn} of Station (dBA) at NSA ¹	Station L _{dn} Plus Ambient L _{dn} (dBA)	Potential Increase Above Ambient (dB)
NSA 1 (House)	3,974 feet N	57.2	49.5	58.0	0.8
NSA 2 (House)	4,076 feet NE	58.2	49.3	58.8	0.6
NSA 3 (House)	4,920 feet E	54.0	47.7	55.0	1.0
NSA 4 (House)	2,221 feet E	55.6	54.6	58.2	2.8
NSA 5 (House)	4,940 feet SE	54.0	47.6	55.0	1.0
NSA 6 (House)	5,229 feet W	61.3	47.2	61.4	0.1
NSA 7 (House)	4,862 feet NW	61.3	47.8	61.4	0.1

¹Estimated L_{dn} of the existing equipment and additional equipment at 100% load

Horizontal Directional Drilling

Noise contributions due to HDD activity were estimated based on a noise survey evaluating noise barrier performance for a similar project, provided by Michels Corporation. The HDD drilling methodology will utilize the “intersect” method. The intersect method utilizes the same “entry”

HDD drilling equipment on both sides of the drill. Entry site drilling equipment typically is louder than exit equipment, as the drilling rig and associated power unit are the predominant noise sources at the entry site. The significant noise producing equipment associated with the HDD entry site will include:

- Drilling Rig
- Mud Rig
- Shaker
- Crane
- Power Unit

The noise contributed by this equipment equates to an estimated sound power level of 125.2 dBA. The estimated noise impact to the nearest NSAs resulting from each HDD is summarized in Table 4. Estimated noise levels that exceed regulations are shown in bold and italics in the table.

TABLE 4					
Noise Quality Analysis for HDD Operations					
Station and Closest NSA(s)	Distance and Direction of NSA	Surveyed Ambient L _{dn} (dBA)	Estimated L _{dn} of HDD Operations (dBA)	Estimated L _{dn} of HDD Operations plus Ambient L _{dn} (dBA)	Potential Increase Above Ambient (dBA)
HDD North Entry					
NSA 1 (13 Houses)	492 feet SE	44.7	84.8	84.8	40.1
NSA 2 (House)	2,597 feet NW	48.7	69.1	69.2	20.5
HDD South Entry					
NSA 3 (House)	2,240 feet SW	54.7	70.4	70.5	15.8

The estimated noise impact to the nearest NSAs resulting from each HDD with temporary acoustical noise barriers in place is summarized in Table 5. Estimated noise levels that exceed regulations are shown in bold and italics in the table. In order to achieve maximum noise reduction, noise barriers should be positioned as close as reasonably possible to the predominant noise-producing equipment and have at a minimum, a Sound Transmission Class (STC)-32 rating.

TABLE 5					
Noise Barrier Analysis for HDD Operations					
Station and Closest NSA(s)	Distance and Direction of NSA	Surveyed Ambient L _{dn} (dBA)	Estimated L _{dn} of HDD Operations (dBA)	Estimated L _{dn} of HDD Operations plus Ambient L _{dn} (dBA)	Potential Increase Above Ambient (dBA)
HDD North Entry					
NSA 1 (13 Houses)	492 feet SE	44.7	78.3	78.3	33.6
NSA 2 (House)	2,597 feet NW	48.7	62.7	62.8	14.1
HDD South Entry					
NSA 3 (House)	2,240 feet SW	54.7	63.9	64.4	9.7
Note: Estimated mitigated noise levels assume equipment is positioned optimally to shield noise, and that noise barriers are placed within line-of-sight between noise-producing equipment and NSAs.					

Based on this evaluation, HDD operations will contribute to noise levels exceeding Williams County and FERC noise guidance at all of the thirteen (13) residences associated with NSA 1 as well as at NSAs 2 and 3. Although nighttime construction is only proposed during pullback operations, which will occur for less than one week, WBI would like the flexibility to operate 24 hours per day, seven days per week. During drilling operations, which are expected to last approximately 6 months, construction will be limited to daytime hours unless site conditions necessitate 24-hour work.

Due to the proximity of the drilling operations to NSAs, on-Site acoustical monitoring should be completed during startup to evaluate the actual noise impact to the nearby NSA and help evaluate if additional noise mitigation will be required to meet FERC's guidance of 55 dBA L_{dn} at the NSAs. If nighttime drilling will only be completed during pullback which is estimated to last less than one week, temporary relocation of residents may be an option. If needed, additional noise mitigation measures may include; use of additional or higher temporary acoustical noise barriers, residential grade silencers or mufflers on engines, and use of gear box and other mechanical noise dampening blankets.

Blowdown Events

Compressor unit blowdowns (venting of gas) can happen during startup and shutdown of the compressor, maintenance activities, or for emergency purposes. During startup and commissioning, there will be 2 full station blowdowns for each compressor station and 5 compressor unit blowdowns for each compressor unit. During annual operation, there will be one emergency shutdown full station blowdown test for each compressor station and 24 compressor unit blowdowns for each compressor unit.

Blowdown noise analysis was based on a sound power level of 120.2 dB from a project of similar size, with sound pressure levels at NSAs calculated using hemispherical attenuation (Hoover & Keith, 2007). The results of this analysis are summarized in Tables 6 and 7.

TABLE 6

Noise Quality Analysis for Blowdown Events at the Elkhorn Creek Compressor Station

Station and Closest NSA(s)	Distance and Direction of NSA	Surveyed Ambient L_{dn} (via measured L_{eq}) (dBA)	Estimated L_{dn} of Station Blowdown(dBA)	Station Blowdown L_{dn} Plus Ambient L_{dn} (dBA)	Potential Increase Above Ambient (dB)
NSA 1 (House)	4,253 feet SW	55.6	53.2	57.6	2.0
NSA 2 (House)	3,465 feet E	41.0	55.0	55.1	14.1
NSA 3 (House)	3,895 feet NE	41.0	53.9	54.1	13.1

TABLE 7

Noise Quality Analysis for Blowdown Events at the Tioga Compressor Station

Station and Closest NSA(s)	Distance and Direction of NSA	Surveyed Ambient L_{dn} (via measured L_{eq}) (dBA)	Estimated L_{dn} of Station Blowdown(dBA)	Station Blowdown L_{dn} Plus Ambient L_{dn} (dBA)	Potential Increase Above Ambient (dB)
NSA 1 (House)	3,974 feet N	57.2	54.0	58.9	1.7
NSA 2 (House)	4,076 feet NE	58.2	53.7	59.5	1.3
NSA 3 (House)	4,920 feet E	54.0	52.1	56.2	2.2

NSA 4 (House)	2,221 feet E	55.6	59.0	60.6	5.0
NSA 5 (House)	4,940 feet SE	54.0	52.1	56.2	2.2
NSA 6 (House)	5,229 feet W	61.3	51.6	61.7	0.4
NSA 7 (House)	4,862 feet NW	61.3	52.2	61.8	0.5

5.0 ACOUSTICAL ANALYSIS METHODOLOGY

Compressor Stations

Predicted noise contributions due to compressor station operations were estimated based on the measured ambient noise data and provided equipment information. To complete this evaluation, the octave band sound power levels for each piece of equipment were calculated using the following equation:

$$L_w = L_p + 20 * \text{Log}(d) + 0.7$$

where L_w is the sound power level and L_p the sound pressure level at a distance (d) from the equipment. Total power levels of the indoor equipment for each octave band were then calculated by performing a logarithmic sum of the individual equipment sound power levels. The transmission loss at each octave band contributed by the roof and insulated metal walls of the buildings were subtracted from these totals. The mitigated octave band sound power levels were then A-weighted to determine an overall sound power level for the buildings.

Next, the mitigated overall building sound power level was logarithmically added to the sound power levels of each piece of outdoor equipment to determine the facility total sound power level, which was then attenuated for distance according to a hemispherical sound propagation model using the following equation:

$$L_{eq\ NSA} = L_w\ Facility - 20 * \text{Log}(D_{NSA}) - 0.7$$

Where $L_{eq, NSA}$ is the sound pressure level associated with all equipment at the NSA distance (D_{NSA}) from the compressor station.

The L_{dn} was then calculated for ambient noise measurements and predicted noise contribution of the compressor stations using the following formula:

$$L_{dn} = 10 * \text{Log}\left(\frac{15}{24} * 10^{L_{eq,day}/10} + \frac{9}{24} * 10^{(L_{eq,night}+10)/10}\right)$$

The two L_{dn} values were logarithmically added to obtain the predicted day-night noise level at each NSA while the compressor station is in operation.

Note that attenuation from foliage, obstructions, and atmospheric absorption are not included in the predicted noise levels, but would likely provide additional attenuation of noise in higher frequency ranges.

HDD Operations

Predicted noise contributions due to HDD activity at NSAs were also estimated according to a hemispherical sound propagation model as described above. Sound power levels were calculated

based on sound pressure levels measured by Michels Corporation at a similar project. The provided measurements and calculated sound power levels are provided in Table 4 above.

Note that attenuation from foliage, obstructions, and atmospheric absorption are not included in the predicted noise levels, but would likely provide additional attenuation of noise in higher frequency ranges.

6.0 CONCLUSION

Based on the measured data and proposed equipment specifications, The new Elkhorn Creek compressor station and expanded Tioga compressor station operation would not contribute to an exceedance the FERC 55 dBA L_{dn} noise limit. During blowdown events at the compressor stations the noise would exceed the FERC 55 dBA L_{dn} noise limit for short periods of time for maintenance activities and emergencies. During planned blowdown events, the blowdown rate will be controlled to not exceed the FERC 55 dBA L_{dn} noise impact at nearby NSAs.

Based on the measured data and HDD entry equipment noise levels, unmitigated noise from HDD operations would exceed both the Williams County and FERC noise limits at the nearest NSAs to the HDD sites. Placement of a temporary acoustical barrier is recommended to help reduce noise impacts at NSAs, but when used alone will not provide adequate attenuation to be in compliance with the FERC 55 dBA L_{dn} noise guidance.

To ensure compliance with FERC limits, on-Site acoustical monitoring should be completed during startup to evaluate the actual noise impact to the nearby NSA and help evaluate if additional noise mitigation will be required to meet FERC's guidance of 55 dBA L_{dn} at the NSAs. If nighttime drilling will only be completed during pullback which is estimated to last less than one week, temporary relocation of residents may be an option. If needed, additional noise mitigation measures may include; use of additional or higher temporary acoustical noise barriers, residential grade silencers or mufflers on engines, and use of gear box and other mechanical noise dampening blankets.

References:

Federal Energy Regulatory Commission. "Guidance Manual for Environmental Report Preparation". February 2017.

Hoover & Keith, Inc. "Results of an Ambient Site Sound Survey and Acoustical Analyses for an New Natural Gas Compressor Station Associated with the Proposed Gulf Crossing Project." June 14, 2007.

Williams County. "Zoning Ordinance and Subdivision Regulations. September 15, 2015.
<https://www.williamsnd.com/usrfiles/dept/122/forms/Zoning%20Ordinance%20and%20Subdivision%20Regulations%20Final.pdf>

NORTH BAKKEN EXPANSION PROJECT

**Pre-Construction Noise Survey and Acoustical Analysis
McKenzie and Williams Counties, North Dakota**

**APPENDIX A
Figures**

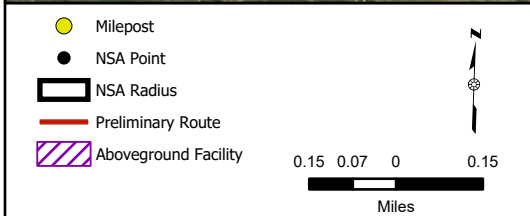
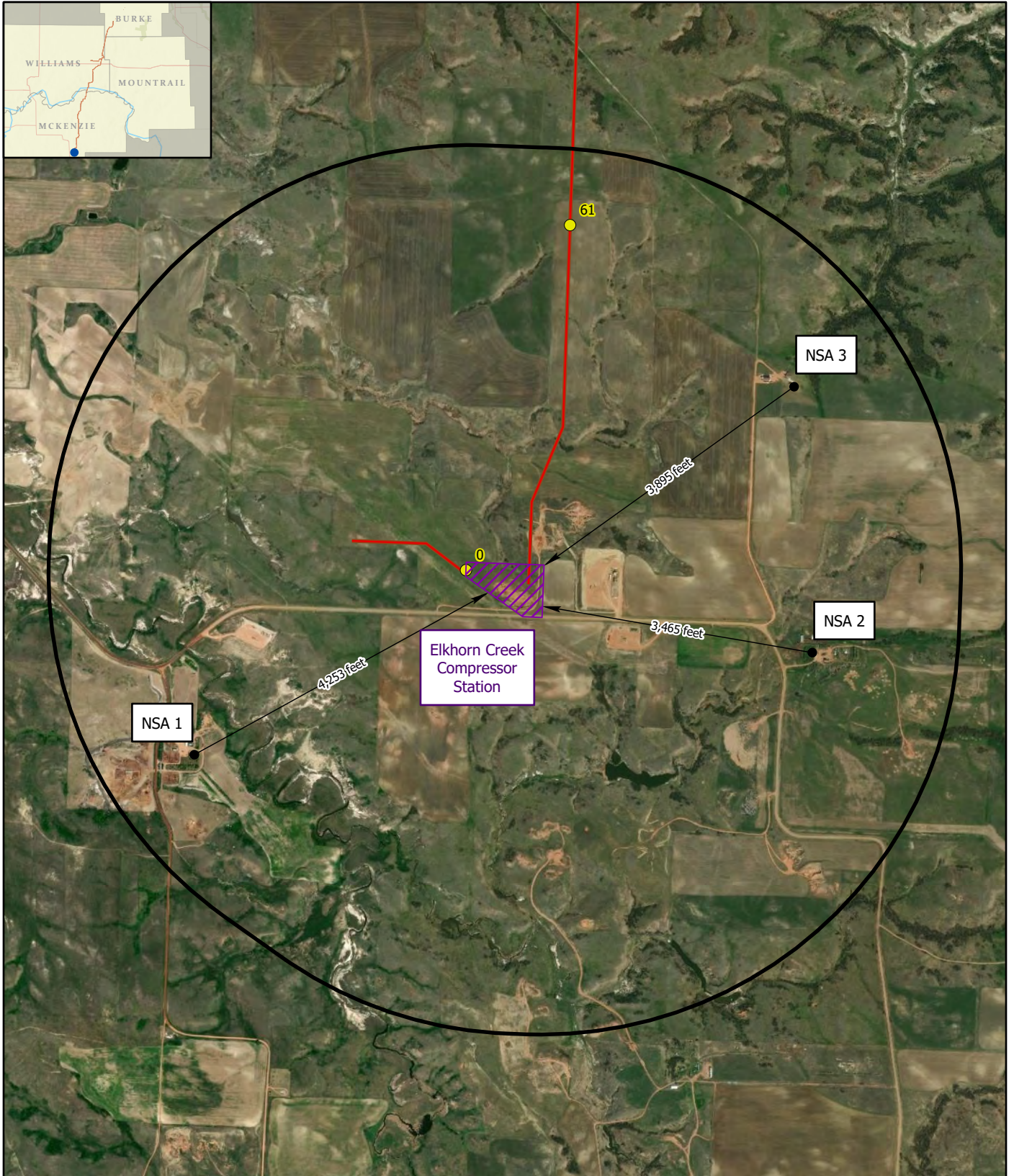


Figure 1
NSAs within 1.0 mile of Elkhorn Creek Compressor Station
North Bakken Expansion Project
 McKenzie County, North Dakota



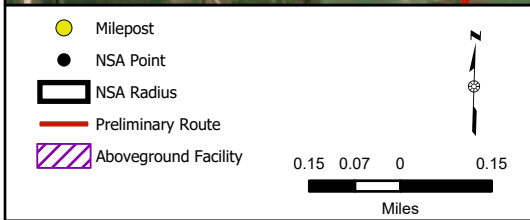
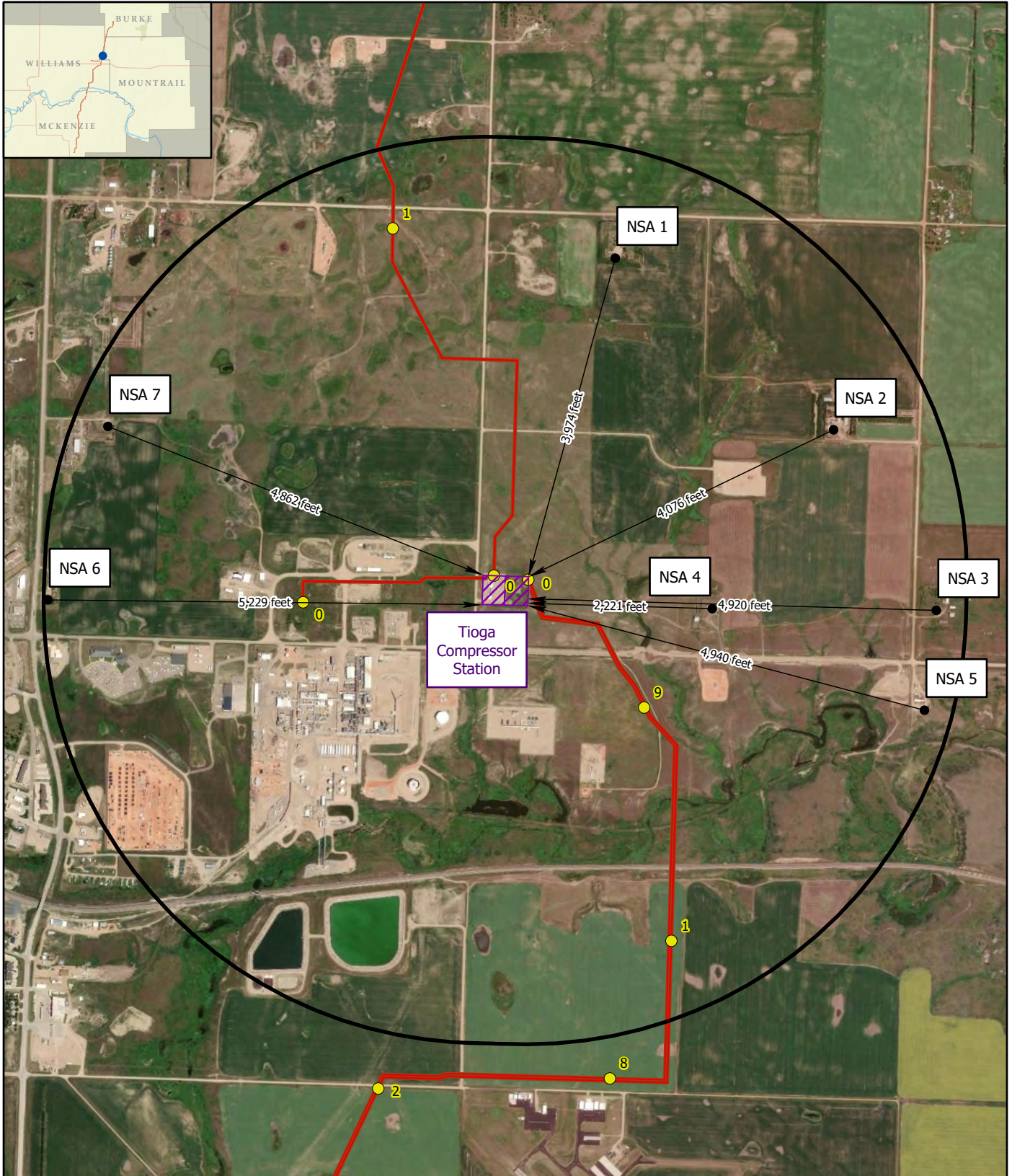


Figure 2
NSAs within 1.0 mile of Tioga Compressor Station
North Bakken Expansion Project
 Williams County, North Dakota



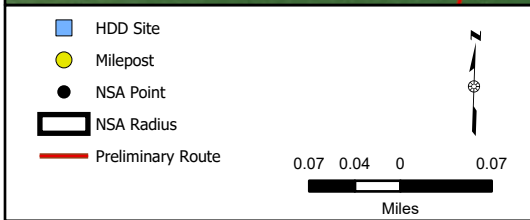


Figure 3
NSAs within 0.5 mile of Lake Sakakawea HDD – North Side
North Bakken Expansion Project
 Williams County, North Dakota



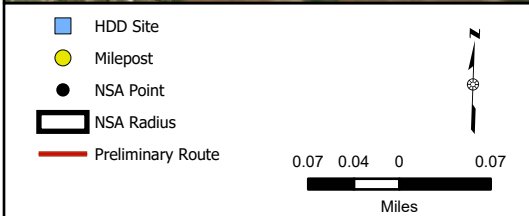
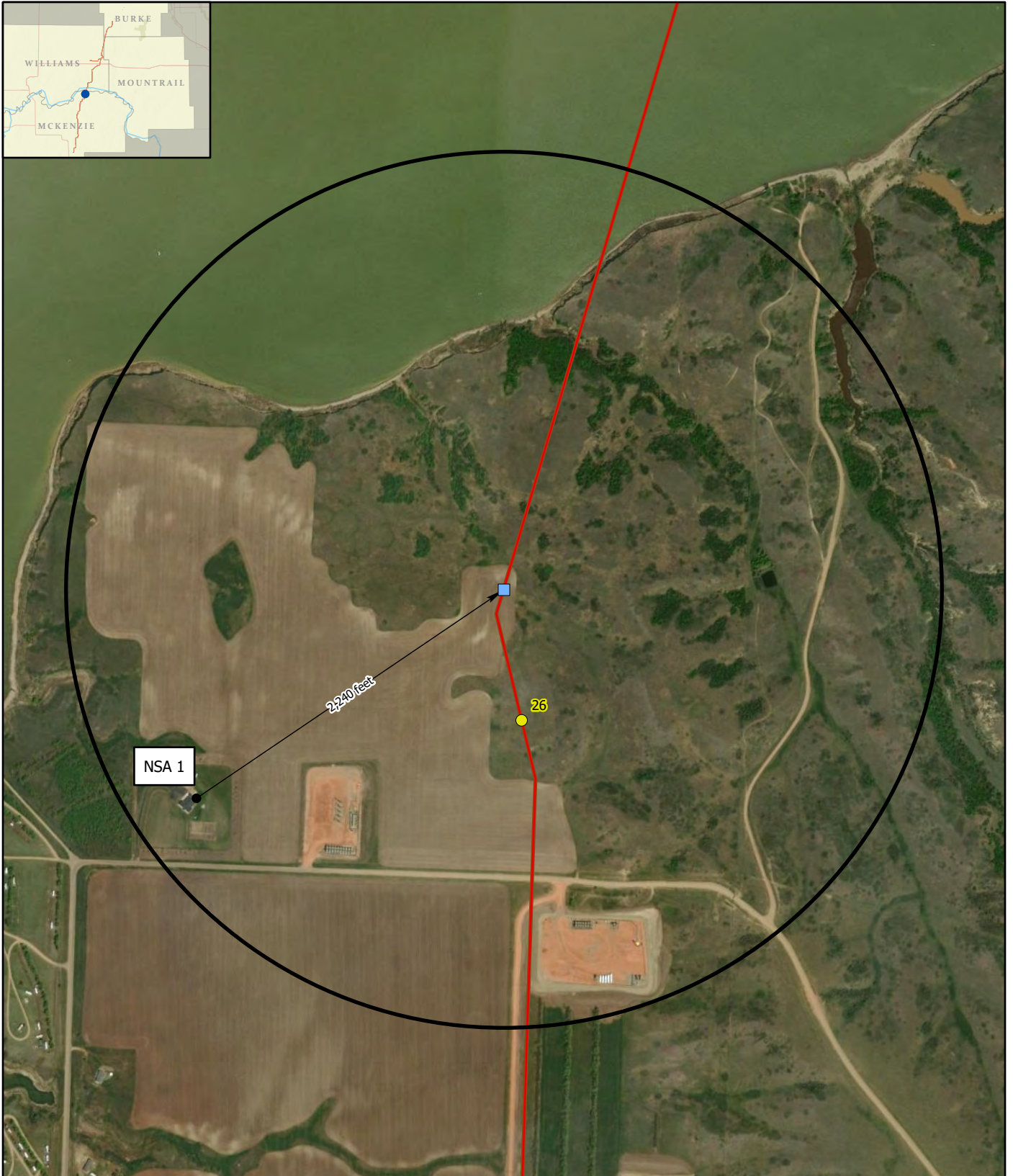


Figure 4
NSAs within 0.5 mile of Lake Sakakawea HDD – South Side
North Bakken Expansion Project
 McKenzie County, North Dakota



