WBI ENERGY TRANSMISSION, INC.

Wahpeton Expansion Project

Resource Report 6
Geological Resources

Final

Docket No.
CP22-XXX-000

May 2022

WBI ENERGY TRANSMISSION, INC.
WAHPETON EXPANSION PROJECT
RESOURCE REPORT 6—GEOLOGICAL RESOURCES

Minimum Filing Requirements for Environmental Reports:	**Addressed In:**
1. Describe, by milepost, mineral resources that are currently or potentially exploitable—Title 18 Code of Federal Regulations (CFR) part (§) 380.12 (h)(1).	Section 6.3
2. Describe, by milepost, existing and potential geological hazards and areas of nonroutine geotechnical concern, such as high seismicity areas, active faults, and areas susceptible to soil liquefaction; planned, active, and abandoned mines; karst terrain; and areas of potential ground failure, such as subsidence, slumping, and landsliding. Discuss the hazards posed to the facility from each one—18 CFR § 380.12 (h)(2).	Section 6.4
3. Describe how the project would be located or designed to avoid or minimize adverse effects to the resources or risk to itself, including geotechnical investigations and monitoring that would be conducted before, during, and after construction. Discuss also the potential for blasting to affect structures, and the measures to be taken to remedy such effects—18 CFR § 380.12 (h)(3).	Section 6.6
4. Specify methods to be used to prevent project-induced contamination from surface mines or from mine tailings along the right-of-way and whether the project would hinder mine reclamation or expansion efforts—18 CFR § 380.12 (h)(4).	Not Applicable
5. If the application involves a liquefied natural gas facility located in zones 2, 3, or 4 of the Uniform Building Code's Seismic Risk Map, or where there is potential for surface faulting or liquefaction, prepare a report on earthquake hazards and engineering in conformance with "Data Requirements for the Seismic Review of liquefied natural gas facilities." National Bureau of Standards Information Report 84-2833. This document may be obtained from the Commission staff—18 CFR § 380.12 (h)(5).	Not Applicable
6. If the application is for underground storage facilities: i. Describe how the applicant would control and monitor the drilling activity of others within the field and buffer zone; ii. Describe how the applicant would monitor potential effects of the operation of adjacent storage or production facilities on the proposed facility, and vice versa; iii. Describe measures taken to locate and determine the condition of old wells within the field and buffer zone and how the applicant would reduce risk from failure of known an undiscovered wells; and iv. Identify and discuss safety and environmental safeguards required by state and federal drilling regulations. —18 CFR § 380.12 (h)(6).	Not Applicable
Additional Information:	
1. Identify any sensitive paleontological resource areas crossed by the proposed facilities.	Section 6.5
2. Briefly summarize the physiography and bedrock geology of the project.	Sections 6.1 and 6.2
3. If a proposed pipeline crosses active drilling areas, describe the plan for coordinating with drillers to ensure early identification of other companies' planned new wells, gathering lines, and aboveground facilities.	Section 6.3
4. Provide a table that identifies areas of steep slopes that would be crossed by the project. Include the following in the table: i. start milepost (of steep slope crossing); ii. end milepost (of steep slope crossing); and iii. the range of slope for each crossing location (i.e., 15–30 percent slopes, 30–50 percent slopes, 50–70 percent slopes, and greater than 70 percent).	Section 6.4.3, table 6.4-1
Federal Energy Regulatory Commission's April 4, 2022 Comments on Draft Resource Report 6:	
1. Include the actual percentage of the planned Project that is subject to landslides.	Section 6.4.3
2. Revise table 6.4-1 to include the start and end MPs for slopes greater than 15 percent.	Section 6.4.3, table 6.4-1
3. Section 6.7 states "Should WBI Energy have to dispose of excess rock outside the right-of-way, an approved landfill or alternative upland area will be utilized and necessary permits and clearances will be obtained." Clarify what is meant by "alternative upland area."	Section 6.7

4.	Section 6.7 states that while blasting is not anticipated it may be required if shallow bedrock or boulders are encountered that could not be removed by conventional methods. Therefore, provide a Blasting Plan which includes methods to mitigate noise and vibration impacts on noise sensitive areas during blasting activities. Include measures that would be utilized to minimize impacts on sensitive resources from blasting activities. Include methods to reduce the amount of blasting needed, handling of explosives, measures to control each blast, monitoring and mitigation measures to minimize impacts, and landowner notification procedures.	Appendix 6B, Blasting Plan

WBI ENERGY TRANSMISSION, INC.
WAHPETON EXPANSION PROJECT
RESOURCE REPORT 6—GEOLOGICAL RESOURCES

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
FERC Plan	Federal Energy Regulatory Commission's *Upland Erosion Control, Revegetation, and Maintenance Plan*
MDU	Montana-Dakota Utilities Company
MP	milepost
NDDOT	North Dakota Department of Transportation
Project	Wahpeton Expansion Project
RFFA	reasonably foreseeable future actions
USGS	United States Geological Survey
WBI Energy	WBI Energy Transmission, Inc.