NORTH BAKKEN EXPANSION PROJECT

**Pre-Construction Noise Survey and Acoustical Analysis
McKenzie and Williams Counties, North Dakota**

**APPENDIX B
Field Monitoring Forms**



Noise Survey Data Sheet

Location: Elkhorn Creek Compressor Station NSA 1
(47.670899,-103.237866)

Investigator Name: Patrick Buffington, Nic Kuzola

Date: 07/22/2019

Meter Manufacturer and Model Number: Bruel & Kjaer 2250

Serial Number: 3011939

Calibrator Manufacturer, Model, and dB: Bruel & Kjaer 421, 94 dB

Calibrator Serial Number: 27012

Initial Calibration: 93.3 dB deviation from last -0.06 dB

Final Calibration: _____

Meteorological Conditions

Wind Speed: 2-4 mph

Direction: South

Temperature: 72°F

RH %: 64%

Barometric Pressure in mmHg: _____

Predominant noise source(s): Construction south of project, trucks on Hwy 34

Other noise source(s): Birds

Time start: 0924

Time end: 1024

Comments: Instantaneous Leq was 40-45 dBA w/o construction

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											Leq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
0939	46.5	40.3	47.2	45.7	42.4	43.4	43.4	37.5	35.4	29.8	23.0	51.0
0954	56.6	47.7	50.9	36.6	30.6	31.8	32.2	28.9	25.5	18.1	15.2	53.2
1009	44.9	50.5	49.6	49.2	44.4	49.9	46.6	41.2	33.9	26.3	20.6	40.4
1024	46.1	45.9	53.4	52.0	53.9	49.2	47.8	42.6	36.9	34.1	18.2	58.4



Noise Survey Data Sheet

Location: Elkhorn Creek Compressor Station NSA 2
(47.674509,-103.207512)

Investigator Name: Patrick Buffington, Nic Kuzola

Date: 07/22/2019

Meter Manufacturer and Model Number: Bruel & Kjaer 2250

Serial Number: 3011939

Calibrator Manufacturer, Model, and dB: Bruel & Kjaer 421, 94 dB

Calibrator Serial Number: 27012

Initial Calibration: 93.4 dB, deviation from last 0.01dB

Final Calibration: 93.4 dB, deviation from last -0.02 dB

Meteorological Conditions

Wind Speed: 2-2.5 mph

Direction: South

Temperature: 88°F

RH %: 30%

Barometric Pressure in mmHg: _____

Predominant noise source(s): Birds, insects, traffic

Other noise source(s): _____

Time start: 1110

Time end: 1210

Comments: _____

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											LAeq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
1128	55.8	44.6	36.0	28.9	22.0	18.7	18.9	19.0	28.3	25.4	27.9	29.4
1140	65.3	54.8	39.1	27.9	22.6	20.7	20.1	16.8	21.6	25.9	23.3	27.7
1155	45.1	50.7	41.	32.0	19.2	26.4	20.4	20.8	22.1	19.4	22.4	30.9
1210	54.3	49.5	44.0	31.5	34.6	23.5	25.4	28.1	15.3	23.0	21.6	25.8



Noise Survey Data Sheet

Location: HDD NSA 1 (48.154528,-103.076141)

Investigator Name: Patrick Buffington, Nic Kuzola

Date: 07/23/2019

Meter Manufacturer and Model Number: Bruel & Kjaer 2250

Serial Number: 3011939

Calibrator Manufacturer, Model, and dB: Bruel & Kjaer 421, 94 dB

Calibrator Serial Number: 27012

Initial Calibration: 94.9 dB, deviation from last -0.05 dB

Final Calibration: 93.9, dB, deviation from last 0.05 dB

Meteorological Conditions

Wind Speed: 0-2 mph

Direction: South

Temperature: 88°F

RH %: 44%

Barometric Pressure in mmHg: _____

Predominant noise source(s): Rustling trees, insects

Other noise source(s): _____

Time start: 1506

Time end: 1606

Comments: _____

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											LAeq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
1521	48.0	45.1	41.9	39.2	32.8	35.5	34.7	39.4	33.7	29.0	27.6	42.2
1537	51.8	49.4	48.1	42.1	42.7	41.6	40.4	37.0	38.1	34.1	26.2	44.2
1551	49.1	45.0	41.9	49.1	33.8	33.5	34.3	32.9	30.6	27.6	30.0	40.3
1606	49.8	46.0	43.9	42.	45.2	50.9	35.2	33.0	26.1	29.1	27.0	42.8



Noise Survey Data Sheet

Location: HDD NSA 2 (48.155231,-103.087188)

Investigator Name: Patrick Buffington, Nic Kuzola

Date: 07/23/2019

Meter Manufacturer and Model Number: Bruel & Kjaer 2250

Serial Number: 3011939

Calibrator Manufacturer, Model, and dB: Bruel & Kjaer 421, 94 dB

Calibrator Serial Number: 27012

Initial Calibration: 93.4 dB, deviation from last 0.07 dB

Final Calibration: 93.8, dB, deviation from last 0.08 dB

Meteorological Conditions

Wind Speed: 8-12 mph

Direction: Southeast

Temperature: 81°F

RH %: 52%

Barometric Pressure in mmHg: _____

Predominant noise source(s): Insects, wind

Other noise source(s): _____

Time start: 1351

Time end: 1451

Comments: _____

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											LAeq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
1406	78.3	71.9	70.2	47.1	41.2	34.9	33.6	30.2	27.7	37.2	39.8	44.6
1421	69.0	62.7	48.1	44.6	32.6	30.1	29.5	27.8	22.3	37.7	40.7	40.8
1436	78.2	67.5	52.1	45.7	28.8	31.0	29.2	28.4	24.8	37.4	40.4	42.1
1451	70.6	66.8	50.5	41.8	30.9	30.2	29.8	29.7	24.0	37.1	36.8	40.6



Noise Survey Data Sheet

Location: HDD NSA 3 (48.110783,-103.099304)

Investigator Name: Patrick Buffington, Nic Kuzola

Date: 07/23/2019

Meter Manufacturer and Model Number: Bruel & Kjaer 2250

Serial Number: 3011939

Calibrator Manufacturer, Model, and dB: Bruel & Kjaer 421, 94 dB

Calibrator Serial Number: 27012

Initial Calibration: 94.0 dB, deviation from last 0.01dB

Final Calibration: 93.4 dB, deviation from last 0.00 dB

Meteorological Conditions

Wind Speed: 9 mph, gust up to 11 mph

Direction: South

Temperature: 72°F

RH %: 64%

Barometric Pressure in mmHg: _____

Predominant noise source(s): Wind, insects

Other noise source(s): Traffic

Time start: 1049

Time end: 1149

Comments: Idling truck ~200' away for first 5-10 minutes, associated with oil drills near NSA

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											LAeq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
1104	76.7	66.0	51.9	50.3	40.1	34.2	30.9	33.3	33.5	40.8	27.1	40.5
1119	77.2	64.8	59.0	50.7	41.9	38.0	37.0	34.1	34.3	34.7	29.8	45.3
1134	83.7	75.1	64.4	52.1	40.2	38.1	35.0	35.2	36.6	33.2	31.6	43.8
1149	78.3	68.2	59.7	61.1	38.9	30.9	42.5	31.8	32.9	32.2	25.7	49.2



Noise Survey Data Sheet

Location: Tioga NSAs 1 & 8 (48.416102,-102.907314)
 Investigator Name: Patrick Buffington, Nic Kuzola
 Date: 07/24/2019
 Meter Manufacturer and Model Number: Bruel & Kjaer 2250
 Serial Number: 3011887
 Calibrator Manufacturer, Model, and dB: Bruel & Kjaer 421, 94 dB
 Calibrator Serial Number: 27012
 Initial Calibration: 93.4 dB, deviation from last 0.02 dB
 Final Calibration: 93.3 dB, deviation from last -0.11 dB

Meteorological Conditions

Wind Speed: 2-5 mph, gusts up to 7 mph
 Direction: South
 Temperature: 72°F
 RH %: 72%
 Barometric Pressure in mmHg: _____
 Predominant noise source(s): Rustling grass
 Other noise source(s): Minor traffic (2 cars)
 Time start: 1310
 Time end: 1502
 Comments: Measurement taken about 1000' from NSAs 1 & 8. 8 is to north, 1 is to east, both in sight from location. Paused run from 1330-1422 for rain.

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											LAeq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
1325	60.5	58.1	53.6	47.7	45.1	36.6	31.8	30.7	25.2	19.7	17.2	41.4
1432	57.5	57.2	51.4	48.8	43.2	37.3	32.1	26.9	21.2	35.5	37.8	41.7
1448	62.4	57.4	54.7	57.6	50.3	43.7	37.6	29.5	21.5	38.6	41.0	45.9
1502	61.3	60.1	53.6	51.9	50.6	38.5	38.9	28.1	22.8	39.9	43.0	44.4



Noise Survey Data Sheet

Location: Tioga NSA 2 (48.408438,-102.885868)

Investigator Name: Patrick Buffington, Nic Kuzola

Date: 07/25/2019

Meter Manufacturer and Model Number: Bruel & Kjaer 2250

Serial Number: 3011939

Calibrator Manufacturer, Model, and dB: Bruel & Kjaer 421, 94 dB

Calibrator Serial Number: 27012

Initial Calibration: 93.8 dB, deviation from last 0.02 dB

Final Calibration: 93.9 dB, deviation from last 0.01 dB

Meteorological Conditions

Wind Speed: 7-9 mph

Direction: North

Temperature: 68°F

RH %: 58%

Barometric Pressure in mmHg: _____

Predominant noise source(s): Insects, wind

Other noise source(s): Minor traffic

Time start: 0959

Time end: 1059

Comments: _____

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											LAeq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
1014	65.9	52.0	47.6	39.2	24.7	22.4	28.4	27.0	25.3	41.4	46.3	43.9
1029	59.9	51.1	43.9	35.3	28.2	20.8	18.8	16.4	22.6	41.1	45.9	49.9
1044	59.7	55.3	42.7	37.7	26.8	21.5	26.0	19.9	30.	41.5	44.9	43.1
1059	73.4	60.1	46.0	34.9	27.5	22.1	22.6	22.5	20.5	39.8	45.0	45.1



Noise Survey Data Sheet

Location: Tioga NSAs 3 & 5 (48.402277,-102.885672)

Investigator Name: Patrick Buffington, Nic Kuzola

Date: 07/24/2019

Meter Manufacturer and Model Number: Bruel & Kjaer 2250

Serial Number: 3011939

Calibrator Manufacturer, Model and dB: Bruel & Kjaer 421, 94 dB

Calibrator Serial Number: 27012

Initial Calibration: 93.4 dB, deviation from last -0.02 dB

Final Calibration: 93.9 dB, deviation from last 0.06 dB

Meteorological Conditions

Wind Speed: 3-4 mph, increased during measurement

Direction: South

Temperature: 73°F

RH %: 72%

Barometric Pressure in mmHg: _____

Predominant noise source(s): Traffic, wind, insects

Other noise source(s): Plane, compressor station

Time start: 1535

Time end: 1635

Comments: Measurement taken about 500' from NSAs 3 & 5. 3 is to north, 5 is to south, both in sight from monitoring location.

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											LAeq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
1550	67.0	53.8	50.3	44.4	37.1	31.6	24.1	18.5	19.4	40.9	50.1	45.7
1605	70.9	63.8	47.4	44.5	34.6	28.4	24.4	23.9	22.5	44.6	49.6	48.7
1620	83.6	72.2	63.9	56.6	41.1	33.6	34.2	31.2	32.3	47.3	51.1	56.8
1635	75.5	65.0	52.1	41.8	40.0	30.3	25.0	24.1	35.0	46.1	50.0	46.8



Noise Survey Data Sheet

Location: Tioga NSA 4 (48.401697,-102.893168)

Investigator Name: Patrick Buffington, Nic Kuzola

Date: 07/24/2019

Meter Manufacturer and Model Number: Bruel & Kjaer 2250

Serial Number: 3011939

Calibrator Manufacturer, Model, and dB: Bruel & Kjaer 421, 94 dB

Calibrator Serial Number: 27012

Initial Calibration: 93.9 dB, deviation from last -0.02 dB

Final Calibration: 93.9 dB, deviation from last 0.05 dB

Meteorological Conditions

Wind Speed: 8-11 mph

Direction: South

Temperature: 79°F

RH %: 66%

Barometric Pressure in mmHg: _____

Predominant noise source(s): Traffic, train, oil well, compressor station

Other noise source(s): Horses

Time start: 1654

Time end: 1754

Comments: _____

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											LAeq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
1709	81.2	63.7	52.5	49.4	40.8	50.4	48.2	38.7	28.7	40.4	45.9	69.2
1724	71.9	62.9	56.3	45.9	41.0	34.7	30.0	28.0	30.3	34.6	44.3	49.3
1739	77.3	55.1	52.2	44.4	35.9	34.8	33.2	29.8	36.9	43.2	39.8	46.2
1754	77.7	70.7	58.6	53.6	33.4	32.0	64.3	51.4	30.5	42.2	41.1	45.0



Noise Survey Data Sheet

Location: Tioga NSA 6 & 7(48.408634,-102.928193)

Investigator Name: Patrick Buffington, Nic Kuzola

Date: 07/24/2019

Meter Manufacturer and Model Number: Bruel & Kjaer 2250

Serial Number: 3011887

Calibrator Manufacturer, Model, and dB: Bruel & Kjaer 421, 94 dB

Calibrator Serial Number: 27012

Initial Calibration: 94.0 dB, deviation from last 0.05 dB

Final Calibration: 93.4 dB, deviation from last 0.05 dB

Meteorological Conditions

Wind Speed: 5.5-7.5 mph

Direction: South

Temperature: 81°F

RH %: 57%

Barometric Pressure in mmHg: _____

Predominant noise source(s): Traffic

Other noise source(s): _____

Time start: 1154

Time end: 1254

Comments: Measurement taken about 500' from NSAs 6 and 7, 2000' from NSA 6. No safe parking closer to 6.

Time	Unweighted Sound Pressure Level (dB) at each Octave Band Center Frequency (Hz)											LAeq (dBA)
	16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
1209	67.0	63.4	59.1	50.0	45.3	44.2	44.6	41.2	35.5	40.8	38.3	54.7
1224	65.0	57.2	57.0	61.3	47.3	42.0	37.9	43.4	31.1	32.1	36.4	44.2
1239	66.9	59.3	56.2	47.8	42.1	55.4	66.7	45.9	31.4	33.1	39.7	55.1
1254	67.7	57.1	54.1	60.1	47.2	42.8	42.2	34.9	27.7	37.4	37.1	56.9

NORTH BAKKEN EXPANSION PROJECT

**Pre-Construction Noise Survey and Acoustical Analysis
McKenzie and Williams Counties, North Dakota**

**APPENDIX C
Sound Level Meter Data**

Project Name	Start Time	Elapsed Time	Persistent Overload	LAFteq	LAFmax	LASmax	LAlmax	LCFmax	LCSmax	LCImax	LAFmin
Project 004	7/22/2019 9:24	01:02:22	0	62.55	78.32	76.77	79.07	82.56	81.19	83.34	27.04
Project 002 (1)	7/22/2019 9:23	01:01:44	0	62.09	78.39	77.16	79.02	82.34	80.98	83.37	26.86
Project 003	7/22/2019 11:09	01:00:00	0	46.02	65.46	57.27	70.01	76.06	71.9	78.52	21.93
Project 004	7/22/2019 12:40	01:00:00	0	68.26	91.89	90.51	92.88	102.16	99.62	103.3	21.45
Project 005	7/22/2019 22:28	00:17:07	0	44.37	64.33	62.39	65.59	72.82	70.94	74.82	23.46
Project 006	7/22/2019 23:02	00:15:01	0	53.72	72.82	70.41	74.95	78.11	76.86	78.7	18.6
Project 007	7/22/2019 23:31	00:15:02	0	37.8	48.73	47.56	53.96	59.65	57.66	61.55	21.97
Project 008	7/23/2019 10:49	01:00:00	0	60.85	83.34	81.17	84.68	92.43	87.31	95.11	35.68
Project 009	7/23/2019 13:50	01:00:00	0	47.36	61.97	55.75	65.31	88.77	82.56	92.39	35.08
Project 010	7/23/2019 15:05	01:00:00	0	48.29	63.76	57.08	68.67	76.28	68.43	79.77	34.26
Project 011	7/23/2019 16:19	00:32:03	0	49.77	64.55	58.32	69.04	83.68	78.18	86.8	35.22
Project 012	7/23/2019 17:00	00:30:04	0	57.61	78.98	74.31	81.44	87.67	80.47	91.66	34.01
Project 013	7/23/2019 22:45	00:15:00	0	50.52	70.56	67.19	75.17	82.92	77.39	85.6	34.79
Project 014	7/24/2019 0:52	00:15:00	0	44.8	55.26	48.02	60.25	74.26	71.2	76.69	35.5
Project 015	7/24/2019 1:21	00:15:00	0	40.43	56.19	47.63	61.29	60.84	57.42	62.78	31.34
Project 016	7/24/2019 1:48	00:15:00	0	41.08	50.75	46.07	53.65	63.6	60.66	65.68	34.48
Project 017	7/24/2019 11:54	01:00:00	0	65.31	83.24	79.95	87.71	89.96	86.73	91.8	39.41
Project 018	7/24/2019 13:10	01:00:00	0	65.91	92.44	89.58	93.36	102.83	99.36	103.58	37.56
Project 005	7/24/2019 15:34	01:02:21	0	54.92	77.6	75.52	78.46	90.45	86.82	93	40.19
Project 006	7/24/2019 16:53	01:01:18	0	60.1	78.47	76.49	79.12	94.19	88.77	98.14	34.81
Project 007	7/24/2019 22:07	00:15:17	0	52.49	69.33	65.22	73.78	70.64	67.94	74.57	38.61
Project 008	7/24/2019 22:29	00:17:00	0	49.39	59.32	56.46	63.57	81.62	74.34	84.75	41.6
Project 009	7/24/2019 22:54	00:15:18	0	53.33	57.37	54.35	61.03	74.17	69.94	77.47	49.66
Project 010	7/24/2019 23:22	00:17:00	0	47.8	52.64	50.07	55.16	68.92	65.26	72.58	43.45
Project 011	7/24/2019 23:53	00:16:17	0	55.33	68.26	66.96	69.01	86.93	82.93	89.52	44.76
Project 012	7/25/2019 9:58	01:01:00	0	50.89	73.67	70.58	74.74	81.76	76.39	86.03	37.7

Project Name	LASmin	LAlmin	LCFmin	LCSmin	LClmin	LApeak	LAleq	LCleq	LAeq	Lep,d	Lep,d,v	LCeq	LAE	LCE	LAleq-LAeq
Project 004	27.97	27.52	42.64	44.98	45.98	90.6	60.2	64.34	57.39	57.11	57.11	62.18	93.12	97.9	2.81
Project 002 (1)	29.12	29	41.47	44.7	45.89	92.09	59.76	64.19	57.15	56.87	56.87	62.19	92.83	97.87	2.61
Project 003	22.9	22.43	36.35	39.5	40.78	86.44	44.96	56.19	36.56	36.28	36.28	52.59	72.12	88.15	8.4
Project 004	22.25	21.49	33.38	35.31	35.41	108.42	65.99	77.14	63.23	62.95	62.95	74.26	98.79	109.82	2.76
Project 005	23.99	23.65	38.54	41.73	42.78	87.1	42.53	55.32	39.95	39.67	39.67	52.92	70.06	83.04	2.58
Project 006	18.97	18.56	33.21	35.25	36.27	89.92	52.28	60.57	48.58	48.3	48.3	58.91	78.13	88.46	3.7
Project 007	22.7	22.12	37.14	39.63	40.67	75.03	36.89	47.86	34.21	33.93	33.93	45.76	63.76	75.31	2.68
Project 008	36.67	35.81	50.57	54.33	56.46	95.92	58.64	80.1	54.86	54.58	54.58	74.48	90.42	110.04	3.78
Project 009	38.14	37.66	47.57	51.13	52.74	85.4	46.39	76.16	43.02	42.74	42.74	70.89	78.57	106.45	3.37
Project 010	34.63	34.46	44.32	46.31	46.73	88.17	47.27	56.1	43.91	43.63	43.63	51.44	79.47	87	3.36
Project 011	36.69	36.12	53.47	55.23	55.92	87.57	48.43	73.18	43.07	42.79	42.79	68.2	75.91	101.04	5.36
Project 012	36.54	35.67	51.99	55.15	55.46	92.28	55.23	73.27	49.1	48.82	48.82	67.82	81.66	100.38	6.13
Project 013	35.56	35.35	50.87	54.19	54.93	92.07	49.34	69.9	44.32	44.04	44.04	64.37	73.86	93.91	5.02
Project 014	37.29	36.63	49.75	52.13	53.29	77.29	43.91	59.47	42.14	41.86	41.86	56.22	71.67	85.76	1.77
Project 015	31.93	31.51	47.73	49.74	50.41	82.07	39.58	55.81	35.7	35.42	35.42	53.21	65.24	82.75	3.88
Project 016	35.19	34.84	52.75	54.64	55.14	67.94	40.29	59.42	39.52	39.24	39.24	56.8	69.06	86.34	0.77
Project 017	40.23	39.89	55.47	58.68	59.91	104.89	62.98	71.73	60.51	60.23	60.23	69.29	96.07	104.85	2.47
Project 018	37.93	37.73	51.7	54.31	55.54	104	60.99	71.59	57.59	57.31	57.31	67.92	93.15	103.48	3.4
Project 005	41.63	40.5	49.99	51.97	52.86	94.02	52.5	74.37	50.56	50.28	50.28	68.84	86.29	104.57	1.94
Project 006	40.36	40.17	52.04	57.51	58.99	96.9	57.37	81.88	55.29	55.01	55.01	76.37	90.95	112.02	2.08
Project 007	39.77	39.41	54.94	57.35	58.45	88.89	50.48	62.38	46	45.72	45.72	59.75	75.62	89.37	4.48
Project 008	42.25	41.65	52.22	54.61	55.31	78.62	48.32	61.64	46.85	46.57	46.57	57.49	76.93	87.57	1.47
Project 009	50.4	50.05	53.69	55.26	55.84	79.63	52.74	61.27	52.31	52.03	52.03	58.35	81.93	87.98	0.43
Project 010	43.87	43.74	55.88	57.98	58.43	74.67	47.15	63.65	46.46	46.18	46.18	61.3	76.54	91.38	0.69
Project 011	45.28	44.94	56.13	58.33	59.73	82.2	53.41	70.25	52.26	51.98	51.98	66.7	82.16	96.6	1.15
Project 012	39.82	38.95	47.16	50.5	51.48	91.29	49.09	68	45.97	45.69	45.69	61.88	81.6	97.51	3.12

Project Name	LCeq-LAeq	LAFteq-LAeq	Overload	LAF1.0	LAF5.0	LAF10.0	LAF50.0	LAF90.0	LAF95.0	LAF99.0	StdDev	LavS5	TWA	TWAv
Project 004	4.79	5.16	0	69.92	63.71	59.98	45.81	36.45	34.3	30.57	8.78	53.76	23.58	23.58
Project 002 (1)	5.04	4.94	0	69.81	63.44	59.28	45.71	36.54	34.39	30.53	8.62	53.43	22.98	22.98
Project 003	16.03	9.46	0	47.41	41.63	38.75	30.12	25.77	24.71	23.41	5.26	34.51		
Project 004	11.03	5.03	0	74.31	64.05	52.71	31.63	25.33	24.32	23.08	11.76	53.88	35.84	35.84
Project 005	12.97	4.42	0	51.4	43.2	38.48	27.58	24.82	24.45	24	6.14	34.83		
Project 006	10.33	5.14	0	60.97	50.07	44.81	24.93	20.51	20.02	19.24	9.89	40.87	-7.36	-7.36
Project 007	11.55	3.59	0	46.55	42.05	36.77	26.54	24.57	24.11	23.21	5.26	31.52		
Project 008	19.62	5.99	0	65.39	52.59	49.59	43.3	39.88	39.17	37.9	4.94	48.69	23.16	23.16
Project 009	27.87	4.34	0	49.27	46.38	45.13	42.05	39.9	39.25	38.03	2.2	42.78		
Project 010	7.53	4.38	0	52.3	49.47	47.7	40.86	37.02	36.2	35.24	4.02	43		
Project 011	25.13	6.7	0	49.69	46.67	45.4	41.39	38.53	37.92	36.86	2.8	42.63		
Project 012	18.72	8.51	0	59.76	54.56	46.96	41.61	38.74	38.06	36.9	4.55	45.59	2.51	2.51
Project 013	20.05	6.2	0	51.21	44.32	42.26	39.1	37.05	36.59	35.71	3.05	41.24		
Project 014	14.08	2.66	0	44.76	44.05	43.69	42.06	39.05	38.35	37.09	1.78	42.05		
Project 015	17.51	4.73	0	40.52	38.96	38.09	34.25	32.78	32.53	32.07	2.19	35.39		
Project 016	17.28	1.56	0	44.1	42.28	41.52	38.94	36.78	36.37	35.72	1.84	39.34		
Project 017	8.78	4.8	0	71.08	66.55	63.73	52.07	42.72	41.82	40.8	8.05	57.61	27.78	27.78
Project 018	10.33	8.32	0	59.59	50.16	47.71	42.92	40.54	39.97	39.05	3.87	47.61	24.04	24.04
Project 005	18.28	4.36	0	57.7	54.51	51.41	48.02	45.48	44.68	43.43	2.84	49.26	7.63	7.63
Project 006	21.08	4.81	0	68.45	58.03	53.96	46.98	42.93	41.88	39.81	5.27	51.53	21.81	21.81
Project 007	13.75	6.49	0	55.69	47.56	46.91	42.28	40.69	40.3	39.65	2.99	44.38		
Project 008	10.64	2.54	0	50.97	48.97	48.61	46.43	43.66	43.26	42.53	2.02	46.67		
Project 009	6.04	1.02	0	53.54	53.24	53.08	52.38	51.24	51	50.53	0.7	52.28		
Project 010	14.84	1.34	0	49.01	47.99	47.61	46.29	45.16	44.81	44.12	0.99	46.4		
Project 011	14.44	3.07	0	64.66	57.95	53.25	47.26	46.2	45.91	45.43	3.85	50.34		
Project 012	15.91	4.92	0	48.82	46.66	46.09	44.38	42.46	41.77	40.41	1.89	44.92	-5.08	-5.08

Project Name	E	Dose	DoseS5	ProjDose	ProjDoseS5	#APeaks(>140dB)	#APeaks(>137dB)	#APeaks(>135dB)
Project 004	0.000228259	0	0.02	0.05	0.15	0	0	0
Project 002 (1)	0.000213778	0	0.01	0.05	0.14	0	0	0
Project 003	1.8131E-06					0	0	0
Project 004	0.000842752	0.07	0.1	0.61	0.87	0	0	0
Project 005	1.12907E-06					0	0	0
Project 006	7.22722E-06	0	0	0	0	0	0	0
Project 007	2.64424E-07					0	0	0
Project 008	0.00012263	0	0.01	0.07	0.15	0	0	0
Project 009	8.0256E-06					0	0	0
Project 010	9.8508E-06					0	0	0
Project 011	4.33658E-06					0	0	0
Project 012	1.63106E-05	0	0	0	0.01	0	0	0
Project 013	2.7066E-06					0	0	0
Project 014	1.6384E-06					0	0	0
Project 015	3.71813E-07					0	0	0
Project 016	8.9615E-07					0	0	0
Project 017	0.000450458	0.01	0.03	0.12	0.28	0	0	0
Project 018	0.000229952	0.02	0.02	0.16	0.17	0	0	0
Project 005	4.73394E-05	0	0	0	0.01	0	0	0
Project 006	0.000138325	0	0.01	0.04	0.12	0	0	0
Project 007	4.06048E-06					0	0	0
Project 008	5.49304E-06					0	0	0
Project 009	1.73824E-05					0	0	0
Project 010	5.02112E-06					0	0	0
Project 011	1.82877E-05					0	0	0
Project 012	1.60951E-05	0	0	0	0	0	0	0

Project Name	LAeq,15,mov,max	LAeq,60,mov,max	LCeq,15,mov,max	LCeq,60,mov,max	ΔLeq,15,mov,max	ΔLeq,60,mov,max
Project 004	61.19	57.55	64.29	62.24	3.1	4.69
Project 002 (1)	60.57	57.27	64.25	62.22	3.68	4.95
Project 003	38.46	36.56	54.37	52.59	15.91	16.03
Project 004	67.55	63.23	77.15	74.26	9.6	11.03
Project 005	40.32		53.4		13.08	
Project 006	48.59		58.92		10.33	
Project 007	34.22		45.76		11.54	
Project 008	57.64	54.86	76.13	74.48	18.49	19.62
Project 009	44.62	43.02	73.66	70.89	29.04	27.87
Project 010	45.6	43.91	53.86	51.44	8.26	7.53
Project 011	43.61		69.23		25.62	
Project 012	51.54		68.77		17.23	
Project 013	44.32		64.37		20.05	
Project 014	42.14		56.22		14.08	
Project 015	35.7		53.21		17.51	
Project 016	39.52		56.8		17.28	
Project 017	63.94	60.51	71.69	69.29	7.75	8.78
Project 018	63.37	57.59	73.39	67.92	10.02	10.33
Project 005	52.34	50.67	72.87	68.99	20.53	18.32
Project 006	58.94	55.33	78.66	76.43	19.72	21.1
Project 007	46.05		59.76		13.71	
Project 008	47.08		57.57		10.49	
Project 009	52.33		58.36		6.03	
Project 010	46.51		61.37		14.86	
Project 011	52.42		66.9		14.48	
Project 012	48.54	46.01	62.6	61.91	14.06	15.9

Project Name	Wind Dir. avg	Wind Dir. min	Wind Dir. max	Wind Speed avg	Wind Speed min	Wind Speed max	Amb. Temperature
Project 004							
Project 002 (1)							
Project 003							
Project 004							
Project 005							
Project 006							
Project 007							
Project 008							
Project 009							
Project 010							
Project 011							
Project 012							
Project 013							
Project 014							
Project 015							
Project 016							
Project 017							
Project 018							
Project 005							
Project 006							
Project 007							
Project 008							
Project 009							
Project 010							
Project 011							
Project 012							

Project Name	Amb. Humidity	Amb. Pressure	Amb. Rain Gauge	Full Scale Level	Max. Input Level	Avg. RPM	CIC 1 Result	CIC 1 Ratio
Project 004				142.6300049	141.3300018		Undefined	
Project 002 (1)				142.6999969	141.3999939		Undefined	
Project 003				142.6900024	141.3899994		Undefined	
Project 004				142.6999969	141.3999939		Undefined	
Project 005				142.7100067	141.4100037		Undefined	
Project 006				142.6999969	141.3999939		Undefined	
Project 007				142.6999969	141.3999939		Undefined	
Project 008				142.6999969	141.3999939		Undefined	
Project 009				142.7599945	141.4600067		Undefined	
Project 010				142.7299957	141.4299927		Undefined	
Project 011				142.7200012	141.4199982		Undefined	
Project 012				142.6699982	141.3699951		Undefined	
Project 013				142.6699982	141.3699951		Undefined	
Project 014				142.5899963	141.2899933		Undefined	
Project 015				142.5599976	141.2599945		Undefined	
Project 016				142.5899963	141.2899933		Undefined	
Project 017				142.6300049	141.3300018		Undefined	
Project 018				142.5899963	141.2899933		Undefined	
Project 005				142.7400055	141.4400024		Undefined	
Project 006				142.6900024	141.3899994		Undefined	
Project 007				142.6900024	141.3899994		Undefined	
Project 008				142.7200012	141.4199982		Undefined	
Project 009				142.6900024	141.3899994		Undefined	
Project 010				142.6999969	141.3999939		Undefined	
Project 011				142.6600037	141.3600006		Undefined	
Project 012				142.6499939	141.3500061		Undefined	

Project Name	CIC 1 Background Level Before	CIC 1 Measurement Level	CIC 1 Generator Level	CIC 1 Background Level After
Project 004				
Project 002 (1)				
Project 003				
Project 004				
Project 005				
Project 006				
Project 007				
Project 008				
Project 009				
Project 010				
Project 011				
Project 012				
Project 013				
Project 014				
Project 015				
Project 016				
Project 017				
Project 018				
Project 005				
Project 006				
Project 007				
Project 008				
Project 009				
Project 010				
Project 011				
Project 012				

Project Name	CIC 1 Dev. from Reference	CIC 2 Result	CIC 2 Ratio	CIC 2 Background Level Before	CIC 2 Measurement Level
Project 004		Undefined			
Project 002 (1)		Undefined			
Project 003		Undefined			
Project 004		Undefined			
Project 005		Undefined			
Project 006		Undefined			
Project 007		Undefined			
Project 008		Undefined			
Project 009		Undefined			
Project 010		Undefined			
Project 011		Undefined			
Project 012		Undefined			
Project 013		Undefined			
Project 014		Undefined			
Project 015		Undefined			
Project 016		Undefined			
Project 017		Undefined			
Project 018		Undefined			
Project 005		Undefined			
Project 006		Undefined			
Project 007		Undefined			
Project 008		Undefined			
Project 009		Undefined			
Project 010		Undefined			
Project 011		Undefined			
Project 012		Undefined			

Project Name	CIC 2 Generator Level	CIC 2 Background Level After	CIC 2 Dev. from Reference	SIL	PSIL	SIL3	LZeq (16 Hz-250 Hz)
Project 004				50.18	52.15	49.56	62.22
Project 002 (1)				50.21	52.05	49.34	62.32
Project 003				29.78	30.48	29.12	57.13
Project 004				53.49	56.73	50.37	75.1
Project 005				32.45	34.33	30.95	54.34
Project 006				40.79	43.43	39.28	60.45
Project 007				26.36	28.66	25.14	48.29
Project 008				47.85	49.43	46.64	80.67
Project 009				32.32	32.92	31.52	77.05
Project 010				37.32	37.04	37.18	54.84
Project 011				35.43	36.41	34.98	74.33
Project 012				42.08	43.83	40.53	73.77
Project 013				37.32	38.71	36.23	70.54
Project 014				23.44	25.28	21.69	61.71
Project 015				26.45	26.42	26.09	57.94
Project 016				32.46	33.5	31.45	61.01
Project 017				53.07	55.29	51.65	71.64
Project 018				47.81	49.79	45.25	68.99
Project 005				39.73	42.21	37.66	74.83
Project 006				46.92	49.37	45.7	82.53
Project 007				37.95	39.2	37.67	63.35
Project 008				30.39	32.9	28.78	61.5
Project 009				26.87	28.36	24.48	63.29
Project 010				31.22	34.39	28.2	64.5
Project 011				43.12	45.85	41.65	72.11
Project 012				34.03	35.69	32.51	68.23

Project Name	NC	NCDecisiveBand	NR	NRDecisiveBand	NCB	NCBCriteria	RC	RCCriteria	Loudness	Loudness_Level
Project 004	53	2000	55	2000	50	(H)		(HF) Objectionable		
Project 002 (1)	52	1000	54	2000	50	(H)		(HF) Objectionable		
Project 003	30		33	4000	30	(H)	30	(HF) Objectionable		
Project 004	60	500	60	500	53	(R) (RV)		(MF) Marginal		
Project 005	35	1000	36	1000	32	(H)	34	(HF) Marginal		
Project 006	45	1000	46	1000	41	(H)	43	(HF) Objectionable		
Project 007	29	1000	31	1000	26	(H)	29	(HF) Marginal		
Project 008	50	1000	51	1000	48	(H) (RV)	49	(HF) Marginal		
Project 009	42	8000	46	8000	32	(R) (H) (RV)	33	(LFVA) Objectionable		
Project 010	41	4000	44	4000	37	(H)	37	(HF) Objectionable		
Project 011	37	1000	39	2000	35	(H) (RV)	36	(LFVB) Objectionable		
Project 012	43	500	44	500	42	(H) (RV)	44	(HF) Marginal		
Project 013	39	1000	40	1000	37	(H) (RV)	39	(HF) Marginal		
Project 014	44	8000	47	8000	23	(H)	25	(LF) Marginal		
Project 015	33	8000	37	8000	26	(H)	26	(HF) Marginal		
Project 016	33	1000	35	1000	32	(H)	34	(HF) Marginal		
Project 017	57	1000	58	1000	53	(H) (RV)		(HF) Objectionable		
Project 018	55	250	54	250	48	(R)	50	(MF) Objectionable		
Project 005	49	8000	52	8000	40	(H) (RV)	42	(LFVB) Marginal		
Project 006	51	1000	52	1000	47	(H) (RV)	49	(LFVA) Marginal		
Project 007	41	8000	45	8000	38	(H)	39	(HF) Marginal		
Project 008	47	8000	51	8000	30	(H)	33	(N) Acceptable		
Project 009	54	8000	57	8000	27	(H)	28	(N) Acceptable		
Project 010	46	8000	49	8000	31	(R) (H)	34	(N) Acceptable		
Project 011	47	1000	51	8000	43	(H) (RV)	46	(N) Marginal		
Project 012	46	8000	50	8000	34	(H) (RV)	36	(LFVB) Marginal		

Project Name	LZFmax_O 16Hz	LZFmax_O 31.5Hz	LZFmax_O 63Hz	LZFmax_O 125Hz	LZFmax_O 250Hz	LZFmax_O 500Hz	LZFmax_O 1kHz
Project 004	74.5	68.48	82.7	77.55	76.84	77.93	73.43
Project 002 (1)	74.25	69.2	81.65	77.47	78.11	78.74	72.19
Project 003	79.32	72.79	72.81	55.92	55.15	57.45	57.97
Project 004	92.22	101.03	97.47	94.54	95.09	92.09	84.95
Project 005	68.88	68.01	73.39	66.33	64.38	62.85	60.32
Project 006	63.96	80.5	72.92	72.42	71.44	69.81	70.07
Project 007	53.12	56.14	56.91	49.26	48.57	45.8	47.26
Project 008	94.52	89.61	85.41	82.21	84.84	80.96	78.58
Project 009	89.33	84.68	78.41	65.92	57.78	50.1	55.23
Project 010	72.22	73.43	73.91	64.89	66.98	57.19	56.45
Project 011	86.12	79.31	74.48	65.7	56.05	52.28	56.94
Project 012	87.19	84.59	79.79	69.87	71.38	77.98	76.58
Project 013	85.3	78.3	72.2	64.17	62.84	69.38	67.29
Project 014	76.23	74	67.06	53.17	48.46	48.58	53.07
Project 015	64.49	55.91	57.56	51.33	42.71	47.7	49.67
Project 016	65.58	61.05	57.08	49.24	40.95	46.71	46.42
Project 017	82.85	78.54	84.2	83.13	88.34	82.55	78.55
Project 018	77.32	82.89	93.87	100.89	96.49	89.34	84.36
Project 005	88.89	87.76	88.14	82.76	76.51	75.7	73.89
Project 006	95.89	90.16	90.45	90.37	79.72	77.16	76.46
Project 007	65.14	63.48	66.19	61.28	61.97	59.93	65.72
Project 008	79.58	78.91	74.9	65.21	62.53	57.89	55.41
Project 009	77.69	70.39	66.86	61.05	52.95	50.2	50.96
Project 010	72.38	63.94	64.1	63.61	59.18	49.01	49.76
Project 011	90.64	83.38	75.52	78.39	72.32	69.21	64.58
Project 012	85.43	79.48	74.65	73.42	70.63	72.14	71.23

Project Name	LZFmax_O 2kHz	LZFmax_O 4kHz	LZFmax_O 8kHz	LZFmax_O 16kHz	LZSmax_O 16Hz	LZSmax_O 31.5Hz	LZSmax_O 63Hz
Project 004	74.56	69.09	55.95	47.1	72.79	66.6	81.27
Project 002 (1)	73.75	69.71	55.47	44.61	72.66	66.79	80.43
Project 003	61.22	59.43	50.37	39.15	77.68	70.06	71.36
Project 004	75.05	69.04	70.64	59.25	91.76	98.57	96.03
Project 005	55.45	54.43	51.55	40.35	66.45	64.09	71.4
Project 006	64.16	58.97	58.15	49.89	62.49	79.42	71.56
Project 007	43.71	45.04	38.49	35.48	52.46	54.87	55.42
Project 008	76.14	73.24	68.34	61.9	92.57	85.53	78.5
Project 009	57.76	58.5	47.5	49.03	87.42	81.92	73.84
Project 010	54.88	60.34	56.05	44.02	70.96	68.26	66.04
Project 011	60.63	60.78	53.72	43.75	84.14	76.67	70.44
Project 012	70.89	63.53	57.68	45.34	85.86	80.46	72.39
Project 013	63.21	59.02	50.91	41.12	83.04	75.47	68.94
Project 014	49.47	40.99	43.92	47.92	75.37	72.16	61.75
Project 015	52.91	49.84	44.79	37.55	62.72	54.77	55.67
Project 016	40.9	49.66	38.78	39.04	64.11	58.99	55.19
Project 017	77.65	73.72	68.08	52.32	80.86	74.92	83.46
Project 018	81.4	78.52	72.21	65.1	75.95	80.31	90.39
Project 005	67.66	62.73	56.49	55.28	87.16	83.38	83.72
Project 006	70.76	65.42	59.09	53.28	94.13	85.88	87.16
Project 007	64.62	58.12	55.56	51.28	64.02	61.8	63.72
Project 008	50.57	45.87	47.48	53.46	77.04	74.19	67.03
Project 009	50.21	45.19	51.96	57.18	76.49	66.39	60.19
Project 010	45.6	41.05	45.77	48.79	70.59	62.09	61.76
Project 011	60.27	52.21	50.25	50.99	89.09	80.73	73.63
Project 012	63.96	61.88	54.59	51.22	83.17	74.25	71.01

Project Name	LZSmax_O 125Hz	LZSmax_O 250Hz	LZSmax_O 500Hz	LZSmax_O 1kHz	LZSmax_O 2kHz	LZSmax_O 4kHz	LZSmax_O 8kHz
Project 004	74.86	75.2	76.55	71.47	70.81	66.5	54.66
Project 002 (1)	74.87	76.64	76.98	71.16	69.99	66.9	53.99
Project 003	53.98	52.55	51.31	49.83	53.05	51.14	42.54
Project 004	91.85	94.12	90.65	82.72	72.58	63.95	62.16
Project 005	63.77	61.48	60.49	58.14	53.24	48.38	43.81
Project 006	70.43	68	66.91	67.23	61.74	56.08	52
Project 007	46.8	46.92	44.55	45.97	38.95	36.27	30.7
Project 008	79.62	81.45	78.64	76.25	72.88	69.42	63.84
Project 009	61.8	49.9	43.81	48.78	51.15	51.03	43.36
Project 010	62.22	58.5	49.33	48.71	46.76	55.08	49.33
Project 011	62.21	51.9	45.21	49.91	53.44	53.81	45.85
Project 012	67.04	66.89	74.05	69.78	65.86	56.01	50.22
Project 013	62.64	60.63	64.44	62.91	60.02	54.87	47.34
Project 014	50.25	40.83	41.12	44.57	40.89	35.51	43.01
Project 015	49.7	39.92	41.02	43.17	44.15	41.05	36.62
Project 016	47.09	38.77	41	40.72	39.45	44.53	33.81
Project 017	80.88	84.32	79.35	76.5	74.46	70.97	65.8
Project 018	96.88	93.61	86.93	81.29	77.81	74.8	68.11
Project 005	79.98	74.52	73.04	71.93	65.79	58.63	51.6
Project 006	87.91	76.64	73.53	73.09	67.87	62.38	55.02
Project 007	58.21	55.38	57.03	60.48	60.88	54.41	51.71
Project 008	58	54.41	54.12	53.45	44.36	39.38	46.83
Project 009	53.95	45.71	42.5	43.22	42.83	38.01	51.42
Project 010	61.84	55.98	46.68	44.34	40.86	34.11	44.65
Project 011	77.42	70.86	67.01	62.97	57.91	50.75	46.1
Project 012	70.83	67.39	69.14	67.57	58.74	53.95	48.16

Project Name	LZSmax_O 16kHz	LZFmin_O 16Hz	LZFmin_O 31.5Hz	LZFmin_O 63Hz	LZFmin_O 125Hz	LZFmin_O 250Hz	LZFmin_O 500Hz
Project 004	44.93	40.47	36.61	35.72	29.93	22.34	20.3
Project 002 (1)	43.05	40	38.26	34.95	29.01	22.85	20.79
Project 003	31.95	39.47	33.72	28.17	20.59	16.67	15.14
Project 004	50.84	30.95	29.08	26.61	21.09	16.23	15.13
Project 005	34.72	39.8	38.8	29.74	23.34	18.4	16.66
Project 006	43.97	33.02	32.55	25.95	18.32	17.89	11.66
Project 007	29.01	38.63	35.72	30.19	22.14	12.43	13.2
Project 008	56.82	55.7	47.59	41.48	36.79	30.63	28.32
Project 009	44.44	53.29	44.8	39.24	30.36	21.95	25.49
Project 010	36.68	40.86	40.33	37.72	34.93	27.78	28.34
Project 011	39.01	50.62	45.5	52.2	42.26	26.51	26.72
Project 012	40.26	50.58	46.66	50.47	40.45	26.79	26.03
Project 013	39.53	52.76	48.64	45.09	39.68	31.36	29.23
Project 014	46.94	51.84	48.17	43.49	35.13	26.34	23.76
Project 015	35.55	47.77	44.38	43.36	37.2	27.24	21.59
Project 016	34.19	52.23	50.08	48.47	40.64	29.88	29.96
Project 017	49.8	57.65	53.53	45.94	42.37	36.53	34.2
Project 018	59.93	53.64	50.75	43.25	42.85	37.8	29.35
Project 005	53.28	49.03	46.94	41.09	36.33	30.62	24.85
Project 006	51.22	55.61	50.55	45.51	40.78	30.22	26.6
Project 007	50.39	53.82	53.09	49.59	43.96	33.64	32.21
Project 008	52.47	51.82	50.7	44.53	40.44	33.35	27.82
Project 009	56.62	52.09	49.42	44.06	38.18	32.31	28.88
Project 010	47.93	54.88	52.26	50.37	46.36	40.29	35.04
Project 011	49.8	58.77	53.55	46.46	43.71	38.28	35.68
Project 012	49.91	49.69	45.05	37.84	29.28	21.02	17.82

Project Name	LZFmin_O 1kHz	LZFmin_O 2kHz	LZFmin_O 4kHz	LZFmin_O 8kHz	LZFmin_O 16kHz	LZSmin_O 16Hz	LZSmin_O 31.5Hz
Project 004	17.89	14.44	13.65	15.14	13.91	41.26	38.93
Project 002 (1)	17.97	15.38	13.63	14.74	13.81	41.77	39.58
Project 003	13.38	10.92	11.57	14.29	13.83	40.53	36.5
Project 004	12.74	10.47	11.48	12.88	13.18	32.69	32.23
Project 005	15.17	11.56	11.54	16.42	15.03	41.49	41.45
Project 006	7.46	7.43	9.93	11.87	12.6	34.79	34.22
Project 007	12.96	11.26	11.63	13.81	13.7	39.85	38.01
Project 008	27.18	27.06	27.61	25.43	19.49	58.05	50.81
Project 009	24.79	19.96	17.4	30.24	31.74	54.81	46.96
Project 010	28.6	25.51	21.13	20.21	18.29	42.84	42.66
Project 011	25.9	22.44	21.74	18.85	16.74	52.27	48.49
Project 012	26.35	22.52	21.25	18.47	17.14	52.35	48.15
Project 013	26.76	23.5	22.51	20.47	17.19	54.44	51.07
Project 014	19.14	14.02	13.22	32.99	36.14	52.8	50.05
Project 015	18.16	14.65	12.77	26.59	29.16	49.1	46.74
Project 016	25.94	21.41	18.54	15.51	13.92	53.23	52.03
Project 017	29.86	24.91	19.15	29.24	29.53	59.95	55.15
Project 018	24.75	17.46	15.27	17.16	15.53	54.77	52.91
Project 005	19.39	15.04	16.05	34.22	36.48	50.55	48.87
Project 006	24.05	22.88	22.01	25.61	25.73	60.55	54.81
Project 007	29.96	26.8	21.13	17.15	13.43	54.88	56.27
Project 008	25.11	19.08	15.61	37.05	41.44	53.25	52.63
Project 009	23.68	16.71	19.58	46.73	52.09	54.76	51.3
Project 010	29.58	22.18	17.02	39.09	41.77	55.51	54.39
Project 011	29.97	25.19	19.87	40.08	44.35	60.1	54.94
Project 012	14.92	12.71	16.34	35.63	38.8	51.46	47.96