WBI ENERGY TRANSMISSION, INC.
WAHPETON EXPANSION PROJECT

6.0 RESOURCE REPORT 6—GEOLOGICAL RESOURCES

WBI Energy Transmission, Inc. (WBI Energy) proposes to construct, modify, operate, and maintain the Wahpeton Expansion Project (Project). The Project will involve the construction of approximately 60.5 miles of 12-inch-diameter natural gas transmission pipeline from WBI Energy's existing Mapleton Compressor Station near Mapleton, North Dakota to a new Montana-Dakota Utilities Company (MDU)—Wahpeton Border Station near Wahpeton, North Dakota. The Project will also include minor modifications at the Mapleton Compressor Station; a new MDU—Kindred Border Station near Kindred, North Dakota; new block valve settings; and new pig launcher/receiver settings. The Project may also include newly constructed farm taps along the pipeline route. The proposed Project facilities will be located in Cass and Richland Counties, North Dakota. Figure 1.1-1 of Resource Report 1 provides an overview of the proposed pipeline and associated facilities.

In accordance with Title 18 of the Code of Federal Regulations (CFR) Part 380.12(h), Resource Report 6 describes the surficial and bedrock geological setting of the area, identifies potential mineral and paleontological resources in the vicinity, describes geologic hazards that may affect the Project, and details mitigation measures to avoid or mitigate the impact on geological resources and from potential geological hazards.