Project Name	LZSmin_O 63Hz	LZSmin_O 125Hz	LZSmin_O 250Hz	LZSmin_O 500Hz	LZSmin_O 1kHz	LZSmin_O 2kHz	LZSmin_O 4kHz
Project 004	38.17	32.54	24.99	21.76	18.06	15.05	17.13
Project 002 (1)	37.83	32.28	24.26	22.46	20.01	17.58	17.47
Project 003	31.13	22.78	18.15	16.17	14.41	11.96	12.48
Project 004	29.42	23.24	17.53	16.47	13.94	10.94	12.46
Project 005	32.67	25.9	19.23	18.07	16.05	12.48	13.78
Project 006	28.66	20.43	19.66	13.03	8.53	8.15	10.39
Project 007	34.09	23.98	14.27	14.2	14.29	12.13	12.16
Project 008	44.45	39.23	32.53	29.32	28.53	27.87	28.42
Project 009	42.47	33.46	23.76	26.48	25.69	21.49	20
Project 010	40.86	37.12	30.29	29.31	29.44	26.13	21.79
Project 011	52.92	43.25	29.31	29.07	27.48	23.87	23.12
Project 012	52.34	42.7	28.79	29.34	29	25.92	23.34
Project 013	48.06	42.21	33.54	30.56	27.98	24.9	23.1
Project 014	46.45	37.76	27.61	24.72	19.92	14.87	13.88
Project 015	45.45	40.51	28.76	22.73	18.92	15.35	13.24
Project 016	51.27	42.6	31.35	30.99	26.9	22.11	19.37
Project 017	48.38	44.03	38.2	35.41	30.77	25.73	19.87
Project 018	45.61	45.08	39.66	30.73	25.84	18.38	16.06
Project 005	44.3	38.59	31.98	25.89	20.26	15.93	17.86
Project 006	48.76	43.3	32.22	27.95	25.58	24.62	24.24
Project 007	52.17	46.48	34.97	33.54	30.65	28.27	23.35
Project 008	47.16	42.03	34.92	28.87	25.99	20.07	16.42
Project 009	46.04	40.19	34.13	30.47	24.56	17.34	20.02
Project 010	52.33	48.57	42.59	36.34	30.64	22.96	17.4
Project 011	49.57	45.32	39.54	36.69	30.41	26.16	20.3
Project 012	40.39	31.09	22.82	18.72	15.88	13.7	17.24

Project Name	LZSmin_O 8kHz	LZSmin_O 16kHz	LZeq_O 16Hz	LZeq_O 31.5Hz	LZeq_O 63Hz	LZeq_O 125Hz	LZeq_O 250Hz	LZeq_O 500Hz
Project 004	15.86	14.43	56.51	51.43	58.35	53.5	52.4	52.05
Project 002 (1)	15.56	14.23	56.97	51.6	58.15	53.03	53.24	52.83
Project 003	15.24	14.65	55.41	49.22	48.88	37.5	32.37	31.75
Project 004	14.69	13.66	66.22	68.81	70.84	67.25	65	62.84
Project 005	16.84	15.44	46.36	46.5	51.99	42.62	38.57	36.96
Project 006	12.18	12.83	46.6	58.38	53.9	49.53	45.95	45.31
Project 007	14.43	14.72	43.81	42.16	43.63	33.93	31.42	30.03
Project 008	25.95	20.39	79.82	72.46	63.73	56.69	53.13	51.47
Project 009	34	35.81	75.98	69.95	60.24	49.2	38.88	34.71
Project 010	21.93	19.96	52.72	47.86	45.43	42.44	36.56	37.72
Project 011	21.41	19.45	73.55	65.56	58.85	49.88	39.39	36.78
Project 012	21.74	21.17	72.86	65.22	59.76	52.71	44.29	46.7
Project 013	21.03	18.16	69.78	61.81	54.01	46.93	40.47	40.61
Project 014	35.12	38.57	60.27	54.87	49.94	41.11	30.18	28.67
Project 015	27.51	30.41	56.06	50.63	48.92	43.67	31.86	27.54
Project 016	17.46	17.06	58.44	55.26	52.93	44.42	34.54	35.48
Project 017	30.62	31.15	68.3	63.13	65.97	60.49	58.5	57.32
Project 018	18.58	16.79	63.1	58.56	59.36	64.48	61.73	55.47
Project 005	35.6	37.4	73.88	67	58.9	52.23	48.22	45.94
Project 006	30.93	30.31	81.74	73.67	66.7	62.46	52.58	50.59
Project 007	20.19	13.77	59.76	59.01	54.86	50.28	39.25	38.78
Project 008	38.07	42.16	58.75	56.63	51.47	47.44	39	35.23
Project 009	48.22	53.13	62.21	54.92	51.05	44.28	37.59	34.04
Project 010	39.6	42.35	61.11	58.56	56.97	54.14	47.21	40.28
Project 011	41.63	45.98	70.84	64.4	58.13	57.72	50.82	47.54
Project 012	38.06	41.7	67.62	58.8	49.39	44.12	38.89	38.58

Project Name	LZeq_O 1kHz	LZeq_O 2kHz	LZeq_O 4kHz	LZeq_O 8kHz	LZeq_O 16kHz	Application	[System] Serial Number
Project 004	52.88	51.53	44.26	33.19	22.4	BZ7224 Version 4.7.5	3011887
Project 002 (1)	52.38	50.93	44.7	32.63	21.17	BZ7224 Version 4.7.5	3011939
Project 003	30.99	28.71	27.66	25.87	23.1	BZ7224 Version 4.7.5	3011939
Project 004	56.79	50.55	43.76	36.23	26.72	BZ7224 Version 4.7.5	3011939
Project 005	35.74	30.29	26.82	21.27	18.17	BZ7224 Version 4.7.5	3011939
Project 006	45.21	39.77	32.85	26.81	19.19	BZ7224 Version 4.7.5	3011939
Project 007	30.98	24.98	19.46	21.28	21.79	BZ7224 Version 4.7.5	3011939
Project 008	50.3	46.52	43.09	37.98	31.34	BZ7224 Version 4.7.5	3011939
Project 009	33.33	30.72	30.51	38.55	40.96	BZ7224 Version 4.7.5	3011939
Project 010	37.81	35.59	38.14	33.03	28.21	BZ7224 Version 4.7.5	3011939
Project 011	37.32	35.12	32.51	28.39	30.62	BZ7224 Version 4.7.5	3011939
Project 012	43.83	40.97	36.8	31.72	32.96	BZ7224 Version 4.7.5	3011887
Project 013	39.43	36.1	33.15	32.4	31.86	BZ7224 Version 4.7.5	3011887
Project 014	25.26	21.91	17.91	40.28	44.23	BZ7224 Version 4.7.5	3011887
Project 015	26.09	25.63	26.54	29.81	32.68	BZ7224 Version 4.7.5	3011887
Project 016	34.18	30.85	29.32	26.33	29.47	BZ7224 Version 4.7.5	3011887
Project 017	57.03	51.53	46.4	40.67	38.16	BZ7224 Version 4.7.5	3011887
Project 018	49.04	44.85	41.86	38.78	39.53	BZ7224 Version 4.7.5	3011887
Project 005	43.35	37.35	32.29	45.52	49.88	BZ7224 Version 4.7.5	3011939
Project 006	51.12	46.39	39.58	41.78	45.7	BZ7224 Version 4.7.5	3011939
Project 007	39.94	38.89	34.17	37.47	42.67	BZ7224 Version 4.7.5	3011939
Project 008	35	28.46	22.87	43.99	49.32	BZ7224 Version 4.7.5	3011939
Project 009	28.57	22.46	22.42	50.24	55.42	BZ7224 Version 4.7.5	3011939
Project 010	34.74	28.15	21.7	42.44	45.68	BZ7224 Version 4.7.5	3011939
Project 011	47.47	42.54	34.93	43.58	47.9	BZ7224 Version 4.7.5	3011939
Project 012	37.21	31.28	29.03	42.83	46.63	BZ7224 Version 4.7.5	3011939

Project Name	[System] User	[System] Instrument Type	[Transducer] Micr Used	[Transducer] Transducer Serial No
Project 004	2250	Type2250	4189(3130964)	3130964
Project 002 (1)	2250	Type2250	4189(3130955)	3130955
Project 003	2250	Type2250	4189(3130955)	3130955
Project 004	2250	Type2250	4189(3130955)	3130955
Project 005	2250	Type2250	4189(3130955)	3130955
Project 006	2250	Type2250	4189(3130955)	3130955
Project 007	2250	Type2250	4189(3130955)	3130955
Project 008	2250	Type2250	4189(3130955)	3130955
Project 009	2250	Type2250	4189(3130955)	3130955
Project 010	2250	Type2250	4189(3130955)	3130955
Project 011	2250	Type2250	4189(3130955)	3130955
Project 012	2250	Type2250	4189(3130964)	3130964
Project 013	2250	Type2250	4189(3130964)	3130964
Project 014	2250	Type2250	4189(3130964)	3130964
Project 015	2250	Type2250	4189(3130964)	3130964
Project 016	2250	Type2250	4189(3130964)	3130964
Project 017	2250	Type2250	4189(3130964)	3130964
Project 018	2250	Type2250	4189(3130964)	3130964
Project 005	2250	Type2250	4189(3130955)	3130955
Project 006	2250	Type2250	4189(3130955)	3130955
Project 007	2250	Type2250	4189(3130955)	3130955
Project 008	2250	Type2250	4189(3130955)	3130955
Project 009	2250	Type2250	4189(3130955)	3130955
Project 010	2250	Type2250	4189(3130955)	3130955
Project 011	2250	Type2250	4189(3130955)	3130955
Project 012	2250	Type2250	4189(3130955)	3130955

Project Name	[Transducer] Transducer Name	[Transducer] Transducer Family	[Transducer] Microphone Type
Project 004	4189	Microphone	4189
Project 002 (1)	4189	Microphone	4189
Project 003	4189	Microphone	4189
Project 004	4189	Microphone	4189
Project 005	4189	Microphone	4189
Project 006	4189	Microphone	4189
Project 007	4189	Microphone	4189
Project 008	4189	Microphone	4189
Project 009	4189	Microphone	4189
Project 010	4189	Microphone	4189
Project 011	4189	Microphone	4189
Project 012	4189	Microphone	4189
Project 013	4189	Microphone	4189
Project 014	4189	Microphone	4189
Project 015	4189	Microphone	4189
Project 016	4189	Microphone	4189
Project 017	4189	Microphone	4189
Project 018	4189	Microphone	4189
Project 005	4189	Microphone	4189
Project 006	4189	Microphone	4189
Project 007	4189	Microphone	4189
Project 008	4189	Microphone	4189
Project 009	4189	Microphone	4189
Project 010	4189	Microphone	4189
Project 011	4189	Microphone	4189
Project 012	4189	Microphone	4189

Project Name	[Transducer] Accelerometer Type	[Transducer] Nominal Sensitivity	[Transducer] Unit	[Transducer] Micr Capacitance
Project 004	Unknown	50	mV/Pa	13.5
Project 002 (1)	Unknown	50	mV/Pa	13.5
Project 003	Unknown	50	mV/Pa	13.5
Project 004	Unknown	50	mV/Pa	13.5
Project 005	Unknown	50	mV/Pa	13.5
Project 006	Unknown	50	mV/Pa	13.5
Project 007	Unknown	50	mV/Pa	13.5
Project 008	Unknown	50	mV/Pa	13.5
Project 009	Unknown	50	mV/Pa	13.5
Project 010	Unknown	50	mV/Pa	13.5
Project 011	Unknown	50	mV/Pa	13.5
Project 012	Unknown	50	mV/Pa	13.5
Project 013	Unknown	50	mV/Pa	13.5
Project 014	Unknown	50	mV/Pa	13.5
Project 015	Unknown	50	mV/Pa	13.5
Project 016	Unknown	50	mV/Pa	13.5
Project 017	Unknown	50	mV/Pa	13.5
Project 018	Unknown	50	mV/Pa	13.5
Project 005	Unknown	50	mV/Pa	13.5
Project 006	Unknown	50	mV/Pa	13.5
Project 007	Unknown	50	mV/Pa	13.5
Project 008	Unknown	50	mV/Pa	13.5
Project 009	Unknown	50	mV/Pa	13.5
Project 010	Unknown	50	mV/Pa	13.5
Project 011	Unknown	50	mV/Pa	13.5
Project 012	Unknown	50	mV/Pa	13.5

Project Name	[Transducer] Accelerometer Weight	[Transducer] Polarization Voltage	[Transducer] Free-field	[Transducer] CCLD
Project 004	0	0	1	0
Project 002 (1)	0	0	1	0
Project 003	0	0	1	0
Project 004	0	0	1	0
Project 005	0	0	1	0
Project 006	0	0	1	0
Project 007	0	0	1	0
Project 008	0	0	1	0
Project 009	0	0	1	0
Project 010	0	0	1	0
Project 011	0	0	1	0
Project 012	0	0	1	0
Project 013	0	0	1	0
Project 014	0	0	1	0
Project 015	0	0	1	0
Project 016	0	0	1	0
Project 017	0	0	1	0
Project 018	0	0	1	0
Project 005	0	0	1	0
Project 006	0	0	1	0
Project 007	0	0	1	0
Project 008	0	0	1	0
Project 009	0	0	1	0
Project 010	0	0	1	0
Project 011	0	0	1	0
Project 012	0	0	1	0

Project Name	[Transducer] Preamplifier ID No	[Transducer] Transd Descr	[Calibration] CalibrationTimeUTC Date Time
Project 004	27164	Free-field 1/2"	7/22/2019 14:16
Project 002 (1)	27012	Free-field 1/2"	7/22/2019 14:17
Project 003	27012	Free-field 1/2"	7/22/2019 16:07
Project 004	27012	Free-field 1/2"	7/22/2019 17:35
Project 005	27012	Free-field 1/2"	7/23/2019 3:24
Project 006	27012	Free-field 1/2"	7/23/2019 3:59
Project 007	27012	Free-field 1/2"	7/23/2019 4:28
Project 008	27012	Free-field 1/2"	7/23/2019 15:41
Project 009	27012	Free-field 1/2"	7/23/2019 18:49
Project 010	27012	Free-field 1/2"	7/23/2019 20:02
Project 011	27012	Free-field 1/2"	7/23/2019 21:19
Project 012	27164	Free-field 1/2"	7/23/2019 21:59
Project 013	27164	Free-field 1/2"	7/24/2019 3:43
Project 014	27164	Free-field 1/2"	7/24/2019 5:51
Project 015	27164	Free-field 1/2"	7/24/2019 6:20
Project 016	27164	Free-field 1/2"	7/24/2019 6:46
Project 017	27164	Free-field 1/2"	7/24/2019 16:52
Project 018	27164	Free-field 1/2"	7/24/2019 18:08
Project 005	27012	Free-field 1/2"	7/24/2019 20:29
Project 006	27012	Free-field 1/2"	7/24/2019 21:51
Project 007	27012	Free-field 1/2"	7/25/2019 3:04
Project 008	27012	Free-field 1/2"	7/25/2019 3:27
Project 009	27012	Free-field 1/2"	7/25/2019 3:51
Project 010	27012	Free-field 1/2"	7/25/2019 4:19
Project 011	27012	Free-field 1/2"	43671.20169
Project 012	27012	Free-field 1/2"	7/25/2019 14:57

Project Name	[Calibration] CalibrationTimeUTC Time Zone	[Calibration] CalibrationTimeUTC Daylight Saving
Project 004	Central Standard Time	TRUE
Project 002 (1)	Central Standard Time	TRUE
Project 003	Central Standard Time	TRUE
Project 004	Central Standard Time	TRUE
Project 005	Central Standard Time	TRUE
Project 006	Central Standard Time	TRUE
Project 007	Central Standard Time	TRUE
Project 008	Central Standard Time	TRUE
Project 009	Central Standard Time	TRUE
Project 010	Central Standard Time	TRUE
Project 011	Central Standard Time	TRUE
Project 012	Central Standard Time	TRUE
Project 013	Central Standard Time	TRUE
Project 014	Central Standard Time	TRUE
Project 015	Central Standard Time	TRUE
Project 016	Central Standard Time	TRUE
Project 017	Central Standard Time	TRUE
Project 018	Central Standard Time	TRUE
Project 005	Central Standard Time	TRUE
Project 006	Central Standard Time	TRUE
Project 007	Central Standard Time	TRUE
Project 008	Central Standard Time	TRUE
Project 009	Central Standard Time	TRUE
Project 010	Central Standard Time	TRUE
Project 011	Central Standard Time	TRUE
Project 012	Central Standard Time	TRUE

Project Name	[Calibration] CalibrationTime	[Calibration] Calibration Sensitivity	[Calibration] Unit
Project 004	7/22/2019 9:16	45.90447247	mV/Pa
Project 002 (1)	7/22/2019 9:17	47.51546681	mV/Pa
Project 003	7/22/2019 11:07	47.5849919	mV/Pa
Project 004	7/22/2019 12:35	47.51765728	mV/Pa
Project 005	7/22/2019 22:24	47.4684462	mV/Pa
Project 006	7/22/2019 22:59	47.48046771	mV/Pa
Project 007	7/22/2019 23:28	47.48702794	mV/Pa
Project 008	7/23/2019 10:41	47.51984403	mV/Pa
Project 009	7/23/2019 13:49	47.18457162	mV/Pa
Project 010	7/23/2019 15:02	47.35000059	mV/Pa
Project 011	7/23/2019 16:19	47.39472643	mV/Pa
Project 012	7/23/2019 16:59	45.91504484	mV/Pa
Project 013	7/23/2019 22:43	45.44750229	mV/Pa
Project 014	7/24/2019 0:51	45.49932852	mV/Pa
Project 015	7/24/2019 1:20	45.724608	mV/Pa
Project 016	7/24/2019 1:46	45.70198059	mV/Pa
Project 017	7/24/2019 11:52	46.08982056	mV/Pa
Project 018	7/24/2019 13:08	46.6680862	mV/Pa
Project 005	7/24/2019 15:29	47.28027433	mV/Pa
Project 006	7/24/2019 16:51	47.53407091	mV/Pa
Project 007	7/24/2019 22:04	47.56198823	mV/Pa
Project 008	7/24/2019 22:27	47.39854485	mV/Pa
Project 009	7/24/2019 22:51	47.5477539	mV/Pa
Project 010	7/24/2019 23:19	47.52367362	mV/Pa
Project 011	43670.99336	47.72270098	mV/Pa
Project 012	7/25/2019 9:57	47.75512591	mV/Pa

Project Name	[Calibration] Calibration Preamp ID No	[Calibration] Calibration User	[Calibration] Calibration Input
Project 004	27164	2250	TopSocket
Project 002 (1)	27012	2250	TopSocket
Project 003	27012	2250	TopSocket
Project 004	27012	2250	TopSocket
Project 005	27012	2250	TopSocket
Project 006	27012	2250	TopSocket
Project 007	27012	2250	TopSocket
Project 008	27012	2250	TopSocket
Project 009	27012	2250	TopSocket
Project 010	27012	2250	TopSocket
Project 011	27012	2250	TopSocket
Project 012	27164	2250	TopSocket
Project 013	27164	2250	TopSocket
Project 014	27164	2250	TopSocket
Project 015	27164	2250	TopSocket
Project 016	27164	2250	TopSocket
Project 017	27164	2250	TopSocket
Project 018	27164	2250	TopSocket
Project 005	27012	2250	TopSocket
Project 006	27012	2250	TopSocket
Project 007	27012	2250	TopSocket
Project 008	27012	2250	TopSocket
Project 009	27012	2250	TopSocket
Project 010	27012	2250	TopSocket
Project 011	27012	2250	TopSocket
Project 012	27012	2250	TopSocket

Project Name	[Calibration] Calibration Type	[Calibration] Calibration Comment	[Calibration] Deviation from initial
Project 004	External reference		-0.451400189
Project 002 (1)	External reference		0.119500182
Project 003	External reference		0.132200171
Project 004	External reference		0.119900594
Project 005	External reference		0.110900496
Project 006	External reference		0.113099943
Project 007	External reference		0.114299964
Project 008	External reference		0.120300306
Project 009	External reference		0.058800507
Project 010	External reference		0.089199951
Project 011	External reference		0.097400591
Project 012	External reference		-0.449399951
Project 013	External reference		-0.538299804
Project 014	External reference		-0.528400459
Project 015	External reference		-0.485500388
Project 016	External reference		-0.489799776
Project 017	External reference		-0.41639986
Project 018	External reference		-0.308100379
Project 005	External reference		0.076399931
Project 006	External reference		0.12290037
Project 007	External reference		0.128000199
Project 008	External reference		0.098100354
Project 009	External reference		0.1254003
Project 010	External reference		0.121000269
Project 011	External reference		0.157300489
Project 012	External reference		0.163200065

Project Name	[Calibration] Deviation from last	[Calibration] CIC Reference Ratio	[Calibration] CIC Ref. DateUTC Date Time
Project 004	-0.06470036	-36.81	1/30/2018 7:14
Project 002 (1)	0.184999661	-37.19	1/30/2018 7:14
Project 003	0.012699989	-37.19	1/30/2018 7:14
Project 004	0.011100554	-37.19	1/30/2018 7:14
Project 005	-0.003199816	-37.19	1/30/2018 7:14
Project 006	-0.089100118	-37.19	1/30/2018 7:14
Project 007	0.006599781	-37.19	1/30/2018 7:14
Project 008	0.008300358	-37.19	1/30/2018 7:14
Project 009	-0.065999549	-37.19	1/30/2018 7:14
Project 010	-0.049300109	-37.19	1/30/2018 7:14
Project 011	-0.046599639	-37.19	1/30/2018 7:14
Project 012	0.002000239	-36.81	1/30/2018 7:14
Project 013	-0.062599925	-36.81	1/30/2018 7:14
Project 014	-0.068900163	-36.81	1/30/2018 7:14
Project 015	-0.057200317	-36.81	1/30/2018 7:14
Project 016	-0.022599989	-36.81	1/30/2018 7:14
Project 017	0.048900537	-36.81	1/30/2018 7:14
Project 018	0.023399569	-36.81	1/30/2018 7:14
Project 005	-0.02100066	-37.19	1/30/2018 7:14
Project 006	-0.016799605	-37.19	1/30/2018 7:14
Project 007	-0.048200162	-37.19	1/30/2018 7:14
Project 008	-0.001800008	-37.19	1/30/2018 7:14
Project 009	0.016200037	-37.19	1/30/2018 7:14
Project 010	0.025299824	-37.19	1/30/2018 7:14
Project 011	0.051200223	-37.19	43130.30184
Project 012	0.017799706	-37.19	1/30/2018 7:14

Project Name	[Calibration] CIC Ref. DateUTC Time Zone	[Calibration] CIC Ref. DateUTC Daylight Saving	[Calibration] CIC Ref. Date
Project 004	Romance Standard Time	FALSE	1/30/2018 8:14
Project 002 (1)	Romance Standard Time	FALSE	1/30/2018 8:14
Project 003	Romance Standard Time	FALSE	1/30/2018 8:14
Project 004	Romance Standard Time	FALSE	1/30/2018 8:14
Project 005	Romance Standard Time	FALSE	1/30/2018 8:14
Project 006	Romance Standard Time	FALSE	1/30/2018 8:14
Project 007	Romance Standard Time	FALSE	1/30/2018 8:14
Project 008	Romance Standard Time	FALSE	1/30/2018 8:14
Project 009	Romance Standard Time	FALSE	1/30/2018 8:14
Project 010	Romance Standard Time	FALSE	1/30/2018 8:14
Project 011	Romance Standard Time	FALSE	1/30/2018 8:14
Project 012	Romance Standard Time	FALSE	1/30/2018 8:14
Project 013	Romance Standard Time	FALSE	1/30/2018 8:14
Project 014	Romance Standard Time	FALSE	1/30/2018 8:14
Project 015	Romance Standard Time	FALSE	1/30/2018 8:14
Project 016	Romance Standard Time	FALSE	1/30/2018 8:14
Project 017	Romance Standard Time	FALSE	1/30/2018 8:14
Project 018	Romance Standard Time	FALSE	1/30/2018 8:14
Project 005	Romance Standard Time	FALSE	1/30/2018 8:14
Project 006	Romance Standard Time	FALSE	1/30/2018 8:14
Project 007	Romance Standard Time	FALSE	1/30/2018 8:14
Project 008	Romance Standard Time	FALSE	1/30/2018 8:14
Project 009	Romance Standard Time	FALSE	1/30/2018 8:14
Project 010	Romance Standard Time	FALSE	1/30/2018 8:14
Project 011	Romance Standard Time	FALSE	43130.34351
Project 012	Romance Standard Time	FALSE	1/30/2018 8:14

Project Name	[Input] Input	[Input] Sound Field Correction	[Input] Loudness	[Input] Windscreen Auto Detect
Project 004	Top Socket	Free-field	Auto	Off
Project 002 (1)	Top Socket	Free-field	Auto	Off
Project 003	Top Socket	Free-field	Auto	Off
Project 004	Top Socket	Free-field	Auto	Off
Project 005	Top Socket	Free-field	Auto	Off
Project 006	Top Socket	Free-field	Auto	Off
Project 007	Top Socket	Free-field	Auto	Off
Project 008	Top Socket	Free-field	Auto	Off
Project 009	Top Socket	Free-field	Auto	Off
Project 010	Top Socket	Free-field	Auto	Off
Project 011	Top Socket	Free-field	Auto	Off
Project 012	Top Socket	Free-field	Auto	Off
Project 013	Top Socket	Free-field	Auto	Off
Project 014	Top Socket	Free-field	Auto	Off
Project 015	Top Socket	Free-field	Auto	Off
Project 016	Top Socket	Free-field	Auto	Off
Project 017	Top Socket	Free-field	Auto	Off
Project 018	Top Socket	Free-field	Auto	Off
Project 005	Top Socket	Free-field	Auto	Off
Project 006	Top Socket	Free-field	Auto	Off
Project 007	Top Socket	Free-field	Auto	Off
Project 008	Top Socket	Free-field	Auto	Off
Project 009	Top Socket	Free-field	Auto	Off
Project 010	Top Socket	Free-field	Auto	Off
Project 011	Top Socket	Free-field	Auto	Off
Project 012	Top Socket	Free-field	Auto	Off

Project Name	[Input] Windscreen Correction	[Input] Trigger Input	[Frequency Weightings] Broadband (excl. Peak)
Project 004	UA-1650	MATRON Handswitch	AC
Project 002 (1)	UA-1650	None/Tacho	AC
Project 003	UA-1650	None/Tacho	AC
Project 004	UA-1650	None/Tacho	AC
Project 005	UA-1650	None/Tacho	AC
Project 006	UA-1650	None/Tacho	AC
Project 007	UA-1650	None/Tacho	AC
Project 008	UA-1650	None/Tacho	AC
Project 009	UA-1650	None/Tacho	AC
Project 010	UA-1650	None/Tacho	AC
Project 011	UA-1650	None/Tacho	AC
Project 012	UA-1650	None/Tacho	AC
Project 013	UA-1650	None/Tacho	AC
Project 014	UA-1650	None/Tacho	AC
Project 015	UA-1650	None/Tacho	AC
Project 016	UA-1650	None/Tacho	AC
Project 017	UA-1650	None/Tacho	AC
Project 018	UA-1650	None/Tacho	AC
Project 005	UA-1650	None/Tacho	AC
Project 006	UA-1650	None/Tacho	AC
Project 007	UA-1650	None/Tacho	AC
Project 008	UA-1650	None/Tacho	AC
Project 009	UA-1650	None/Tacho	AC
Project 010	UA-1650	None/Tacho	AC
Project 011	UA-1650	None/Tacho	AC
Project 012	UA-1650	None/Tacho	AC

Project Name	[Frequency Weightings] Broadband Peak	[Frequency Weightings] Spectrum	[Frequency Weightings] Bandwidth
Project 004	A	Z	1/1-octave
Project 002 (1)	A	Z	1/1-octave
Project 003	A	Z	1/1-octave
Project 004	A	Z	1/1-octave
Project 005	A	Z	1/1-octave
Project 006	A	Z	1/1-octave
Project 007	A	Z	1/1-octave
Project 008	A	Z	1/1-octave
Project 009	A	Z	1/1-octave
Project 010	A	Z	1/1-octave
Project 011	A	Z	1/1-octave
Project 012	A	Z	1/1-octave
Project 013	A	Z	1/1-octave
Project 014	A	Z	1/1-octave
Project 015	A	Z	1/1-octave
Project 016	A	Z	1/1-octave
Project 017	A	Z	1/1-octave
Project 018	A	Z	1/1-octave
Project 005	A	Z	1/1-octave
Project 006	A	Z	1/1-octave
Project 007	A	Z	1/1-octave
Project 008	A	Z	1/1-octave
Project 009	A	Z	1/1-octave
Project 010	A	Z	1/1-octave
Project 011	A	Z	1/1-octave
Project 012	A	Z	1/1-octave

Project Name	[Frequency Weightings] Low Frequency	[Frequency Weightings] Bottom F. for Special Leq
Project 004	Normal	16 Hz
Project 002 (1)	Normal	16 Hz
Project 003	Normal	16 Hz
Project 004	Normal	16 Hz
Project 005	Normal	16 Hz
Project 006	Normal	16 Hz
Project 007	Normal	16 Hz
Project 008	Normal	16 Hz
Project 009	Normal	16 Hz
Project 010	Normal	16 Hz
Project 011	Normal	16 Hz
Project 012	Normal	16 Hz
Project 013	Normal	16 Hz
Project 014	Normal	16 Hz
Project 015	Normal	16 Hz
Project 016	Normal	16 Hz
Project 017	Normal	16 Hz
Project 018	Normal	16 Hz
Project 005	Normal	16 Hz
Project 006	Normal	16 Hz
Project 007	Normal	16 Hz
Project 008	Normal	16 Hz
Project 009	Normal	16 Hz
Project 010	Normal	16 Hz
Project 011	Normal	16 Hz
Project 012	Normal	16 Hz

Project Name	[Frequency Weightings] Top Freq. for Special Leq	[Statistics] Broadband Statistics based on
Project 004	250 Hz	LAF
Project 002 (1)	250 Hz	LAF
Project 003	250 Hz	LAF
Project 004	250 Hz	LAF
Project 005	250 Hz	LAF
Project 006	250 Hz	LAF
Project 007	250 Hz	LAF
Project 008	250 Hz	LAF
Project 009	250 Hz	LAF
Project 010	250 Hz	LAF
Project 011	250 Hz	LAF
Project 012	250 Hz	LAF
Project 013	250 Hz	LAF
Project 014	250 Hz	LAF
Project 015	250 Hz	LAF
Project 016	250 Hz	LAF
Project 017	250 Hz	LAF
Project 018	250 Hz	LAF
Project 005	250 Hz	LAF
Project 006	250 Hz	LAF
Project 007	250 Hz	LAF
Project 008	250 Hz	LAF
Project 009	250 Hz	LAF
Project 010	250 Hz	LAF
Project 011	250 Hz	LAF
Project 012	250 Hz	LAF

Project Name	[Statistics] Spectral Statistics based on	[Statistics] Percentile 1	[Statistics] Percentile 2	[Statistics] Percentile 3
Project 004	LXF	1	5	10
Project 002 (1)	LXF	1	5	10
Project 003	LXF	1	5	10
Project 004	LXF	1	5	10
Project 005	LXF	1	5	10
Project 006	LXF	1	5	10
Project 007	LXF	1	5	10
Project 008	LXF	1	5	10
Project 009	LXF	1	5	10
Project 010	LXF	1	5	10
Project 011	LXF	1	5	10
Project 012	LXF	1	5	10
Project 013	LXF	1	5	10
Project 014	LXF	1	5	10
Project 015	LXF	1	5	10
Project 016	LXF	1	5	10
Project 017	LXF	1	5	10
Project 018	LXF	1	5	10
Project 005	LXF	1	5	10
Project 006	LXF	1	5	10
Project 007	LXF	1	5	10
Project 008	LXF	1	5	10
Project 009	LXF	1	5	10
Project 010	LXF	1	5	10
Project 011	LXF	1	5	10
Project 012	LXF	1	5	10

Project Name	[Statistics] Percentile 4	[Statistics] Percentile 5	[Statistics] Percentile 6	[Statistics] Percentile 7
Project 004	50	90	95	99
Project 002 (1)	50	90	95	99
Project 003	50	90	95	99
Project 004	50	90	95	99
Project 005	50	90	95	99
Project 006	50	90	95	99
Project 007	50	90	95	99
Project 008	50	90	95	99
Project 009	50	90	95	99
Project 010	50	90	95	99
Project 011	50	90	95	99
Project 012	50	90	95	99
Project 013	50	90	95	99
Project 014	50	90	95	99
Project 015	50	90	95	99
Project 016	50	90	95	99
Project 017	50	90	95	99
Project 018	50	90	95	99
Project 005	50	90	95	99
Project 006	50	90	95	99
Project 007	50	90	95	99
Project 008	50	90	95	99
Project 009	50	90	95	99
Project 010	50	90	95	99
Project 011	50	90	95	99
Project 012	50	90	95	99

Project Name	[Measurement Control] Preset Logging Time	[Measurement Control] LoggingPeriodTimespan
Project 004	1.01:00:00	0:00:01
Project 002 (1)	1.01:00:00	0:00:01
Project 003	1:00:00	0:00:01
Project 004	1:00:00	0:00:01
Project 005	1:00:00	0:00:01
Project 006	1:00:00	0:00:01
Project 007	1:00:00	0:00:01
Project 008	1:00:00	0:00:01
Project 009	1:00:00	0:00:01
Project 010	1:00:00	0:00:01
Project 011	1:00:00	0:00:01
Project 012	1:00:00	0:00:01
Project 013	0:15:00	0:00:01
Project 014	0:15:00	0:00:01
Project 015	0:15:00	0:00:01
Project 016	0:15:00	0:00:01
Project 017	1:00:00	0:00:01
Project 018	1:00:00	0:00:01
Project 005	1.01:00:00	0:00:01
Project 006	1.01:00:00	0:00:01
Project 007	1.01:00:00	0:00:01
Project 008	1.01:00:00	0:00:01
Project 009	1.01:00:00	0:00:01
Project 010	1.01:00:00	0:00:01
Project 011	1.01:00:00	1.15741E-05
Project 012	1.01:00:00	0:00:01

Project Name	[Measurement Control] Synchronize with Clock	[Measurement Control] T for LAeq,T,mov
Project 004	1	1:00:00
Project 002 (1)	1	1:00:00
Project 003	1	1:00:00
Project 004	1	1:00:00
Project 005	1	1:00:00
Project 006	1	1:00:00
Project 007	1	1:00:00
Project 008	1	1:00:00
Project 009	1	1:00:00
Project 010	1	1:00:00
Project 011	1	1:00:00
Project 012	1	1:00:00
Project 013	1	1:00:00
Project 014	1	1:00:00
Project 015	1	1:00:00
Project 016	1	1:00:00
Project 017	1	1:00:00
Project 018	1	1:00:00
Project 005	1	1:00:00
Project 006	1	1:00:00
Project 007	1	1:00:00
Project 008	1	1:00:00
Project 009	1	1:00:00
Project 010	1	1:00:00
Project 011	1	0.041666667
Project 012	1	1:00:00

Project Name	[Measurement Control] Charge Injection Calibration	[Logged Broadband] FullStatisticsLogged
Project 004	Off	1
Project 002 (1)	Off	0
Project 003	Off	0
Project 004	Off	0
Project 005	Off	0
Project 006	Off	0
Project 007	Off	0
Project 008	Off	0
Project 009	Off	0
Project 010	Off	0
Project 011	Off	0
Project 012	Off	0
Project 013	Off	0
Project 014	Off	0
Project 015	Off	0
Project 016	Off	0
Project 017	Off	0
Project 018	Off	0
Project 005	Off	0
Project 006	Off	0
Project 007	Off	0
Project 008	Off	0
Project 009	Off	0
Project 010	Off	0
Project 011	Off	0
Project 012	Off	0

Project Name	[Logged Broadband] Broadband Parameters	[Logged Broadband] Parameter 1	[Logged Broadband] Parameter 2
Project 004	Selected	LAeq	LCeq
Project 002 (1)	Selected	LAeq	LCeq
Project 003	Selected	LAeq	LCeq
Project 004	Selected	LAeq	LCeq
Project 005	Selected	LAeq	LCeq
Project 006	Selected	LAeq	LCeq
Project 007	Selected	LAeq	LCeq
Project 008	Selected	LAeq	LCeq
Project 009	Selected	LAeq	LCeq
Project 010	Selected	LAeq	LCeq
Project 011	Selected	LAeq	LCeq
Project 012	Selected	LAeq	LCeq
Project 013	Selected	LAeq	LCeq
Project 014	Selected	LAeq	LCeq
Project 015	Selected	LAeq	LCeq
Project 016	Selected	LAeq	LCeq
Project 017	Selected	LAeq	LCeq
Project 018	Selected	LAeq	LCeq
Project 005	Selected	LAeq	LCeq
Project 006	Selected	LAeq	LCeq
Project 007	Selected	LAeq	LCeq
Project 008	Selected	LAeq	LCeq
Project 009	Selected	LAeq	LCeq
Project 010	Selected	LAeq	LCeq
Project 011	Selected	LAeq	LCeq
Project 012	Selected	LAeq	LCeq

Project Name	[Logged Broadband] Parameter 3	[Logged Broadband] Parameter 4	[Logged Broadband] Parameter 5
Project 004	LALeq-LAeq	LCFmax	LCFmin
Project 002 (1)	LAFmax	LAFmin	LCeq
Project 003	LAFmax	LAFmin	LCeq
Project 004	LAFmax	LAFmin	LCeq
Project 005	LAFmax	LAFmin	LCeq
Project 006	LAFmax	LAFmin	LCeq
Project 007	LAFmax	LAFmin	LCeq
Project 008	LAFmax	LAFmin	LCeq
Project 009	LAFmax	LAFmin	LCeq
Project 010	LAFmax	LAFmin	LCeq
Project 011	LAFmax	LAFmin	LCeq
Project 012	LAFmax	LAFmin	LCeq
Project 013	LAFmax	LAFmin	LCeq
Project 014	LAFmax	LAFmin	LCeq
Project 015	LAFmax	LAFmin	LCeq
Project 016	LAFmax	LAFmin	LCeq
Project 017	LAFmax	LAFmin	LCeq
Project 018	LAFmax	LAFmin	LCeq
Project 005	LAFmax	LAFmin	LCeq
Project 006	LAFmax	LAFmin	LCeq
Project 007	LAFmax	LAFmin	LCeq
Project 008	LAFmax	LAFmin	LCeq
Project 009	LAFmax	LAFmin	LCeq
Project 010	LAFmax	LAFmin	LCeq
Project 011	LAFmax	LAFmin	LCeq
Project 012	LAFmax	LAFmin	LCeq

Project Name	[Logged Broadband] Parameter 6	[Logged Broadband] Parameter 7	[Logged Broadband] Parameter 8
Project 004	Overload	None	None
Project 002 (1)	LAleq	None	None
Project 003	LAleq	None	None
Project 004	LAleq	None	None
Project 005	LAleq	None	None
Project 006	LAleq	None	None
Project 007	LAleq	None	None
Project 008	LAleq	None	None
Project 009	LAleq	None	None
Project 010	LAleq	None	None
Project 011	LAleq	None	None
Project 012	LAleq	None	None
Project 013	LAleq	None	None
Project 014	LAleq	None	None
Project 015	LAleq	None	None
Project 016	LAleq	None	None
Project 017	LAleq	None	None
Project 018	LAleq	None	None
Project 005	LAleq	None	None
Project 006	LAleq	None	None
Project 007	LAleq	None	None
Project 008	LAleq	None	None
Project 009	LAleq	None	None
Project 010	LAleq	None	None
Project 011	LAleq	None	None
Project 012	LAleq	None	None

Project Name	[Logged Broadband] Parameter 9	[Logged Broadband] Parameter 10	[Logged Spectrum] Full Statistics
Project 004	None	None	0
Project 002 (1)	None	None	0
Project 003	None	None	0
Project 004	None	None	0
Project 005	None	None	0
Project 006	None	None	0
Project 007	None	None	0
Project 008	None	None	0
Project 009	None	None	0
Project 010	None	None	0
Project 011	None	None	0
Project 012	None	None	0
Project 013	None	None	0
Project 014	None	None	0
Project 015	None	None	0
Project 016	None	None	0
Project 017	None	None	0
Project 018	None	None	0
Project 005	None	None	0
Project 006	None	None	0
Project 007	None	None	0
Project 008	None	None	0
Project 009	None	None	0
Project 010	None	None	0
Project 011	None	None	0
Project 012	None	None	0

Project Name	[Logged Spectrum] Spectrum Parameters	[Logged Spectrum] Spectrum 1	[Logged Spectrum] Spectrum 2
Project 004	All	LZeq	None
Project 002 (1)	All	LZeq	None
Project 003	All	LZeq	None
Project 004	All	LZeq	None
Project 005	All	LZeq	None
Project 006	All	LZeq	None
Project 007	All	LZeq	None
Project 008	All	LZeq	None
Project 009	All	LZeq	None
Project 010	All	LZeq	None
Project 011	All	LZeq	None
Project 012	All	LZeq	None
Project 013	All	LZeq	None
Project 014	All	LZeq	None
Project 015	All	LZeq	None
Project 016	All	LZeq	None
Project 017	All	LZeq	None
Project 018	All	LZeq	None
Project 005	All	LZeq	None
Project 006	All	LZeq	None
Project 007	All	LZeq	None
Project 008	All	LZeq	None
Project 009	All	LZeq	None
Project 010	All	LZeq	None
Project 011	All	LZeq	None
Project 012	All	LZeq	None

Project Name	[Logged Spectrum] Spectrum 3	[Logged Broadband (100 ms)] Parameter 1	[Logged Broadband (100 ms)] Parameter 2
Project 004	None	None	None
Project 002 (1)	None	None	None
Project 003	None	None	None
Project 004	None	None	None
Project 005	None	None	None
Project 006	None	None	None
Project 007	None	None	None
Project 008	None	None	None
Project 009	None	None	None
Project 010	None	None	None
Project 011	None	None	None
Project 012	None	None	None
Project 013	None	None	None
Project 014	None	None	None
Project 015	None	None	None
Project 016	None	None	None
Project 017	None	None	None
Project 018	None	None	None
Project 005	None	None	None
Project 006	None	None	None
Project 007	None	None	None
Project 008	None	None	None
Project 009	None	None	None
Project 010	None	None	None
Project 011	None	None	None
Project 012	None	None	None

Project Name	[Logged Broadband (100 ms)] Parameter 3	[Logged Broadband (100 ms)] Spectrum Par. 1	[Markers] Marker 1
Project 004	None	None	Exclude
Project 002 (1)	None	None	Exclude
Project 003	None	None	Exclude
Project 004	None	None	Exclude
Project 005	None	None	Exclude
Project 006	None	None	Exclude
Project 007	None	None	Exclude
Project 008	None	None	Exclude
Project 009	None	None	Exclude
Project 010	None	None	Exclude
Project 011	None	None	Exclude
Project 012	None	None	Exclude
Project 013	None	None	Exclude
Project 014	None	None	Exclude
Project 015	None	None	Exclude
Project 016	None	None	Exclude
Project 017	None	None	Exclude
Project 018	None	None	Exclude
Project 005	None	None	Exclude
Project 006	None	None	Exclude
Project 007	None	None	Exclude
Project 008	None	None	Exclude
Project 009	None	None	Exclude
Project 010	None	None	Exclude
Project 011	None	None	Exclude
Project 012	None	None	Exclude

Project Name	[Markers] Marker 2	[Markers] Marker 3	[Markers] Marker 4	[Markers] Marker 5	[Markers] Marker 6
Project 004	Manual	Level	Marker4	Marker5	Sound
Project 002 (1)	Manual	Level	Marker4	Marker5	Sound
Project 003	Manual	Level	Marker4	Marker5	Sound
Project 004	Manual	Level	Marker4	Marker5	Sound
Project 005	Manual	Level	Marker4	Marker5	Sound
Project 006	Manual	Level	Marker4	Marker5	Sound
Project 007	Manual	Level	Marker4	Marker5	Sound
Project 008	Manual	Level	Marker4	Marker5	Sound
Project 009	Manual	Level	Marker4	Marker5	Sound
Project 010	Manual	Level	Marker4	Marker5	Sound
Project 011	Manual	Level	Marker4	Marker5	Sound
Project 012	Manual	Level	Marker4	Marker5	Sound
Project 013	Manual	Level	Marker4	Marker5	Sound
Project 014	Manual	Level	Marker4	Marker5	Sound
Project 015	Manual	Level	Marker4	Marker5	Sound
Project 016	Manual	Level	Marker4	Marker5	Sound
Project 017	Manual	Level	Marker4	Marker5	Sound
Project 018	Manual	Level	Marker4	Marker5	Sound
Project 005	Manual	Level	Marker4	Marker5	Sound
Project 006	Manual	Level	Marker4	Marker5	Sound
Project 007	Manual	Level	Marker4	Marker5	Sound
Project 008	Manual	Level	Marker4	Marker5	Sound
Project 009	Manual	Level	Marker4	Marker5	Sound
Project 010	Manual	Level	Marker4	Marker5	Sound
Project 011	Manual	Level	Marker4	Marker5	Sound
Project 012	Manual	Level	Marker4	Marker5	Sound

Project Name	[Markers] Pre-marker Time	[Level Trigger] Trigger	[Level Trigger] Start Slope	[Level Trigger] Start Level
Project 004	3	Off	Rising	80
Project 002 (1)	3	Off	Rising	80
Project 003	3	Off	Rising	80
Project 004	3	Off	Rising	80
Project 005	3	Off	Rising	80
Project 006	3	Off	Rising	80
Project 007	3	Off	Rising	80
Project 008	3	Off	Rising	80
Project 009	3	Off	Rising	80
Project 010	3	Off	Rising	80
Project 011	3	Off	Rising	80
Project 012	3	Off	Rising	80
Project 013	3	Off	Rising	80
Project 014	3	Off	Rising	80
Project 015	3	Off	Rising	80
Project 016	3	Off	Rising	80
Project 017	3	Off	Rising	80
Project 018	3	Off	Rising	80
Project 005	3	Off	Rising	80
Project 006	3	Off	Rising	80
Project 007	3	Off	Rising	80
Project 008	3	Off	Rising	80
Project 009	3	Off	Rising	80
Project 010	3	Off	Rising	80
Project 011	3	Off	Rising	80
Project 012	3	Off	Rising	80

Project Name	[Level Trigger] Start Duration	[Level Trigger] Stop Level	[Level Trigger] Stop Duration	[Level Trigger] Parameter
Project 004	2	70	2	None
Project 002 (1)	2	70	2	None
Project 003	2	70	2	None
Project 004	2	70	2	None
Project 005	2	70	2	None
Project 006	2	70	2	None
Project 007	2	70	2	None
Project 008	2	70	2	None
Project 009	2	70	2	None
Project 010	2	70	2	None
Project 011	2	70	2	None
Project 012	2	70	2	None
Project 013	2	70	2	None
Project 014	2	70	2	None
Project 015	2	70	2	None
Project 016	2	70	2	None
Project 017	2	70	2	None
Project 018	2	70	2	None
Project 005	2	70	2	None
Project 006	2	70	2	None
Project 007	2	70	2	None
Project 008	2	70	2	None
Project 009	2	70	2	None
Project 010	2	70	2	None
Project 011	2	70	2	None
Project 012	2	70	2	None

Project Name	[Sound Recording] Recording Control	[Sound Recording] Recording Quality	[Sound Recording] Recorded Signal
Project 004	Automatic	Fair	Input Z-weighted
Project 002 (1)	Automatic	High	Input Z-weighted
Project 003	Automatic	High	Input Z-weighted
Project 004	Automatic	High	Input Z-weighted
Project 005	Automatic	High	Input Z-weighted
Project 006	Automatic	High	Input Z-weighted
Project 007	Automatic	High	Input Z-weighted
Project 008	Automatic	High	Input Z-weighted
Project 009	Automatic	High	Input Z-weighted
Project 010	Automatic	High	Input Z-weighted
Project 011	Automatic	High	Input Z-weighted
Project 012	Automatic	High	Input Z-weighted
Project 013	Automatic	High	Input Z-weighted
Project 014	Automatic	High	Input Z-weighted
Project 015	Automatic	High	Input Z-weighted
Project 016	Automatic	High	Input Z-weighted
Project 017	Automatic	High	Input Z-weighted
Project 018	Automatic	High	Input Z-weighted
Project 005	Automatic	High	Input Z-weighted
Project 006	Automatic	High	Input Z-weighted
Project 007	Automatic	High	Input Z-weighted
Project 008	Automatic	High	Input Z-weighted
Project 009	Automatic	High	Input Z-weighted
Project 010	Automatic	High	Input Z-weighted
Project 011	Automatic	High	Input Z-weighted
Project 012	Automatic	High	Input Z-weighted