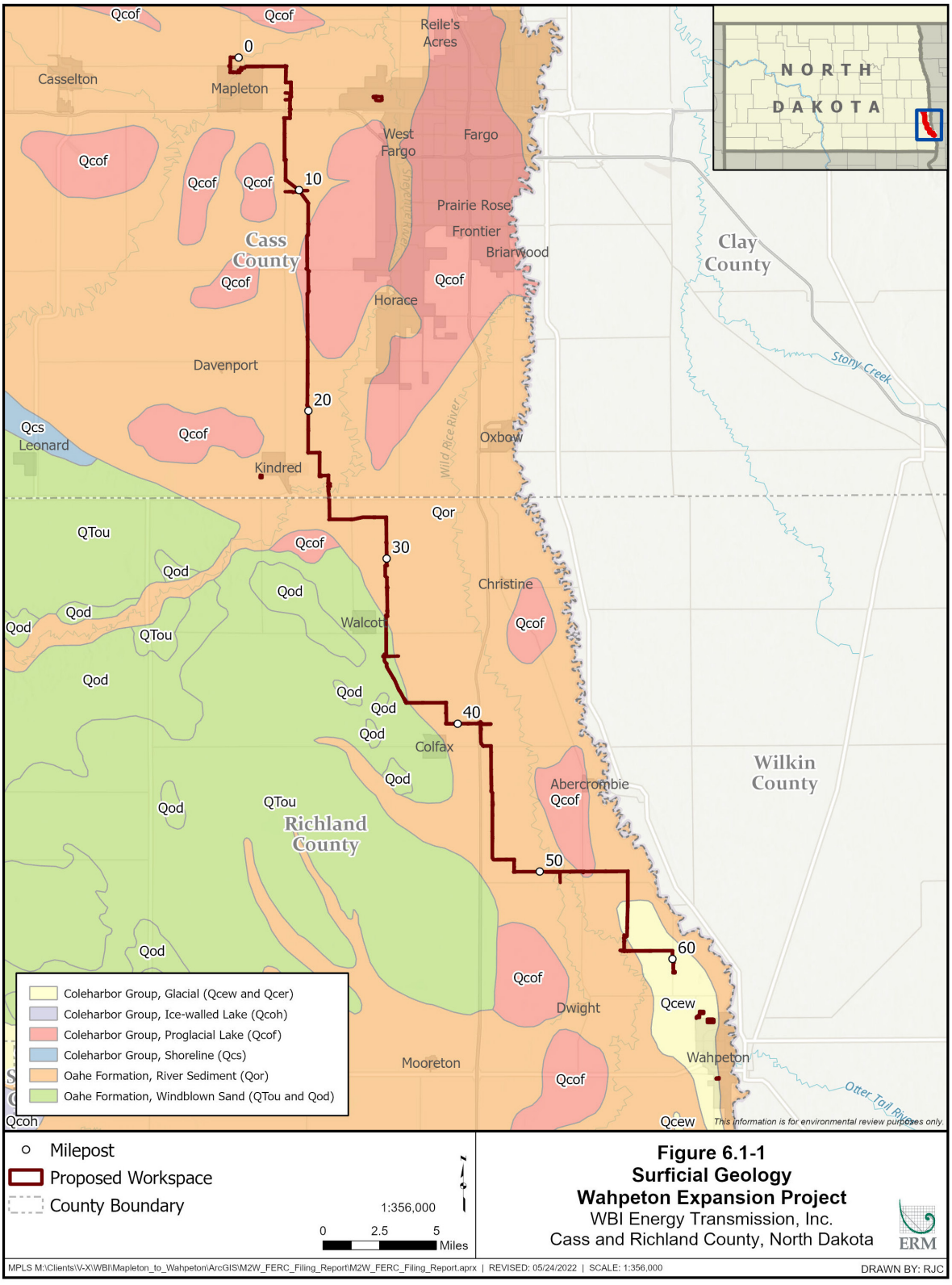
6.1 Geological Setting

The proposed Project is located within the Red River basin of eastern North Dakota. The Red River basin reflects the prehistoric bounds of glacial Lake Agassiz, which extended from the Hudson Bay to the eastern portion of North Dakota and formed during the end of the Pleistocene epoch about 11,700 years ago. Around 9,000 years ago, Lake Agassiz drained and retreated from North Dakota, leaving behind thick deposited layers of fine silt and clay (Bluemle, 2021). In addition, evidence in the sedimentary record indicates fluctuating glaciation, flooding, postglacial rebound, and other smaller glacial lakes in the region that predate glacial Lake Agassiz (Bluemle, 2021).

The bedrock underlying surficial deposits in the Red River basin consists of crystalline Precambrian basement rock, overlain by Cretaceous sedimentary rocks including the Dakota (also referred to as Inyan Kara) sandstone, Graneros (also referred to as Mowry, Belle Fourche, and Newcastle) shale, and the Greenhorn formation (Klausing, 1968; Baker Jr., 1967). These Cretaceous formations, which were deposited when a shallow epicontinental sea extended from the Arctic Ocean to the Gulf of Mexico, consist primarily of gray to dark gray silty to sandy shale that was deposited in a marine offshore or shoreline setting. The marine offshore Graneros (Mowry, Belle Fourche, and Newcastle) shale underlies the Project area between approximate mileposts (MP) 0.0 and 19.3, MPs 32.0 and 33.2, MPs 37.4 and 44.6, and MPs 55.2 and 60.5. In addition to the marine offshore Cretaceous formations, the Cretaceous-age Dakota (Inyan Kara) formation—which consists of fine to coarse-grained sandstone with interbedded shale and underlies the Project area between approximate MPs 44.6 and 46.2, MPs 49.0 and 52.3, and MPs 53.1 and 55.2—represents a nearshore marine or river/lake deposition setting. Finally, between approximate MPs 19.3 and 32.0, MPs 33.2 and 37.4, MPs 46.2 and 49.0, and MPs 52.3 and 53.1, Precambrian crystalline rocks underlie the surficial sediments (NDGS, 2021b).

The surficial geology underlying the Project area consists primarily of Quaternary (Pleistocene and Holocene) age glacial till, glacial lake, and glaciofluvial (originating from streams carrying glacial runoff) deposits. The thickness of the glacial drift ranges from approximately 130 feet to 490 feet (Klausing, 1968; Baker Jr., 1967). The glacial deposits in the Project area are referred to as the Coleharbor Group, which predominantly consist of glacial lake deposits. The Coleharbor Group sediments underlie the proposed pipeline between approximate MPs 11.8 and 16.6, MPs 51.8 and 52.4, MPs 55.2 and 56.9, and MPs 57.9 and 60.5 (NDGS, 2021b).

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 (Clayton et al., 1976). The Oahe Formation consists largely of organic clay and silt deposited in sloughs and in shallow channels eroded during deglaciation. This sediment, which in places overlies the sand and gravel of the glacial Coleharbor Group, was deposited by Holocene streams, intermittent runoff from valley sides, and wind. The Oahe Formation deposits are generally thin throughout the Project area (between 0.2 and 1 meter thick) and confined to the valley and slough bottoms. The Oahe Formation found in sloughs throughout the Project area consists of fine-grained, organic-rich sediment deposited by runoff from surrounding higher ground, wind, and the decomposition of vegetation that grows in the wet environment (Clayton et al., 1976). The pipeline will cross windblown deposits of the Oahe Formation between approximate MPs 32.9 and 37.0 and river sediments of the Oahe Formation between approximate MPs 0.0 and 11.8, MPs 16.6 and 32.9, MPs 37.0 and 51.8, MPs 52.4 and 55.2, and MPs 56.9 and 57.9 (NDGS, 2021b). Figure 6.1-1 depicts the surficial geologic deposits that underlie the Project area.


Qcof
Reile's Acres
0
Casselton
Mapleton
West Fargo
Fargo
10
Prairie Rose
Frontier
Briarwood
Cass County
Clay County
Horace
Davenport
20
Stony Creek
Qcs
Leonard
Oxbow
Kindred
Wild Rice River
Qor
QTou
30
Qod
Christine
Walcott
40
Colfax
Abercrombie
Wilkin County
Richland County
50
60
Dwight
Qcew
Mooreton
Wahpeton
Otter Tail River
Qcoh
NORTH DAKOTA
Coleharbor Group, Glacial (Qcew and Qcer)
Coleharbor Group, Ice-walled Lake (Qcoh)
Coleharbor Group, Proglacial Lake (Qcof)
Coleharbor Group, Shoreline (Qcs)
Oahe Formation, River Sediment (Qor)
Oahe Formation, Windblown Sand (QTou and Qod)
This information is for environmental review purposes only.
Milepost
Proposed Workspace
County Boundary
1:356,000
0 2.5 5 Miles
Figure 6.1-1
Surficial Geology
Wahpeton Expansion Project
WBI Energy Transmission, Inc.
Cass and Richland County, North Dakota
ERM
MPLS M:\Clients\V-X\WBI\Mapleton_to_Wahpeton\ArcGIS\M2W_FERC_Filing_Report\M2W_FERC_Filing_Report.aprx | REVISED: 05/24/2022 | SCALE: 1:356,000
DRAWN BY: RJC

6.2 Physiographic Setting and Topography

Physiographic provinces are distinguished by geologic structures, rock units, soil types, and vegetation that reflect a similar climatic and geological history. The elevations and characteristics of landforms within each physiographic province differ from those in adjacent regions. The proposed Project will be located within the Red River Valley physiographic province, a 30- to 40-mile-wide flat plain that is separated from the Glaciated Plains province to the west by a north to south trending linear topographic boundary referred to as the Pembina Escarpment (Bluemle and Biek, 2007). Elevations in the Red River Valley generally range from approximately 800 feet above mean sea level at the northern boundary of the state to approximately 1,000 feet above mean sea level at the southern boundary (Simpson, 1929).

In Cass County, the land surface is generally very flat and featureless, reflecting the low energy depositional environment of the glacial Lake Agassiz lakebed. As such, the topography where the proposed Project will cross the Red River Valley has an eastward slope of about 2 feet per mile near the Red River and a northward slope of about 1 to 1.5 feet per mile. Apart from a few isolated ridges to the east, beaches to the west, and where rivers and streams are incised about 30 feet into the plain, local relief is about 5 feet (Klausing, 1968). Characteristics of Richland County are similar to those of Cass County with the addition of sand dunes near Hankinson, North Dakota—where the crests of the dunes rise up to 75 feet above the plain (Baker Jr., 1967). Figure 6.2-1 provides an elevation profile of the topography of the Project area.