Project Name	[Sound Recording] Automatic Gain Control	[Sound Recording] Resolution	[Sound Recording] Peak Rec. Level
Project 004	On	16 bit	145.6400018
Project 002 (1)	On	16 bit	145.7099939
Project 003	On	16 bit	145.6999994
Project 004	On	16 bit	145.7099939
Project 005	On	16 bit	145.7200037
Project 006	On	16 bit	145.7099939
Project 007	On	16 bit	145.7099939
Project 008	On	16 bit	145.7099939
Project 009	On	16 bit	145.7700067
Project 010	On	16 bit	145.7399927
Project 011	On	16 bit	145.7299982
Project 012	On	16 bit	145.6799951
Project 013	On	16 bit	145.6799951
Project 014	On	16 bit	145.5999933
Project 015	On	16 bit	145.5699945
Project 016	On	16 bit	145.5999933
Project 017	On	16 bit	145.6400018
Project 018	On	16 bit	145.5999933
Project 005	On	16 bit	145.7500024
Project 006	On	16 bit	145.6999994
Project 007	On	16 bit	145.6999994
Project 008	On	16 bit	145.7299982
Project 009	On	16 bit	145.6999994
Project 010	On	16 bit	145.7099939
Project 011	On	16 bit	145.6700006
Project 012	On	16 bit	145.6600061

Project Name	[Sound Recording] Pre-recording Time	[Sound Recording] Post-recording Time	[Sound Recording] Duration Limit
Project 004	0:00:10	0:00:02	Off
Project 002 (1)	0:00:10	0:00:02	Off
Project 003	0:00:10	0:00:02	Off
Project 004	0:00:10	0:00:02	Off
Project 005	0:00:10	0:00:02	Off
Project 006	0:00:10	0:00:02	Off
Project 007	0:00:10	0:00:02	Off
Project 008	0:00:10	0:00:02	Off
Project 009	0:00:10	0:00:02	Off
Project 010	0:00:10	0:00:02	Off
Project 011	0:00:10	0:00:02	Off
Project 012	0:00:10	0:00:02	Off
Project 013	0:00:10	0:00:02	Off
Project 014	0:00:10	0:00:02	Off
Project 015	0:00:10	0:00:02	Off
Project 016	0:00:10	0:00:02	Off
Project 017	0:00:10	0:00:02	Off
Project 018	0:00:10	0:00:02	Off
Project 005	0:00:10	0:00:02	Off
Project 006	0:00:10	0:00:02	Off
Project 007	0:00:10	0:00:02	Off
Project 008	0:00:10	0:00:02	Off
Project 009	0:00:10	0:00:02	Off
Project 010	0:00:10	0:00:02	Off
Project 011	0.000115741	2.31481E-05	Off
Project 012	0:00:10	0:00:02	Off

Project Name	[Sound Recording] Minimum Duration	[Sound Recording] Maximum Duration	[Output Socket Signal] Source
Project 004	0:00:30	0:00:31	Off
Project 002 (1)	0:00:05	0:02:00	Off
Project 003	0:00:05	0:02:00	Off
Project 004	0:00:05	0:02:00	Off
Project 005	0:00:05	0:02:00	Off
Project 006	0:00:05	0:02:00	Off
Project 007	0:00:05	0:02:00	Off
Project 008	0:00:05	0:02:00	Off
Project 009	0:00:05	0:02:00	Off
Project 010	0:00:05	0:02:00	Off
Project 011	0:00:05	0:02:00	Off
Project 012	0:00:05	0:02:00	Off
Project 013	0:00:05	0:02:00	Off
Project 014	0:00:05	0:02:00	Off
Project 015	0:00:05	0:02:00	Off
Project 016	0:00:05	0:02:00	Off
Project 017	0:00:05	0:02:00	Off
Project 018	0:00:05	0:02:00	Off
Project 005	0:00:05	0:02:00	Off
Project 006	0:00:05	0:02:00	Off
Project 007	0:00:05	0:02:00	Off
Project 008	0:00:05	0:02:00	Off
Project 009	0:00:05	0:02:00	Off
Project 010	0:00:05	0:02:00	Off
Project 011	5.78704E-05	0.001388889	Off
Project 012	0:00:05	0:02:00	Off

Project Name	[Output Socket Signal] Gain	[Output Socket Signal] DC Output (20mV/dB)	[Occupational Health] Exposure Time
Project 004	0	0	7:30:00
Project 002 (1)	0	0	7:30:00
Project 003	0	0	7:30:00
Project 004	0	0	7:30:00
Project 005	0	0	7:30:00
Project 006	0	0	7:30:00
Project 007	0	0	7:30:00
Project 008	0	0	7:30:00
Project 009	0	0	7:30:00
Project 010	0	0	7:30:00
Project 011	0	0	7:30:00
Project 012	0	0	7:30:00
Project 013	0	0	7:30:00
Project 014	0	0	7:30:00
Project 015	0	0	7:30:00
Project 016	0	0	7:30:00
Project 017	0	0	7:30:00
Project 018	0	0	7:30:00
Project 005	0	0	7:30:00
Project 006	0	0	7:30:00
Project 007	0	0	7:30:00
Project 008	0	0	7:30:00
Project 009	0	0	7:30:00
Project 010	0	0	7:30:00
Project 011	0	0	0.3125
Project 012	0	0	7:30:00

Project Name	[Occupational Health] Reference Time	[Occupational Health] Threshold Level	[Occupational Health] Criterion Level
Project 004	8:00:00	70	85
Project 002 (1)	8:00:00	70	85
Project 003	8:00:00	70	85
Project 004	8:00:00	70	85
Project 005	8:00:00	70	85
Project 006	8:00:00	70	85
Project 007	8:00:00	70	85
Project 008	8:00:00	70	85
Project 009	8:00:00	70	85
Project 010	8:00:00	70	85
Project 011	8:00:00	70	85
Project 012	8:00:00	70	85
Project 013	8:00:00	70	85
Project 014	8:00:00	70	85
Project 015	8:00:00	70	85
Project 016	8:00:00	70	85
Project 017	8:00:00	70	85
Project 018	8:00:00	70	85
Project 005	8:00:00	70	85
Project 006	8:00:00	70	85
Project 007	8:00:00	70	85
Project 008	8:00:00	70	85
Project 009	8:00:00	70	85
Project 010	8:00:00	70	85
Project 011	0.333333333	70	85
Project 012	8:00:00	70	85

Project Name	[Occupational Health] PeaksOver Level	[Occupational Health] Exchange Rate for Lav
Project 004	140	5 dB
Project 002 (1)	140	5 dB
Project 003	140	5 dB
Project 004	140	5 dB
Project 005	140	5 dB
Project 006	140	5 dB
Project 007	140	5 dB
Project 008	140	5 dB
Project 009	140	5 dB
Project 010	140	5 dB
Project 011	140	5 dB
Project 012	140	5 dB
Project 013	140	5 dB
Project 014	140	5 dB
Project 015	140	5 dB
Project 016	140	5 dB
Project 017	140	5 dB
Project 018	140	5 dB
Project 005	140	5 dB
Project 006	140	5 dB
Project 007	140	5 dB
Project 008	140	5 dB
Project 009	140	5 dB
Project 010	140	5 dB
Project 011	140	5 dB
Project 012	140	5 dB

Project Name	[Occupational Health] Time Weighting for Lav	[Tone Assessment] Tone Assessment	[Tone Assessment] Tone Standard
Project 004	S	Off	ISO 1996-2:2007
Project 002 (1)	S	Off	ISO 1996-2:2007
Project 003	S	Off	ISO 1996-2:2007
Project 004	S	Off	ISO 1996-2:2007
Project 005	S	Off	ISO 1996-2:2007
Project 006	S	Off	ISO 1996-2:2007
Project 007	S	Off	ISO 1996-2:2007
Project 008	S	Off	ISO 1996-2:2007
Project 009	S	Off	ISO 1996-2:2007
Project 010	S	Off	ISO 1996-2:2007
Project 011	S	Off	ISO 1996-2:2007
Project 012	S	Off	ISO 1996-2:2007
Project 013	S	Off	ISO 1996-2:2007
Project 014	S	Off	ISO 1996-2:2007
Project 015	S	Off	ISO 1996-2:2007
Project 016	S	Off	ISO 1996-2:2007
Project 017	S	Off	ISO 1996-2:2007
Project 018	S	Off	ISO 1996-2:2007
Project 005	S	Off	ISO 1996-2:2007
Project 006	S	Off	ISO 1996-2:2007
Project 007	S	Off	ISO 1996-2:2007
Project 008	S	Off	ISO 1996-2:2007
Project 009	S	Off	ISO 1996-2:2007
Project 010	S	Off	ISO 1996-2:2007
Project 011	S	Off	ISO 1996-2:2007
Project 012	S	Off	ISO 1996-2:2007

Project Name	[Tone Assessment] Adjustment	[Tone Assessment] Low Freq. Last Band	[Tone Assessment] Middle Freq. Last Band
Project 004	5	Hz125	Hz400
Project 002 (1)	5	Hz125	Hz400
Project 003	5	Hz125	Hz400
Project 004	5	Hz125	Hz400
Project 005	5	Hz125	Hz400
Project 006	5	Hz125	Hz400
Project 007	5	Hz125	Hz400
Project 008	5	Hz125	Hz400
Project 009	5	Hz125	Hz400
Project 010	5	Hz125	Hz400
Project 011	5	Hz125	Hz400
Project 012	5	Hz125	Hz400
Project 013	5	Hz125	Hz400
Project 014	5	Hz125	Hz400
Project 015	5	Hz125	Hz400
Project 016	5	Hz125	Hz400
Project 017	5	Hz125	Hz400
Project 018	5	Hz125	Hz400
Project 005	5	Hz125	Hz400
Project 006	5	Hz125	Hz400
Project 007	5	Hz125	Hz400
Project 008	5	Hz125	Hz400
Project 009	5	Hz125	Hz400
Project 010	5	Hz125	Hz400
Project 011	5	Hz125	Hz400
Project 012	5	Hz125	Hz400

Project Name	[Tone Assessment] Level Difference Low	[Tone Assessment] Level Difference Middle
Project 004	15	8
Project 002 (1)	15	8
Project 003	15	8
Project 004	15	8
Project 005	15	8
Project 006	15	8
Project 007	15	8
Project 008	15	8
Project 009	15	8
Project 010	15	8
Project 011	15	8
Project 012	15	8
Project 013	15	8
Project 014	15	8
Project 015	15	8
Project 016	15	8
Project 017	15	8
Project 018	15	8
Project 005	15	8
Project 006	15	8
Project 007	15	8
Project 008	15	8
Project 009	15	8
Project 010	15	8
Project 011	15	8
Project 012	15	8

Project Name	[Tone Assessment] Level Difference High	[Tone Assessment] ISO 226	[Tacho] Tacho	[Tacho] RPM Gear Ratio
Project 004	5	1987 Free-field	Off	1
Project 002 (1)	5	1987 Free-field	Off	1
Project 003	5	1987 Free-field	Off	1
Project 004	5	1987 Free-field	Off	1
Project 005	5	1987 Free-field	Off	1
Project 006	5	1987 Free-field	Off	1
Project 007	5	1987 Free-field	Off	1
Project 008	5	1987 Free-field	Off	1
Project 009	5	1987 Free-field	Off	1
Project 010	5	1987 Free-field	Off	1
Project 011	5	1987 Free-field	Off	1
Project 012	5	1987 Free-field	Off	1
Project 013	5	1987 Free-field	Off	1
Project 014	5	1987 Free-field	Off	1
Project 015	5	1987 Free-field	Off	1
Project 016	5	1987 Free-field	Off	1
Project 017	5	1987 Free-field	Off	1
Project 018	5	1987 Free-field	Off	1
Project 005	5	1987 Free-field	Off	1
Project 006	5	1987 Free-field	Off	1
Project 007	5	1987 Free-field	Off	1
Project 008	5	1987 Free-field	Off	1
Project 009	5	1987 Free-field	Off	1
Project 010	5	1987 Free-field	Off	1
Project 011	5	1987 Free-field	Off	1
Project 012	5	1987 Free-field	Off	1

Project Name	[Tacho] External Level	[Tacho] Hysteresis	[Tacho] Slope	[Tacho] CCLD	Start TimeUTC Date Time
Project 004	18.1	0.1	Falling	On	7/22/2019 14:24
Project 002 (1)	18.1	0.1	Falling	On	7/22/2019 14:23
Project 003	18.1	0.1	Falling	On	7/22/2019 16:09
Project 004	18.1	0.1	Falling	On	7/22/2019 17:40
Project 005	18.1	0.1	Falling	On	7/23/2019 3:28
Project 006	18.1	0.1	Falling	On	7/23/2019 4:02
Project 007	18.1	0.1	Falling	On	7/23/2019 4:31
Project 008	18.1	0.1	Falling	On	7/23/2019 15:49
Project 009	18.1	0.1	Falling	On	7/23/2019 18:50
Project 010	18.1	0.1	Falling	On	7/23/2019 20:05
Project 011	18.1	0.1	Falling	On	7/23/2019 21:19
Project 012	18.1	0.1	Falling	On	7/23/2019 22:00
Project 013	18.1	0.1	Falling	On	7/24/2019 3:45
Project 014	18.1	0.1	Falling	On	7/24/2019 5:52
Project 015	18.1	0.1	Falling	On	7/24/2019 6:21
Project 016	18.1	0.1	Falling	On	7/24/2019 6:48
Project 017	18.1	0.1	Falling	On	7/24/2019 16:54
Project 018	18.1	0.1	Falling	On	7/24/2019 18:10
Project 005	18.1	0.1	Falling	On	7/24/2019 20:34
Project 006	18.1	0.1	Falling	On	7/24/2019 21:53
Project 007	18.1	0.1	Falling	On	7/25/2019 3:07
Project 008	18.1	0.1	Falling	On	7/25/2019 3:29
Project 009	18.1	0.1	Falling	On	7/25/2019 3:54
Project 010	18.1	0.1	Falling	On	7/25/2019 4:22
Project 011	18.1	0.1	Falling	On	7/25/2019 4:53
Project 012	18.1	0.1	Falling	On	7/25/2019 14:58

Project Name	Start TimeUTC Time Zone	Start TimeUTC Daylight Saving	Start Time	Stop TimeUTC Date Time
Project 004	Central Standard Time	TRUE	7/22/2019 9:24	7/22/2019 15:27
Project 002 (1)	Central Standard Time	TRUE	7/22/2019 9:23	7/22/2019 15:25
Project 003	Central Standard Time	TRUE	7/22/2019 11:09	7/22/2019 17:09
Project 004	Central Standard Time	TRUE	7/22/2019 12:40	7/22/2019 18:40
Project 005	Central Standard Time	TRUE	7/22/2019 22:28	7/23/2019 3:45
Project 006	Central Standard Time	TRUE	7/22/2019 23:02	7/23/2019 4:17
Project 007	Central Standard Time	TRUE	7/22/2019 23:31	7/23/2019 4:46
Project 008	Central Standard Time	TRUE	7/23/2019 10:49	7/23/2019 16:49
Project 009	Central Standard Time	TRUE	7/23/2019 13:50	7/23/2019 19:50
Project 010	Central Standard Time	TRUE	7/23/2019 15:05	7/23/2019 21:05
Project 011	Central Standard Time	TRUE	7/23/2019 16:19	7/23/2019 21:51
Project 012	Central Standard Time	TRUE	7/23/2019 17:00	7/23/2019 22:30
Project 013	Central Standard Time	TRUE	7/23/2019 22:45	7/24/2019 4:00
Project 014	Central Standard Time	TRUE	7/24/2019 0:52	7/24/2019 6:07
Project 015	Central Standard Time	TRUE	7/24/2019 1:21	7/24/2019 6:36
Project 016	Central Standard Time	TRUE	7/24/2019 1:48	7/24/2019 7:03
Project 017	Central Standard Time	TRUE	7/24/2019 11:54	7/24/2019 17:54
Project 018	Central Standard Time	TRUE	7/24/2019 13:10	7/24/2019 20:01
Project 005	Central Standard Time	TRUE	7/24/2019 15:34	7/24/2019 21:36
Project 006	Central Standard Time	TRUE	7/24/2019 16:53	7/24/2019 22:55
Project 007	Central Standard Time	TRUE	7/24/2019 22:07	7/25/2019 3:22
Project 008	Central Standard Time	TRUE	7/24/2019 22:29	7/25/2019 3:46
Project 009	Central Standard Time	TRUE	7/24/2019 22:54	7/25/2019 4:09
Project 010	Central Standard Time	TRUE	7/24/2019 23:22	7/25/2019 4:39
Project 011	Central Standard Time	TRUE	7/24/2019 23:53	7/25/2019 5:10
Project 012	Central Standard Time	TRUE	7/25/2019 9:58	7/25/2019 15:59

Project Name	Stop TimeUTC Time Zone	Stop TimeUTC Daylight Saving	Stop Time	TApeakUTC Date Time	TApeakUTC Time Zone
Project 004	Central Standard Time	TRUE	7/22/2019 10:27	7/22/2019 15:23	Central Standard Time
Project 002 (1)	Central Standard Time	TRUE	7/22/2019 10:25	7/22/2019 14:55	Central Standard Time
Project 003	Central Standard Time	TRUE	7/22/2019 12:09	7/22/2019 16:27	Central Standard Time
Project 004	Central Standard Time	TRUE	7/22/2019 13:40	7/22/2019 18:13	Central Standard Time
Project 005	Central Standard Time	TRUE	7/22/2019 22:45	7/23/2019 3:44	Central Standard Time
Project 006	Central Standard Time	TRUE	7/22/2019 23:17	7/23/2019 4:16	Central Standard Time
Project 007	Central Standard Time	TRUE	7/22/2019 23:46	7/23/2019 4:32	Central Standard Time
Project 008	Central Standard Time	TRUE	7/23/2019 11:49	7/23/2019 16:38	Central Standard Time
Project 009	Central Standard Time	TRUE	7/23/2019 14:50	7/23/2019 19:06	Central Standard Time
Project 010	Central Standard Time	TRUE	7/23/2019 16:05	7/23/2019 20:23	Central Standard Time
Project 011	Central Standard Time	TRUE	7/23/2019 16:51	7/23/2019 21:34	Central Standard Time
Project 012	Central Standard Time	TRUE	7/23/2019 17:30	7/23/2019 22:14	Central Standard Time
Project 013	Central Standard Time	TRUE	7/23/2019 23:00	7/24/2019 3:52	Central Standard Time
Project 014	Central Standard Time	TRUE	7/24/2019 1:07	7/24/2019 5:52	Central Standard Time
Project 015	Central Standard Time	TRUE	7/24/2019 1:36	7/24/2019 6:22	Central Standard Time
Project 016	Central Standard Time	TRUE	7/24/2019 2:03	7/24/2019 7:00	Central Standard Time
Project 017	Central Standard Time	TRUE	7/24/2019 12:54	7/24/2019 17:12	Central Standard Time
Project 018	Central Standard Time	TRUE	7/24/2019 15:01	7/24/2019 19:40	Central Standard Time
Project 005	Central Standard Time	TRUE	7/24/2019 16:36	7/24/2019 21:18	Central Standard Time
Project 006	Central Standard Time	TRUE	7/24/2019 17:55	7/24/2019 22:38	Central Standard Time
Project 007	Central Standard Time	TRUE	7/24/2019 22:22	7/25/2019 3:18	Central Standard Time
Project 008	Central Standard Time	TRUE	7/24/2019 22:46	7/25/2019 3:45	Central Standard Time
Project 009	Central Standard Time	TRUE	7/24/2019 23:09	7/25/2019 3:56	Central Standard Time
Project 010	Central Standard Time	TRUE	7/24/2019 23:39	7/25/2019 4:22	Central Standard Time
Project 011	Central Standard Time	TRUE	7/25/2019 0:10	7/25/2019 5:10	Central Standard Time
Project 012	Central Standard Time	TRUE	7/25/2019 10:59	7/25/2019 15:58	Central Standard Time

Project Name	TApeakUTC Daylight Saving	TApeak	CIC 1 Ratio DateUTC Date Time	CIC 1 Ratio DateUTC Time Zone
Project 004	TRUE	7/22/2019 10:23	12:00:00 AM	Central Standard Time
Project 002 (1)	TRUE	7/22/2019 9:55	12:00:00 AM	Central Standard Time
Project 003	TRUE	7/22/2019 11:27	12:00:00 AM	Central Standard Time
Project 004	TRUE	7/22/2019 13:13	12:00:00 AM	Central Standard Time
Project 005	TRUE	7/22/2019 22:44	12:00:00 AM	Central Standard Time
Project 006	TRUE	7/22/2019 23:16	12:00:00 AM	Central Standard Time
Project 007	TRUE	7/22/2019 23:32	12:00:00 AM	Central Standard Time
Project 008	TRUE	7/23/2019 11:38	12:00:00 AM	Central Standard Time
Project 009	TRUE	7/23/2019 14:06	12:00:00 AM	Central Standard Time
Project 010	TRUE	7/23/2019 15:23	12:00:00 AM	Central Standard Time
Project 011	TRUE	7/23/2019 16:34	12:00:00 AM	Central Standard Time
Project 012	TRUE	7/23/2019 17:14	12:00:00 AM	Central Standard Time
Project 013	TRUE	7/23/2019 22:52	12:00:00 AM	Central Standard Time
Project 014	TRUE	7/24/2019 0:52	12:00:00 AM	Central Standard Time
Project 015	TRUE	7/24/2019 1:22	12:00:00 AM	Central Standard Time
Project 016	TRUE	7/24/2019 2:00	12:00:00 AM	Central Standard Time
Project 017	TRUE	7/24/2019 12:12	12:00:00 AM	Central Standard Time
Project 018	TRUE	7/24/2019 14:40	12:00:00 AM	Central Standard Time
Project 005	TRUE	7/24/2019 16:18	12:00:00 AM	Central Standard Time
Project 006	TRUE	7/24/2019 17:38	12:00:00 AM	Central Standard Time
Project 007	TRUE	7/24/2019 22:18	12:00:00 AM	Central Standard Time
Project 008	TRUE	7/24/2019 22:45	12:00:00 AM	Central Standard Time
Project 009	TRUE	7/24/2019 22:56	12:00:00 AM	Central Standard Time
Project 010	TRUE	7/24/2019 23:22	12:00:00 AM	Central Standard Time
Project 011	TRUE	7/25/2019 0:10	12:00:00 AM	Central Standard Time
Project 012	TRUE	7/25/2019 10:58	12:00:00 AM	Central Standard Time

Project Name	CIC 1 Ratio DateUTC Daylight Saving	CIC 1 Ratio Date	CIC 2 Ratio DateUTC Date Time	CIC 2 Ratio DateUTC Time Zone
Project 004	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 002 (1)	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 003	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 004	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 005	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 006	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 007	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 008	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 009	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 010	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 011	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 012	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 013	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 014	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 015	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 016	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 017	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 018	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 005	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 006	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 007	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 008	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 009	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 010	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 011	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time
Project 012	TRUE	12:00:00 AM	12:00:00 AM	Central Standard Time

Project Name	CIC 2 Ratio DateUTC Daylight Saving	CIC 2 Ratio Date	[Spectrum] Base	[Spectrum] Bandwidth	[Spectrum] First Index
Project 004	TRUE	12:00:00 AM	10	1/1	4
Project 002 (1)	TRUE	12:00:00 AM	10	1/1	4
Project 003	TRUE	12:00:00 AM	10	1/1	4
Project 004	TRUE	12:00:00 AM	10	1/1	4
Project 005	TRUE	12:00:00 AM	10	1/1	4
Project 006	TRUE	12:00:00 AM	10	1/1	4
Project 007	TRUE	12:00:00 AM	10	1/1	4
Project 008	TRUE	12:00:00 AM	10	1/1	4
Project 009	TRUE	12:00:00 AM	10	1/1	4
Project 010	TRUE	12:00:00 AM	10	1/1	4
Project 011	TRUE	12:00:00 AM	10	1/1	4
Project 012	TRUE	12:00:00 AM	10	1/1	4
Project 013	TRUE	12:00:00 AM	10	1/1	4
Project 014	TRUE	12:00:00 AM	10	1/1	4
Project 015	TRUE	12:00:00 AM	10	1/1	4
Project 016	TRUE	12:00:00 AM	10	1/1	4
Project 017	TRUE	12:00:00 AM	10	1/1	4
Project 018	TRUE	12:00:00 AM	10	1/1	4
Project 005	TRUE	12:00:00 AM	10	1/1	4
Project 006	TRUE	12:00:00 AM	10	1/1	4
Project 007	TRUE	12:00:00 AM	10	1/1	4
Project 008	TRUE	12:00:00 AM	10	1/1	4
Project 009	TRUE	12:00:00 AM	10	1/1	4
Project 010	TRUE	12:00:00 AM	10	1/1	4
Project 011	TRUE	12:00:00 AM	10	1/1	4
Project 012	TRUE	12:00:00 AM	10	1/1	4