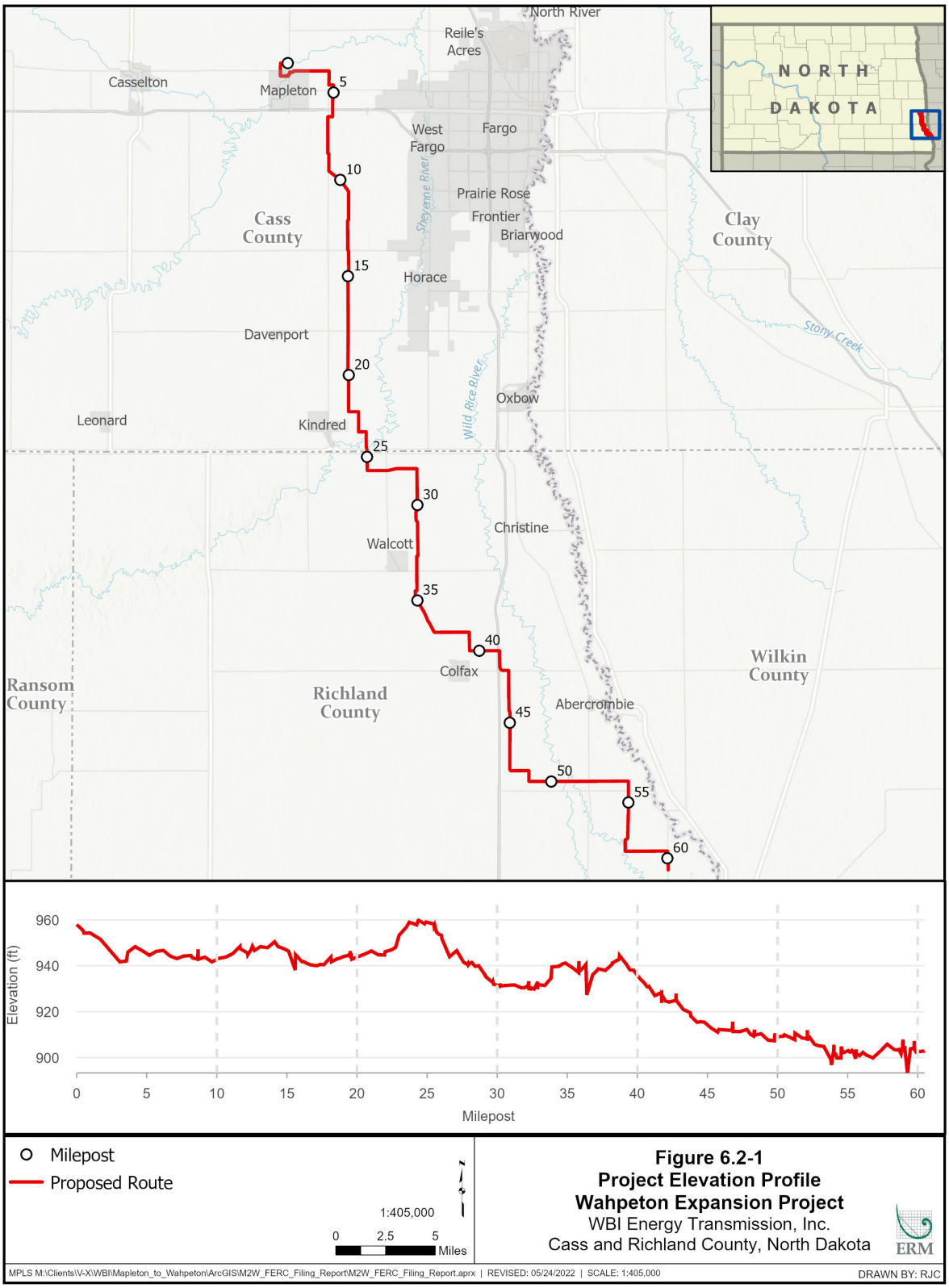


Figure 6.2-1
Project Elevation Profile
Wahpeton Expansion Project
WBI Energy Transmission, Inc.
Cass and Richland County, North Dakota

6.3 Mineral Resources

Due in part to the expansive boundary of glacial Lake Agassiz during the Pleistocene epoch, glacial sediments cover three-fourths of North Dakota and contain sand and gravel that is mined for industrial and commercial purposes (Murphy, 2021; USGS, 2021c). Sand and gravel is the third largest mineral industry in the state after oil and gas and lignite. According to the 2016 Minerals Yearbook for North Dakota (USGS, 2021c), the quantity of construction sand and gravel decreased by almost 30 percent from 2015 to 2016. The United States Geological Survey (USGS) Mineral Resources Data System was queried to determine the number of nonfuel mining sites near the Project. According to the Mineral Resources Data System database, the closest mineral resource site is the Turner Pitsd Mill construction sand and gravel mine located approximately 10 miles northeast of MP 41 of the proposed Project (USGS, 2021b).

Based on review of available aerial imagery, USGS topographic maps, and mines mapped by the North Dakota Department of Transportation (NDDOT) and North Dakota Public Services Commission, no gravel or scoria pits or abandoned mines were identified within 0.5 mile of the proposed Project (ESRI, 2021; NDDOT, 2021; NDPSC, 2021). As such, it is not anticipated that the Project will affect existing nonfuel mineral resources.

Based on a query of the North Dakota Department of Mineral Resources database, there is no permitted oil and gas well located within 0.25 mile of the Project workspaces (North Dakota Department of Mineral Resources, 2021). As such, it is not anticipated that the Project will affect existing fuel mineral resources.

6.4 Geologic Hazards

Geologic hazards encompass geologic conditions capable of causing damage or loss of property and life. These hazards include seismic events and earthquakes, mass wasting events such as landslides and slump or debris flows, land subsidence or collapse, and flooding and scouring along waterbodies. Potential hazards in the Project area are described below.