Project Name	[Spectrum] Number Of Data
Project 004	11
Project 002 (1)	11
Project 003	11
Project 004	11
Project 005	11
Project 006	11
Project 007	11
Project 008	11
Project 009	11
Project 010	11
Project 011	11
Project 012	11
Project 013	11
Project 014	11
Project 015	11
Project 016	11
Project 017	11
Project 018	11
Project 005	11
Project 006	11
Project 007	11
Project 008	11
Project 009	11
Project 010	11
Project 011	11
Project 012	11

NORTH BAKKEN EXPANSION PROJECT

**Pre-Construction Noise Survey and Acoustical Analysis
McKenzie and Williams Counties, North Dakota**

APPENDIX D

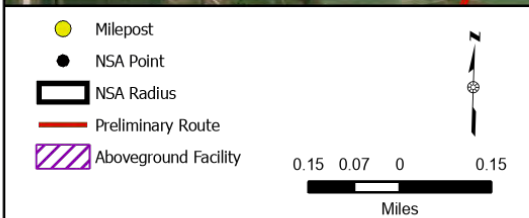
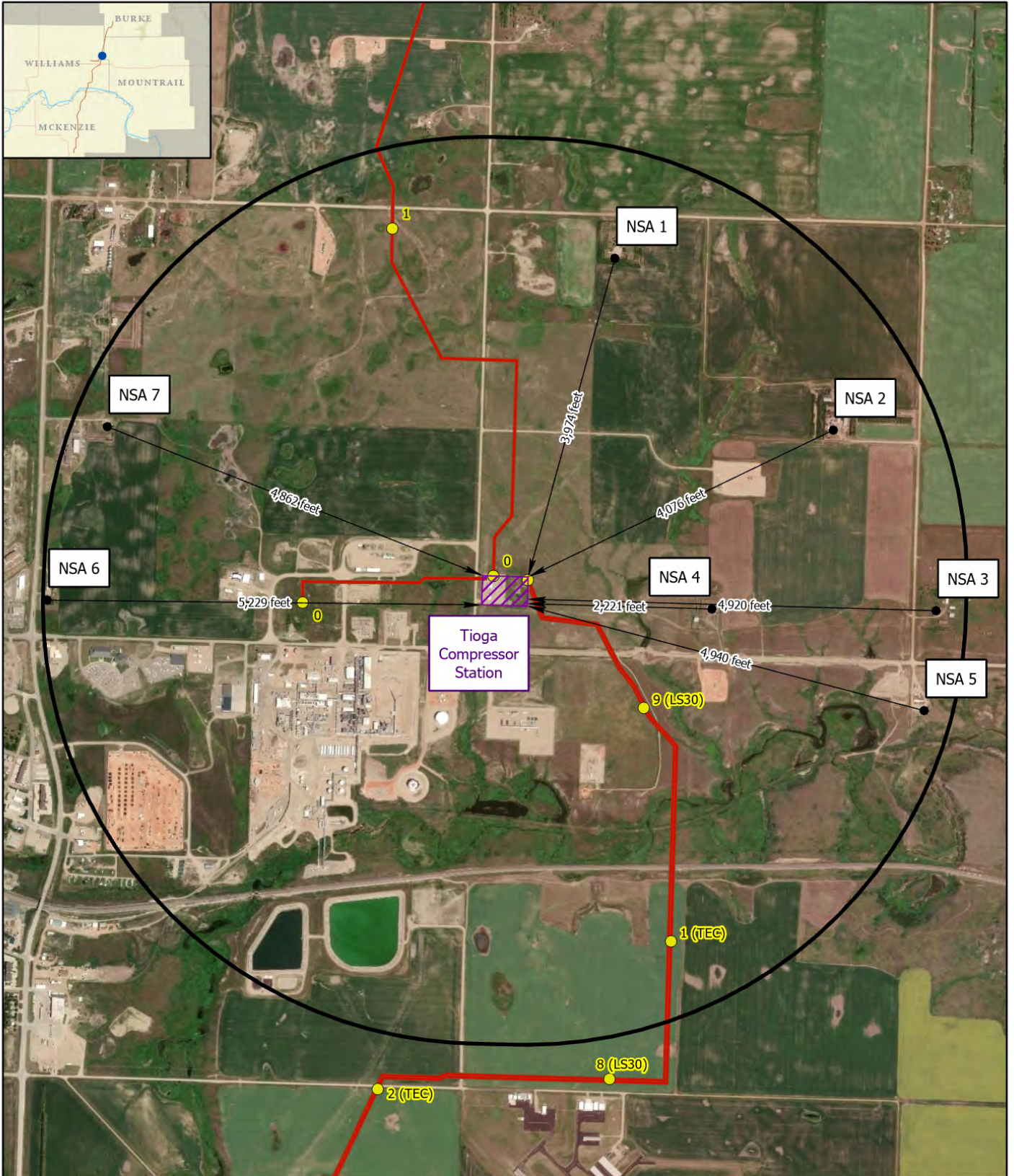
Noise Calculations for Compressor Station Sound Power Levels

Elkhorn Creek											
Indoor Equipment	Quantity	32	63	125	250	500	1000	2000	4000	8000	Total L _w
Compressor Engine Mechanical (CAT G3612 A4)	1	108	121.3	125.7	119.6	119.6	118.9	119.7	118.8	110.9	125.7
Engine Exhaust	1	107.9	122.9	121	120.5	122.5	127.5	132.8	139	140.3	143.3
Catalyst Insertion Loss	1	30	30	30	30	30	30	30	30	30	---
Mitigated Exhaust Noise	1	77.9	92.9	91	90.5	92.5	97.5	102.8	109	110.3	113.3
Compressor (Ariel KBU-4)	1	0.0	99.0	99.0	109.0	99.0	95.0	91.0	89.0	85.0	103.2
Total	---	108.0	121.3	125.7	120.0	119.6	118.9	119.8	119.2	113.6	126.0
Wall and Roof Transmission Loss	---	0.0	0.0	12.0	16.0	26.0	33.0	36.0	47.0	0.0	---
Total Outside Compressor Building	---	108.0	121.3	113.7	104.0	93.6	85.9	83.8	72.2	113.6	112.9
Outdoor Equipment	Quantity	Single L _p (dBA)	d (m)	Single L _w (dBA)	Total L _w (dBA)						Overall Station L _w
Gas Cooler	1	71.9	15	106.4	106.4						114.4
Aux Cooler	1	71.1	15	105.6	105.6						

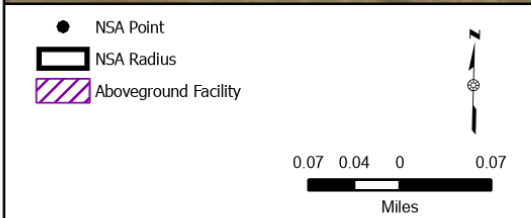
Tioga											
Indoor Equipment	Quantity	32	63	125	250	500	1000	2000	4000	8000	Total L _w
Compressor Engine Mechanical (CAT G3612 A4)	6	108	121.3	125.7	119.6	119.6	118.9	119.7	118.8	110.9	125.7
Engine Exhaust	6	107.9	122.9	121	120.5	122.5	127.5	132.8	139	140.3	143.3
Catalyst Insertion Loss	6	30	30	30	30	30	30	30	30	30	---
Mitigated Exhaust Noise	6	77.9	92.9	91	90.5	92.5	97.5	102.8	109	110.3	113.3
Compressor (Ariel KBU-4)	6	0.0	99.0	99.0	109.0	99.0	95.0	91.0	89.0	85.0	103.2
Generator Mechanical (L5794GSI)	1	94.7	112.7	113.7	110.7	109.7	107.7	106.7	106.7	104.7	114.3
Generator Exhaust	1	112.7	130.7	132.7	122.7	119.7	114.7	111.7	104.7	91.7	122.3
Silencer Insertion Loss	1	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	---
Mitigated Exhaust Noise	1	80.7	98.7	100.7	90.7	87.7	82.7	79.7	72.7	59.7	90.3
Total	---	115.8	129.2	133.5	127.8	127.5	126.8	127.6	127.1	121.5	133.8
Wall and Roof Transmission Loss	---	0.0	0.0	12.0	16.0	26.0	33.0	36.0	47.0	0.0	---
Total Outside Compressor Building	---	115.8	129.2	121.5	111.8	101.5	93.8	91.6	80.1	121.5	120.7
Outdoor Equipment	Quantity	Single L _p (dBA)	d (m)	Single L _w (dBA)	Total L _w (dBA)						Overall Station L _w
Gas Cooler	6	71.9	15	106.4	114.2						122.2
Aux Cooler	6	71.1	15	105.6	113.4						

APPENDIX L

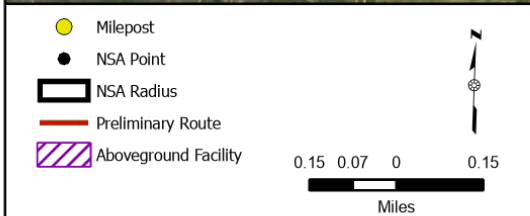
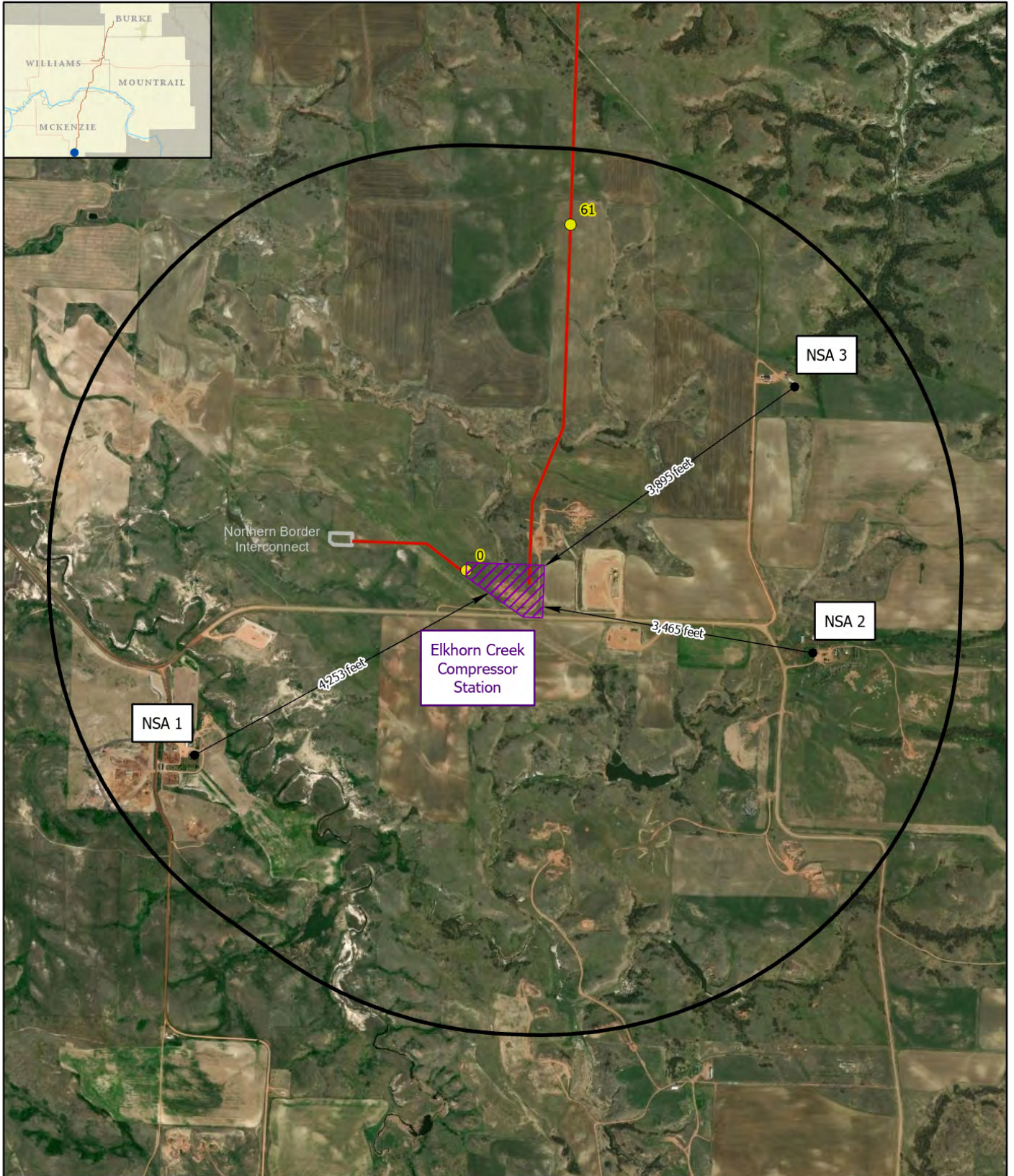
NOISE SENSITIVE AREA FIGURES



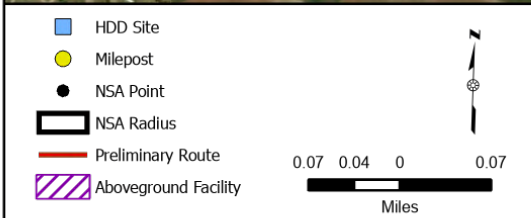
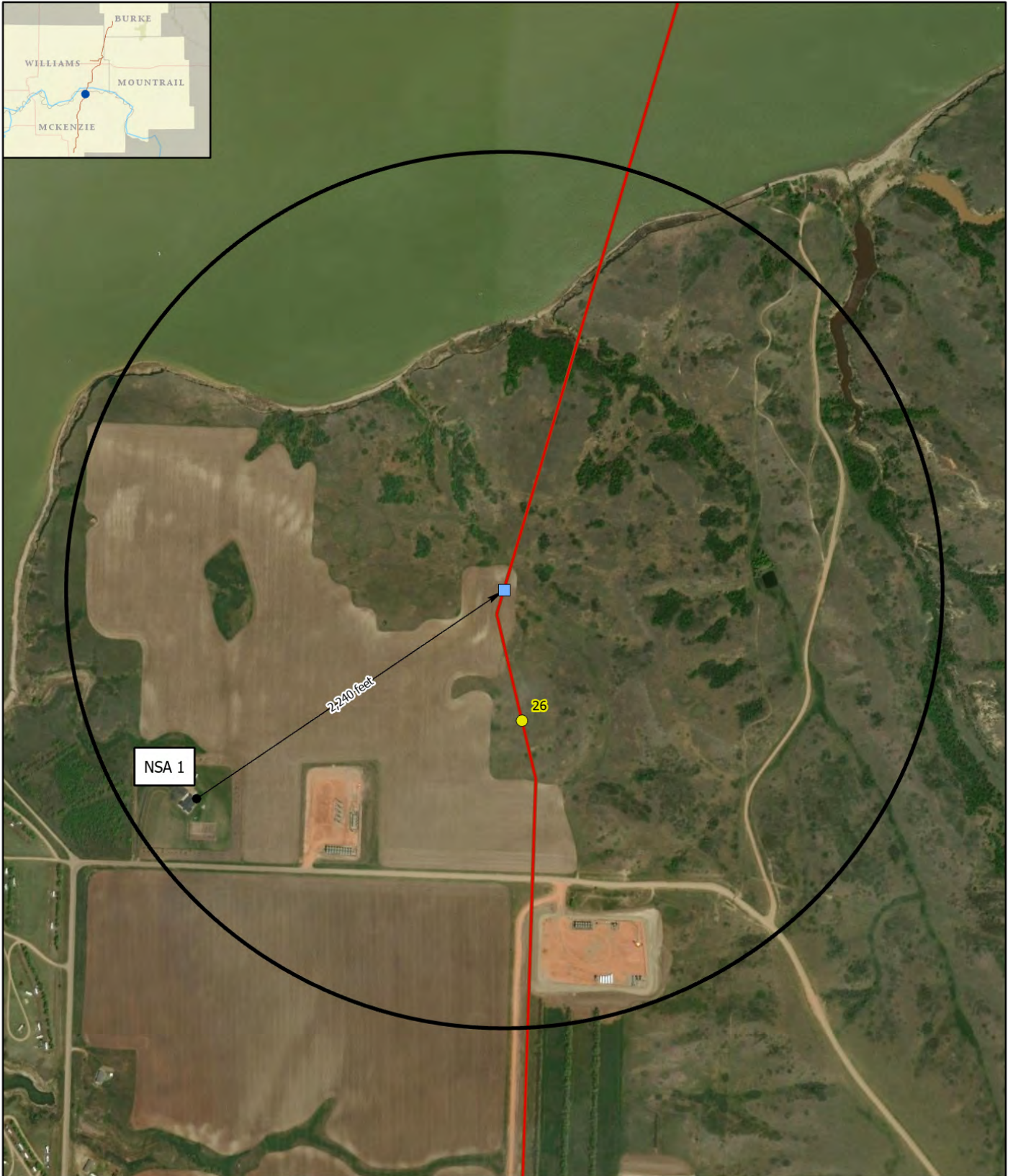
Appendix L
NSAs within 1.0 mile of
Tioga Compressor Station
North Bakken Expansion Project
 Williams County, North Dakota
 Page 1 of 10



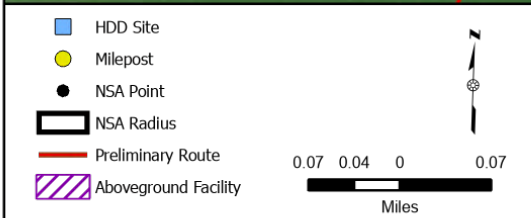
Appendix L
NSAs within 0.5 mile of
Robinson Lake Plant Receipt Station
North Bakken Expansion Project
 Mountrail County, North Dakota
 Page 2 of 10



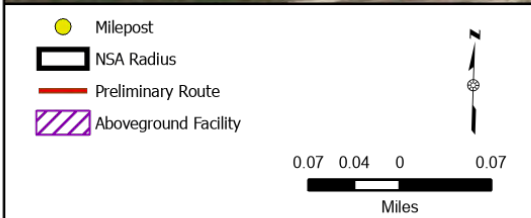
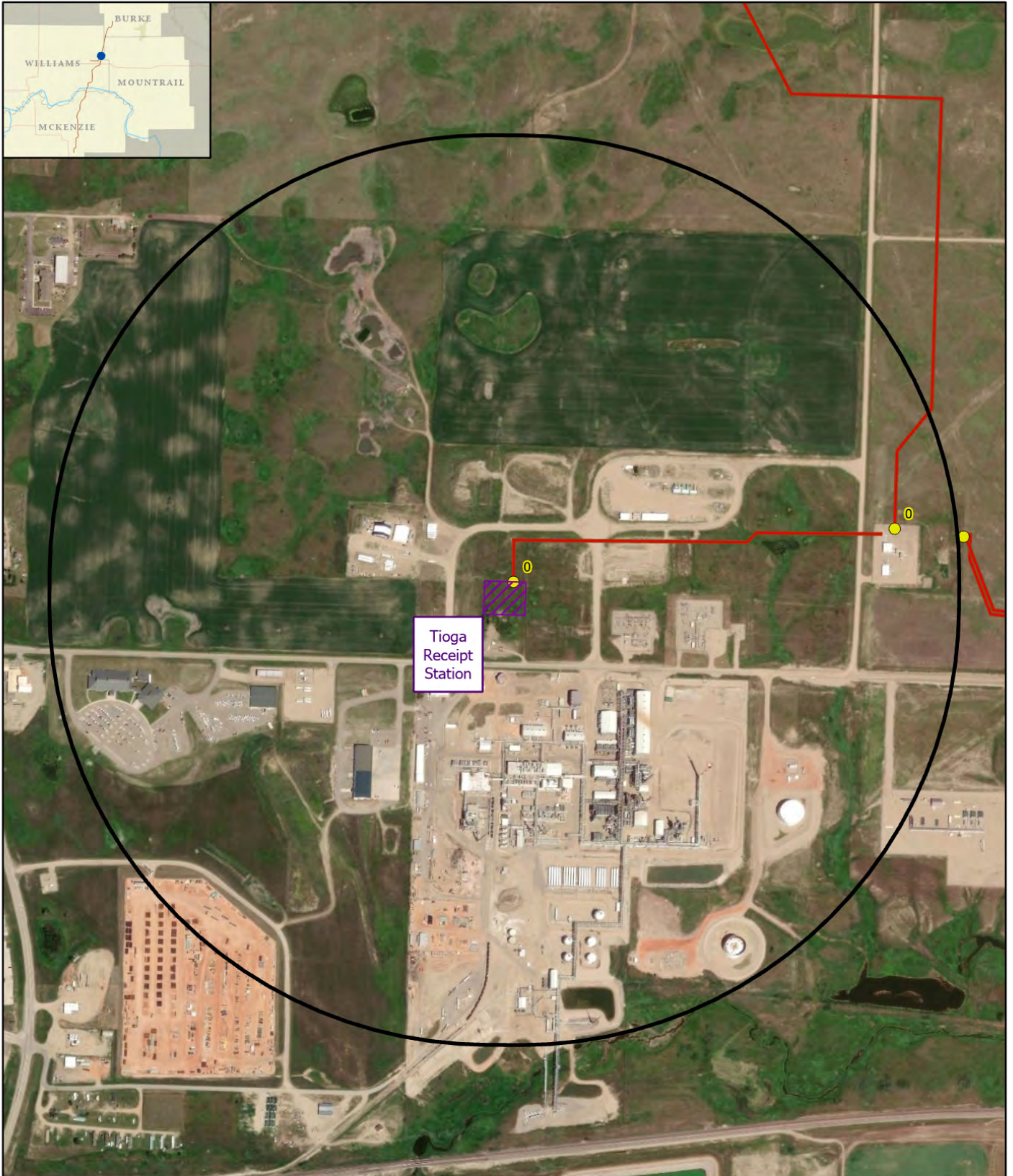
Appendix L
NSAs within 1.0 mile of
Elkhorn Creek Compressor Station
North Bakken Expansion Project
 McKenzie County, North Dakota
 Page 3 of 10



Appendix L
NSAs within 0.5 mile of
Lake Sakakawea HDD – South Side
North Bakken Expansion Project
 McKenzie County, North Dakota
 Page 4 of 10





Appendix L
NSAs within 0.5 mile of
Lake Sakakawea HDD – North Side
North Bakken Expansion Project
 Williams County, North Dakota
 Page 5 of 10

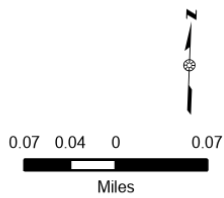


Appendix L
NSAs within 0.5 mile of
Tioga Plant Receipt Station
North Bakken Expansion Project
 Williams County, North Dakota
 Page 6 of 10

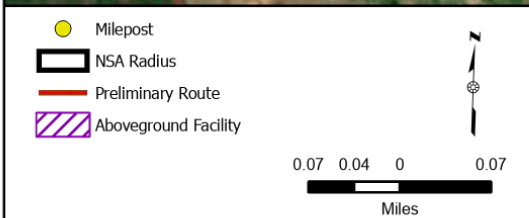
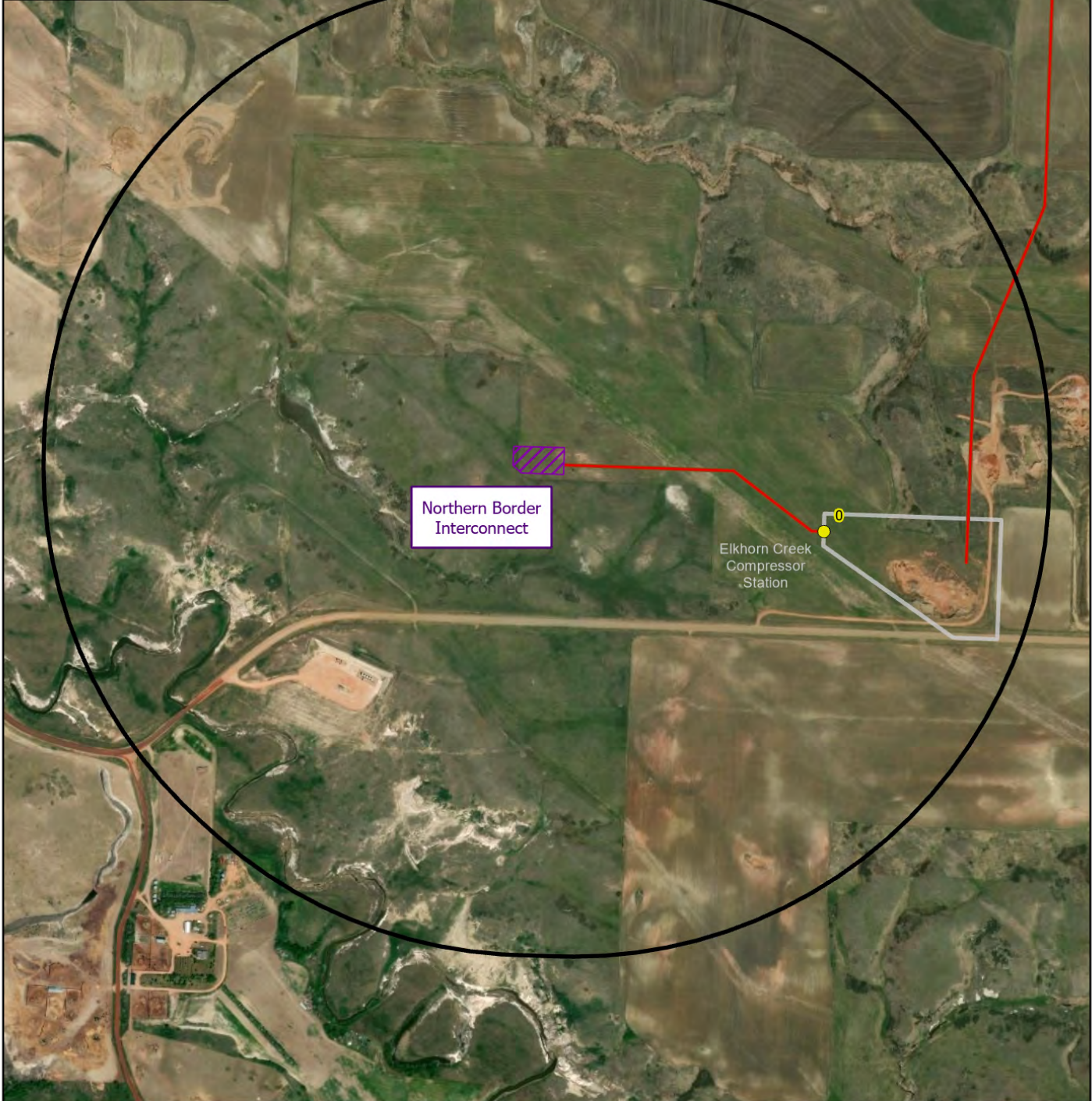


Springbrook
Plant Receipt
Station

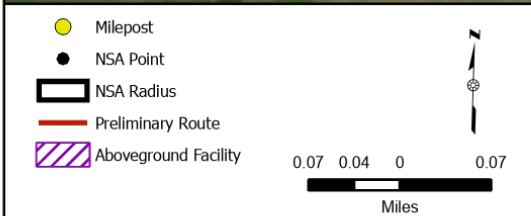
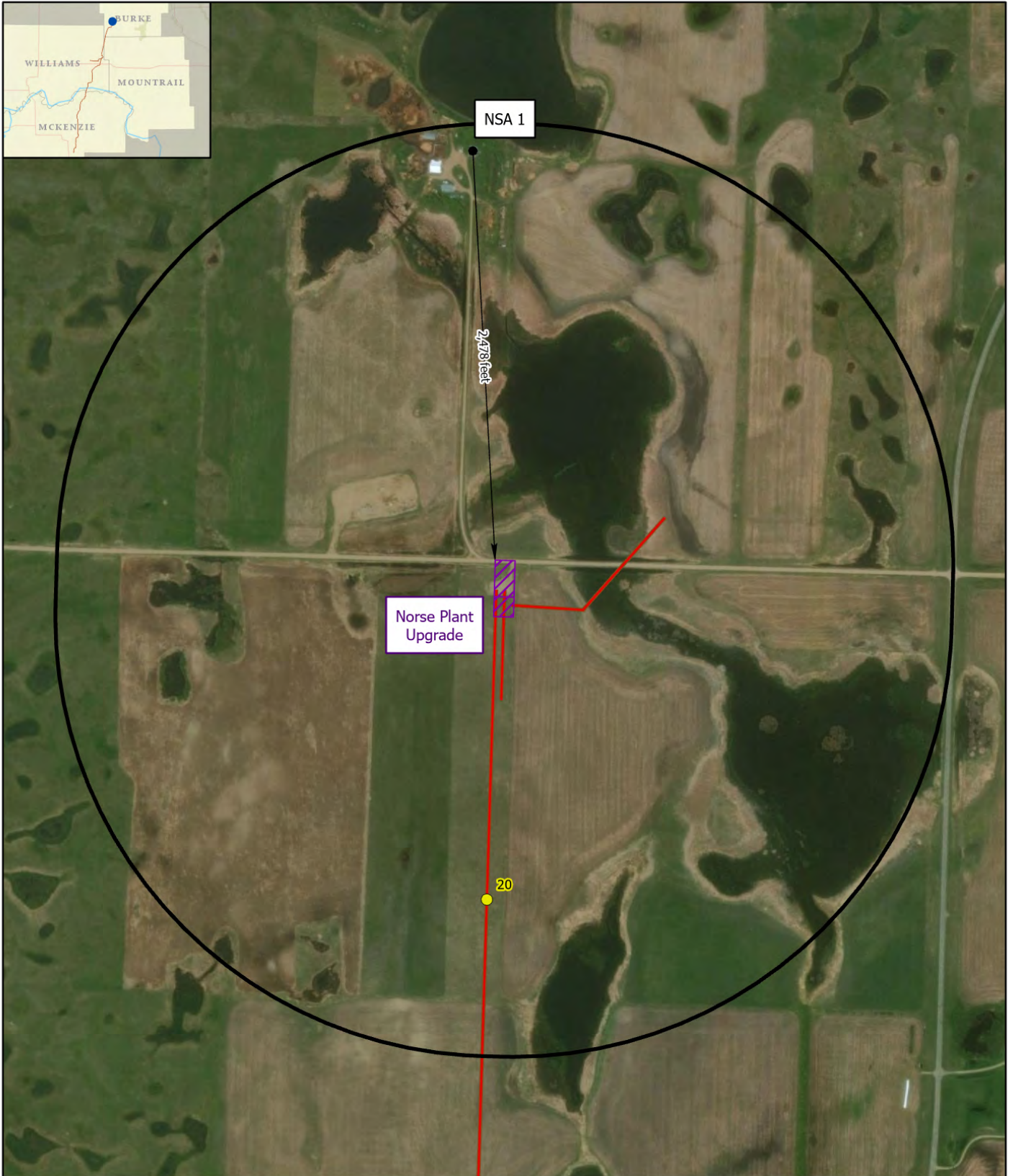
-  NSA Radius
-  Aboveground Facility



Appendix L
NSAs within 0.5 mile of
Springbrook Plant Receipt Station
North Bakken Expansion Project
Williams County, North Dakota
Page 7 of 10





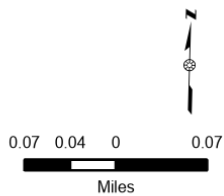
Appendix L
NSAs within 0.5 mile of
Northern Border Interconnect Station
North Bakken Expansion Project
 McKenzie County, North Dakota
 Page 8 of 10



Appendix L
NSAs within 0.5 mile of
Norse Plant and Transfer Station
North Bakken Expansion Project
 Burke County, North Dakota
 Page 9 of 10



 NSA Radius
 Aboveground Facility



Appendix L
NSAs within 0.5 mile of
Lignite Plant Receipt Station and Lignite Town Border Station
North Bakken Expansion Project
 Burke County, North Dakota
 Page 10 of 10

APPENDIX M

**PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE PROJECTS
EVALUATED FOR POTENTIAL CUMULATIVE IMPACTS WITH THE NORTH BAKKEN
EXPANSION PROJECT**

APPENDIX M

North Bakken Expansion Project
Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the North Bakken Expansion Project ^{a,b}

Project Name	Category	Project Description	Approx. Total Acres ^c	Status	Construction Commences	Operation Commences	County(ies)	Distance from Project (miles)	Approximate Acres of Overlap	Resources with Potential for Cumulative Impacts	Citation
Montana-Dakota Utilities Transmission Line	Energy	Montana-Dakota Utilities is seeking to purchase a 50' wide strip of land from Stenehjem Holdings for the purpose of constructing an overhead electric transmission line in or near Watford City.	73	Early permitting phases	Unknown	Unknown	Williams	1	0	WW, VG, WF, TE, SO, LU, VS	(Watford City Planning and Zoning Commission, 2015)
Aurora Wind Electric Transmission Line	Energy	The Aurora Wind electric transmission line is an approximately 20-mile-long 345-kilovolt aboveground transmission line. It would extend from the proposed Aurora Wind Project substation in Williams County to the existing Basin Electric Power Cooperative Tande Substation located in Mountrail County.	364	PSC Application submitted	2Q 2019	4Q 2019	Mountrail, Williams	0	<1	WW, VG, WF, TE, CR, GS, N-con, N-op, SO, LU, RS, VS	(Burns & McDonnell, 2018a)
Aurora Wind Project	Energy	The Aurora Wind Project is a proposed wind energy development that would generate up to 300 megawatts of electricity at rated capacity. It would include construction of up to 121 wind turbines located on a 48,000 acre site approximately 5 miles northwest of Tioga.	48,000	Permit obtained	2Q 2019	4Q 2019	Williams, Mountrail	5.2	0	N-op, SO, LU, VS	(Burns & McDonnell, 2018b)

APPENDIX M (cont'd)

North Bakken Expansion Project
Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the North Bakken Expansion Project ^{a,b}

Project Name	Category	Project Description	Approx. Total Acres	Status	Construction Commences	Operation Commences	County(ies)	Distance from Project (miles)	Approximate Acres of Overlap	Resources with Potential for Cumulative Impacts	Citation
Demicks Lake Plant II	Energy	ONEOK is constructing the Demicks Lake Plant II, a 200-million cubic feet per day natural gas processing facility northeast of Watford City and about 14 miles east of the proposed Tioga-Elkhorn Creek pipeline MP 45.	Unknown	Under construction	Under construction	1Q 2020	McKenzie	14	0	AQ-op, SO	(ONEOK, 2019)
Nesson Gathering Gas Plant (LU-0036-19)	Energy	Nesson Gathering Inc. proposes to construct a natural gas gathering plant on 76 acres and located in the SE/4 of section 35, T154N R102W.	76	Permit obtained	Unknown	Unknown	Williams	36	0	AQ-op, SO	(Williams County Planning and Zoning Commission, 2019b)
Nesson Gathering Gas Plant (LU-0001-19)	Energy	Nesson Gathering Inc. proposes to construct a natural gas gathering plant on a 158 acre property, located NE/4 of Section 1, T153N R104W.	158	Permit obtained	Unknown	Unknown	Williams	40	0	AQ-op, SO	(Williams County Planning and Zoning Commission, 2019b)
Natural Gas Plant Expansion (LU-0191-18)	Energy	An existing gas plant located about 5 miles south-southwest of Tioga will expand to include additional laydown space. The property is 73 acres and located in NW/4 of Section 4.	73	Permit obtained	Unknown	Unknown	Williams	1	0	WW, VG, SO	(Williams County Planning and Zoning Commission, 2019c)
Kinder Morgan Roosevelt Gas Plant Expansion	Energy	The expansion would increase the capacity to process 150 million cubic feet per day; located about 7 miles south of Watford City and about 10 miles west of proposed project MP 37.	30	Approved by ND PSC 4Q 2018	Unknown	4Q 2019	McKenzie	10	0	WW, AQ-op, SO	(Hiland Partners, 2018a)

APPENDIX M (cont'd)

North Bakken Expansion Project
Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the North Bakken Expansion Project ^{a,b}

Project Name	Category	Project Description	Approx. Total Acres	Status	Construction Commences	Operation Commences	County(ies)	Distance from Project (miles)	Approximate Acres of Overlap	Resources with Potential for Cumulative Impacts	Citation
Arrow Bear Den Gas Processing Plant II	Energy	McKenzie Arrow Field Services, LLC proposes to construct the Arrow Bear Den Gas Processing Plant II, a 200mcf capacity processing plant. The proposed site is within 1 mile of MP 59 of the proposed Tioga-Elkhorn Creek pipeline.	52	Under construction	3Q 2018	4Q 2019	McKenzie	Under 1	0	AQ-op, SO, LU, RS, VS	(Arrow Field Services, LLC, 2017)
Robinson Lake Gas Plant	Energy	The Robinson Lake Gas Plant Expansion is located 30 miles west of the proposed Tioga-Elkhorn Creek pipeline MP 30.	23	Under construction	3Q 2019	Unknown	Mountrail	30	0	AQ-op, SO	(Whiting Oil and Gas Corporation, 2013)
Demicks Lake - Cherry Creek Pipeline Project	Energy	WBI Energy's Demicks Lake - Cherry Creek Pipeline Project will carry gas from ONEOK Rockies Midstream LLC's Demicks Lake gas processing plant near Keene, North Dakota, to an interconnect with Northern Border Pipeline Co.'s mainline outside of Watford City, North Dakota. The proposed Tioga-Elkhorn Creek pipeline would cross the 12.2 mile pipeline near MP 47.	261	Completed	1Q 2019	3Q 2019	McKenzie	0	2	WW, VG, WF, TE, CR, SO, LU	(WBI Energy Transmission, Inc., 2018)
Wild Basin to Sax Valve Looped Pipeline	Energy	WBI Energy's Wild Basin to Sax Valve Looped Pipeline consists of approximately 2 miles of 20-inch-diameter natural gas pipeline in McKenzie County, North Dakota. Project falls under WBI Energy's Blanket Authorization.	42	Under Construction	4Q 2019	1Q 2020	McKenzie	1	0	WW, VG, WF, TE, CR, GS, SO, LU, VS	(WBI Energy Transmission, Inc. 2019)

APPENDIX M (cont'd)

North Bakken Expansion Project

Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the North Bakken Expansion Project ^{a,b}

Project Name	Category	Project Description	Approx. Total Acres	Status	Construction Commences	Operation Commences	County(ies)	Distance from Project (miles)	Approximate Acres of Overlap	Resources with Potential for Cumulative Impacts	Citation
Bakken Pipeline LLC	Energy	The ONEOK Bakken Pipeline Project is a 10.8-mile, 12-inch-diameter steel natural gas liquids pipeline that would originate at the Targa Badlands, LLC. Little Missouri Gas Processing Plant and terminate at an interconnection with ONEOK's Demicks Lake Plant. The Project would be located in McKenzie County, and is approximately 2 miles west of the proposed Tioga-Elkhorn Creek pipeline MP 60.	118	PSC Approved 2Q 2019	2Q 2019	4Q 2019	McKenzie, Richland	2	0	WW, VG, WF, TE, CR, GS, AR-con, N-con, SO	(ONEOK Bakken Pipeline, LLC, 2019)
Bakken Missouri River Crossing Project	Energy	Kinder Morgan's Bakken Missouri River Crossing Project plans to connect the existing Kinder Morgan Brogger compressor station located in Williams County, North Dakota, to a Kinder Morgan natural gas gathering system located in McKenzie County, North Dakota. The project will include the installation of approximately 10 miles of 20-inch diameter pipeline between the Brogger compressor station and Kinder Morgan natural gas gathering system.	38	Unknown	2Q 2019	Unknown	Williams	7	0	SO	(Hiland Partners, 2018b)

APPENDIX M (cont'd)

North Bakken Expansion Project
Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the North Bakken Expansion Project ^{a,b}

Project Name	Category	Project Description	Approx. Total Acres	Status	Construction Commences	Operation Commences	County(ies)	Distance from Project (miles)	Approximate Acres of Overlap	Resources with Potential for Cumulative Impacts	Citation
Gunslinger Federal and Gladstone Oil and Gas Well Pads	Energy	The Gunslinger Federal well pad would have 10 wells and be operated by Slawson. The Gladstone well pad would have seven wells and be operated by Burlington. The proposed project also includes construction of a new access road and associated oil and gas equipment and utilities. The well pads would be constructed on the Little Missouri National Grasslands (LMNG), which are part of the Dakota Prairie Grasslands (DPG) managed by the USFS in the Tobacco Gardens Area of McKenzie County, North Dakota.	14	Decision Notice and Finding of No Significant Impacts received	Unknown	Unknown	McKenzie	0	3	WW, VG, WF, CR, LU	(U.S. Forest Service, 2019)
Other Oil and Gas Well Developments (various)	Energy	Various Bureau of Land Management oil and gas developments including well pads, directional drill (horizontal) wells, and access roads are planned throughout the state.	Unknown	Analysis and document preparation	Unknown	Unknown	Various	Various, nearest is about 7 miles	0	WW, VG, AQ-con, SO	(U.S. Bureau of Land Management, 2019)
North Bakken Expansion Project Customer Tie-In Facilities	Energy	Customer tie-in facilities at the proposed transfer/receipt/delivery stations that are part of the proposed North Bakken Expansion Project.	Unknown	Under Development	2020-2021	2021	Various	0	Unknown	WW, VG, WF, CR, LU	N/A

APPENDIX M (cont'd)

**North Bakken Expansion Project
Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the North Bakken Expansion Project ^{a,b}**

Project Name	Category	Project Description	Approx. Total Acres	Status	Construction Commences	Operation Commences	County(ies)	Distance from Project (miles)	Approximate Acres of Overlap	Resources with Potential for Cumulative Impacts	Citation
Lower Sundhagen Scoria Mine Reclamation	Energy	Reclamation of scoria (clinker) pits in Williams County would require backfill of 6,300 cubic yards of soil and revegetation of 3 acres.	3	Decision and Appeal	Unknown	Unknown	Williams	5	0	N/A	(U.S. Bureau of Land Management, 2016)
Williston Basin International Airport	Commercial	The Williston Basin International Airport will have 2 runways and 110,000 square foot terminal building and will be located about 10 miles NW of Williston.	1,570	Under construction	2018	4Q 2019	Williams	33	0	AQ-op, N-op, SO	(KLJ, 2015)
Cenex Pipeline	Energy	Cenex Pipeline, LLC plans to construct a 10" refined fuels pipeline from Sidney, Montana, to Minot, North Dakota, to replace a portion of an existing 8-inch pipeline system, while adding throughput capacity. The proposed route is in the early permitting phase and would intersect the proposed Tioga-Elkhorn Creek pipeline near MP 10.	1,360	Unknown	Unknown	Unknown	Williams, Mountrail	0	<1	WW, VG, WF, CR, GS, N-con, SO, LU, RS, VS	(KLJ, 2017)
Water transmission line in Watford City	Utilities (Non Energy)	A proposed water transmission line in Watford City pipeline would furnish water to "The Crossings at Watford City" and to support the oil industry.	Unknown	Early permitting phases	Unknown	Unknown	McKenzie	2	0	WW, VG, WF, TE, CR, GS, AR-con, N-con, SO	(Watford City Planning and Zoning Commission, 2019)

APPENDIX M (cont'd)

North Bakken Expansion Project
Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the North Bakken Expansion Project ^{a,b}

Project Name	Category	Project Description	Approx. Total Acres	Status	Construction Commences	Operation Commences	County(ies)	Distance from Project (miles)	Approximate Acres of Overlap	Resources with Potential for Cumulative Impacts	Citation
Western Area Water Supply Project	Utilities (Non Energy)	The Western Area Water Supply Project (WAWSP) was developed to supply drinking water from the Missouri River supplemented with groundwater from the R&T Water Supply Commerce Authority (WSCA) to meet the municipal, rural, and industrial water needs for all or parts of McKenzie, Williams, Divide, Burke, and Mountrail Counties. Two of the development areas, East White Earth and System I Spring Creek, intersect the proposed Tioga-Elkhorn Creek pipeline near MP 61.9.	Unknown	Under construction	Under construction	Unknown	Mountrail, McKenzie	0	Unknown – Exact locations of projects are not known, only the development areas.	WW, VG, WF, TE, CR, GS, AR-con, N-con, SO, LU	(Western Area Water Supply Authority, 2019)
Route 9 Reconstruction	Transportation	USACE has issued a permit for reconstruction of Route 9 approximately 6 miles east of the proposed Tioga-Elkhorn Creek pipeline MP 6.	15	Permit issued by USACE 4Q 2018	Unknown	Unknown	Mountrail	6	0	WW, TE	(U.S. Army Corps of Engineers, 2018)
DOT Road Improvements - Red Mike Area to County Road 42	Transportation	Improvements are planned along ND 1804 from Red Mike Area to CR 42 (Epping Road). Improvements include increasing structural capacity, widening the shoulders, improving the road surface and installing a stop light.	183	Unknown	2020	2020	Williams	2	0	WW, VG, AQ-op, SO, VS	(North Dakota Department of Transportation, 2019a)

APPENDIX M (cont'd)

North Bakken Expansion Project
Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the North Bakken Expansion Project ^{a,b}

Project Name	Category	Project Description	Approx. Total Acres	Status	Construction Commences	Operation Commences	County(ies)	Distance from Project (miles)	Approximate Acres of Overlap	Resources with Potential for Cumulative Impacts	Citation
US 85 - I-94 to Watford City Bypass	Transportation	The U.S. Highway 85 Project encompasses approximately 62 miles of roadway in Stark, Billings, and McKenzie counties, North Dakota. The project begins at the Interstate 94 (I-94) interchange and extends north to the Watford City Bypass (McKenzie County Road 30). The proposed action is to expand this segment of U.S. Highway 85 from a two-lane highway to a four-lane highway. The north end of the improvements are approximately 3 miles west of the south end of the proposed Tioga-Elkhorn pipeline.	842	Record of Decision 2Q 2019	2019	2020	McKenzie	3	0	WW, VG, WF, TE, AQ-op, SO, VS	(North Dakota Department of Transportation, 2019b)
Pine Ridge Development	Residential	The Pine Ridge Development would include curbs, gutters, paved streets, and the addition of single-family homes and additional duplexes and a four-plex in Tioga.	119	Unknown	Unknown	2019	Williams	1	0	WW, VG, WF, TE, CR, GS, N-con, SO, VS	(Landgrid, 2016)
Homestead at Watford City First Addition	Residential	Homestead at Watford City First Addition is a development of six single family homes in Watford City.	640	Unknown	Unknown	Unknown	McKenzie	5	0	VG, SO	(Homestead at Watford City, 2015)
Aspen Heights Condominiums	Residential	Aspen Heights Condominiums would include 48 new apartment units at 1000 South Pheasant Ridge Street.	Unknown	Early permitting phases	Unknown	Unknown	McKenzie	5	0	VG, SO	(Orange Property Management, 2019)

APPENDIX M (cont'd)

North Bakken Expansion Project
Past, Present, and Reasonably Foreseeable Future Projects Evaluated for Potential Cumulative Impacts with the North Bakken Expansion Project ^{a,b}

Project Name	Category	Project Description	Approx. Total Acres	Status	Construction Commences	Operation Commences	County(ies)	Distance from Project (miles)	Approximate Acres of Overlap	Resources with Potential for Cumulative Impacts	Citation
Elementary School	Government	McKenzie County School District is proposes to build a new elementary school in Watford City, in the Fox Hills Village Subdivision.	53	Rezoning process	Unknown	Unknown	McKenzie	3	0	WW, VG, CR, GS, N-con, VS	(McKenzie County, 2019)

AQ-con = air quality (construction); AQ-op = air quality (operations); CR = cultural resources; GS = geology and soils; LU = land use; N/A = Not available; N-con = noise (construction); N-op = noise (operation); RS = recreation and special interest areas; SO = socioeconomics; TE = threatened and endangered species; VG = vegetation; VS = visual resources; WF = wildlife, fish; WW = wetlands, water resources

^a The impacts of past actions are expressed as the baseline environmental conditions and are not included in this table, although recent past actions that continue to contribute to discernable impacts on a resource are included.

^b A description of the geographic and temporal scope of the analysis for each resource is provided tables 1.10-1 and 1.10-2 of Resource Report 1.

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