6.4.1 Seismic-Related Hazards

Seismicity refers to the frequency, intensity, and distribution of earthquakes within a given area. Earthquakes generally occur when the two sides of a fault suddenly slip past each other. The movement creates ground motion, which can damage property and structures if the motion is sufficiently intense. The majority of earthquakes occur along boundaries of tectonic plates.

Seismic risk can be quantified by the motions experienced by the ground surface or structures during a given earthquake. The USGS Hazard Mapping Program produced probabilistic seismic hazard maps that show an estimate of the probability that ground motion would exceed a certain value, the peak ground acceleration, in 50 years (Rukstales and Petersen, 2019). The maps are generally based on the historic distribution, frequency, and magnitude of earthquakes in the United States. The peak ground acceleration, or the force caused by shaking, is expressed as a percentage of gravity. Low percentage of gravity values reflect low ground acceleration values and are generally associated with low seismic risk. According to the USGS, probabilistic hazard maps for the Project area indicate a 10 percent probability of experiencing an earthquake with an effective peak ground acceleration of between 0 and 1 percent gravity in a 50-year period and a 2 percent probability of experiencing an earthquake with an effective peak ground acceleration of 2 to 4 percent gravity in a 50-year period (Rukstales and Petersen, 2019).

Additionally, according to the USGS Quaternary Fault and Fold Database, there are no Quaternary faults or Quaternary fault areas mapped within North Dakota (USGS, 2021a). These values and information indicate that the seismic risk is low in the Project area.

Based on earthquake records in Minnesota and North Dakota, the closest recorded earthquake to the Project area was a 3.0- to 3.9-magnitude earthquake that occurred in 1939 (Chandler, 2020). The earthquake was located about 47 miles east-northeast of MP 11.0 and was reportedly felt within an 8,000-square kilometer area. The shaking was categorized as a IV on the Modified Mercalli Intensity Scale (Chandler, 2020), which classifies earthquake intensity based on observed effects on people and structures and ranges from Roman Numeral I (not felt) to X (extreme shaking). An earthquake classified as IV would be felt by people indoors and would disturb dishes, windows, and doors (USGS, 1989). Due to the distance from the earthquake epicenter, it is unlikely that an 8,000-square kilometer area would include any portion of the Project area. No recorded earthquakes in North Dakota have been located within 50 miles of the Project. Due to the low seismic risk and rarity of earthquakes in the Project area, it is unlikely that an earthquake would affect the proposed aboveground facilities or buried steel natural gas pipeline.

Soil liquefaction is a process whereby earthquake shaking or other rapid loading reduces the strength and stiffness of a saturated sandy soil. The result is a transformation of soil to a liquid state. Due to the reported absence of Quaternary faults and low seismic hazard, it is not anticipated that soil liquefaction will affect the Project area.

6.4.2 Subsidence

Subsidence can manifest as rapid sinking or gradual settling of the ground surface and can be caused by aquifer-system compaction, drainage of organic soils, underground mining, hydro-compaction, natural compaction, sinkholes (dissolution of bedrock), and thawing permafrost. Underground mining also poses risks to engineered structures due to the potential of the overlying strata to collapse into the void formed by the extraction of minerals.

Potential subsidence near the Project area could occur from the dissolution of evaporite rocks (salt) deep beneath the land surface or from mining exploration and extraction activities. However, no karst topography, evaporite rocks, recent subsidence events, or large-scale mineral mining sites are in, or near, the Project area (Bluemle, 1983). In most areas, the Project will require excavating a trench that is approximately 5 feet in depth through the surface sediments and, therefore, it is unlikely to contribute to land subsidence.

6.4.3 Landslides

Landslides are defined as the downslope movement of soil, rock, and organic materials induced by gravity and include—but are not limited to—rock falls, debris flows, and slumps. Common landslide triggers include earthquakes, heavy rains, volcanic eruptions, erosion, or human activities. Landslides are more likely to occur in areas with steep slopes and soils that shrink or swell due to changes in moisture content. Landslide hazards are often assessed by evaluating landslide incidence (areas where landslides have occurred in the past) and by evaluating landslide susceptibility (areas where previous landslides are susceptible to future movement). Susceptibility to landslides is rated from low to high, based on the percent of an area affected by landslides (Godt, 1997). The Project area is rated as low landslide incidence per the descriptions below:

- low (less than 1.5 percent of the area affected by landslides);
- moderate (1.5 to 15 percent of the area affected by landslides); and
- high (greater than 15 percent of the area affected by landslides).

In North Dakota, landslides typically occur in the form of soil slides or rotational slumps, where soil and weathered rock glide or rotate downslope as a coherent layer caused by a combination of saturated soils and gravity. Soil slides or slumps tend to occur along steep slopes of river valleys, particularly along the Red River of the North (Murphy, 2017). Landslide deposit maps of the Red River Valley province indicate that most landslide deposits are associated with the banks of waterbodies; in particular, small-scale landslide deposits are mapped along the banks of Antelope Creek and the Wild Rice River near MPs 50.8 and 51.1 (NDGS, 2021a). The surficial geology of the Red River Valley, particularly the high shrink-swell properties of the clays that were deposited in the glacial lakebed, can cause slope instability in these riverine settings (Anderson, 2005). However, it is unlikely that the Project would be affected by landslides as the proposed entry and exit locations for the guided bore crossings of Antelope Creek and the Wild Rice River will be set back from the banks by at least approximately 200 feet.

Based on the National Elevation Dataset provided by the USGS, the Project is primarily located within areas with slopes of less than or equal to 10 percent (USGS, 2013). Table 6.4-1 provides a summary of the percent slope crossed by the proposed pipeline route and identifies the MP locations where the proposed Project crosses slopes greater than 15 percent. The Project crosses one short segment where the slope exceeds 20 percent, which coincides with the north bank of the Sheyenne River at approximate MP 24.1. At this location, the Sheyenne River will be crossed using the guided bore method. In general, based on available maps of existing landslide deposits (NDGS, 2021a), less than 0.05 percent of the Project would cross areas of mapped Pleistocene-age landslide deposits (i.e., approximately 150 feet of landslide deposits are present along the banks of Antelope Creek and the Wild Rice River near MPs 50.8 and 51.1). As the Project will cross river banks where the risk of a landslide is higher using the guided bore method and the Project is generally located in areas of low relief, it is not anticipated that landslides will affect the Project.

TABLE 6.4-1

Wahpeton Expansion Project
Summary of Slopes Crossed by the Proposed Pipeline Route [a]

	Slope (percent)	Crossing Length (feet)	Crossing Length (miles)
Mapleton-Wahpeton	0 to 2	312,054	59.1
	2 to 5	5,475	1.0
	5 to 10	1,600	0.3
	10 to 20 [b]	250	0.05
	20 to 40 [c]	25	<0.01
	40+	0	0

[a] Sourced from USGS, 2013.

[b] The Project crosses slopes between 15 and 20 percent at MPs 18.77, 18.78, and 24.15. Each of these locations is a crossing of under 50 feet and, therefore, single MP locations are identified instead of ranges.

[c] The Project crosses a maximum slope of 35.3 percent at approximate MP 24.14. This is a crossing of less than 50 feet and, therefore, a single MP location is identified instead of ranges.

6.4.4 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 Cass and Richland Counties, portions of the Project area—including the proposed new border station facility located near Kindred, North Dakota (MDU—Kindred Border Station)—are located within the 100-year special flood hazard zone (Zone AE or Zone A). Construction of the MDU—Kindred Border Station will involve installing impervious footprints for a 10-foot-wide by 14-foot-long communications building and a 20-foot-wide by 24-foot-long filtration/meter building within the 100-year floodplain. Refer to section 2.2.5 of Resource Report 2 for detailed information regarding potential impacts to the floodplain storage capacity associated with these new impervious surfaces.

Heavy or excessive rainfall in a relatively short time period and/or spring thaw and associated snowmelt can cause flash flooding and scour along streambanks and within flood zones. The Red River has a long recorded history of significant flooding events, beginning in the late 1700s and continuing to the present day. The largest flood of the Red River in recorded history was in 1997, which prompted planning changes and discussions regarding potential mitigation strategies including—but not limited to—enhanced wetland restoration and/or impoundments to carry the water (Schwert, 2003; Shultz, 1999). Flooding within the Red River Valley and associated Maple River and Wild Rice River watersheds is exacerbated by several factors including the synchrony between the northward flow of the river and northward spring thaw, build-up of ice jams, and decreasing gradient as the river flows to the north (Schwert, 2003). To minimize potential flooding impacts on the proposed pipeline, where the Project crosses perennial waterbodies—including the Wild Rice River, Pitcairn Creek, the Sheyenne River, and the Maple River—the Project will be designed, installed, and weighted, as necessary, to prevent scour or flooding from exposing the pipelines in accordance with 49 CFR Part 192.

6.5 Paleontological Resources

Paleontological resources are vertebrate and invertebrate fossils that are sometimes discovered at locations under excavation or in areas exposed by erosion. Direct effects on paleontological resources could occur during Project construction by activities such as grading or trenching. Indirect effects on fossil beds could result from erosion caused by slope regrading, vegetation clearing, and/or unauthorized collection. The Project will cross several geologic units that may host paleontological resources including the Quaternary Coleharbor Group.

The Quaternary Coleharbor Group hosts fossils of vertebrates that existed during the Pleistocene including mammoths, mastodons, ground sloths, giant bison, beavers, and horses and smaller organisms such as frogs, insects, fish, mollusks, and crustaceans. The remains found in these Pleistocene-age deposits tend to be poorly preserved (Hoganson, 2006). Moreover, studies of the geology of Richland County indicate that few fossils have been found in the county (Baker Jr., 1967). This suggests that there is a low potential to encounter high quality paleontological resources during construction of the Project.

If paleontological resources are discovered during construction of the Project, they will be managed in accordance with WBI Energy's *Plan for Unanticipated Discovery of Paleontological Resources during Construction* (see appendix 6A).

6.6 Blasting

Based on a query of the Soil Survey Geographic database for soil characteristics in Cass and Richland Counties (United States Department of Agriculture Natural Resources Conservation Service, 1975; 1985), soils where bedrock is shallower than 60 inches from the ground surface are not located within the Project area. As such, blasting is not anticipated to be necessary; however, blasting may be required if shallow bedrock or boulders are encountered that cannot be removed by conventional methods. In the event that blasting is required, WBI Energy will implement the procedures described in the Project-specific Blasting Plan (refer to appendix 6B).

6.7 Design, Construction, and Mitigation

The proposed pipeline will be designed and installed in accordance with United States Department of Transportation standards (49 CFR Part 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*), which will minimize or avoid potential impacts on the proposed facilities from potential geological hazards. Under these regulations, pipelines must be designed and constructed to provide adequate protection from washouts, floods, unstable soils, landslides, or other hazards that may cause the pipe to move or sustain abnormal loads. In addition, the proposed aboveground MDU—Kindred Border Station would be designed to withstand anticipated seasonal flooding. For the proposed Project, no areas requiring special design or construction considerations as a result of geological hazards have been identified. Where the pipeline route crosses slopes, potential impacts will be mitigated through the use of erosion control measures as described below. Additionally, WBI Energy notes that it avoided slopes to the extent practicable in routing the proposed pipeline.

With regard to topography, the construction techniques described in Resource Reports 1 and 7 will minimize the potential for slope failure and erosion. These techniques include the use of erosion control devices and other best management practices described in the Federal Energy Regulatory Commission's *Upland Erosion Control, Revegetation, and Maintenance Plan* (FERC Plan) and *Wetland and Waterbody Construction and Mitigation Procedures*. WBI Energy will install temporary sediment barriers such as silt fences, straw bales, or straw logs during construction to prevent the movement of disturbed soil off the right-of-way (in accordance with the FERC Plan). Trench breakers (stacked sand bags or foam) may be installed in the trench around the pipe in sloped areas to prevent movement of subsurface water along the pipeline. Temporary slope breakers consisting of mounded and compacted soil also will be installed across the right-of-way during construction in accordance with the FERC Plan and permanent slope breakers will be installed during cleanup or as soon as weather conditions permit. Trench breakers are designed to prevent preferential water flow along the pipeline trench by diverting subsurface water flow to the land surface; groundwater discharging at the land surface is then redirected off the right-of-way by the slope breakers. Used in combination, these structures prevent subsurface erosion of soils that can lead to slope instability and failure.

WBI Energy does not expect that blasting will be required to excavate the trench. However, in the event that blasting is required if shallow bedrock or boulders are encountered that cannot be removed by conventional methods, WBI Energy will implement the procedures described in the Project-specific Blasting Plan provided in appendix 6B. If blasting is necessary, WBI Energy's construction contractor will use blasting techniques 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 will 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

will conduct pre-blasting evaluations of the rock, as needed, and develop specific blasting operations and monitoring plans. Control of blasting will limit stresses on existing pipelines, nearby domestic structures, water supply wells, or electric transmission tower footings that may be located near the Project area. Blasting will be conducted during daylight hours and will not begin until occupants of nearby buildings, stores, residences, places of business, and farms have been notified.

Due to the nature of the unsorted glacial sediments in the Project area, the Project may generate minor quantities of rock debris. If rock debris is generated during construction, WBI Energy will not permanently windrow rock along the right-of-way without permission from the landowner. Disposal of rock debris will be in areas approved by the individual landowners in accordance with the FERC Plan and regulatory requirements. Should WBI Energy have to dispose of excess rock outside the right-of-way, an approved landfill or alternative upland area[1] will be utilized and necessary permits and clearances will be obtained.

Appendix 6C includes a table listing each guided bore with lengths, features crossed, and subsurface geology data identified. WBI Energy does not plan to conduct geotechnical investigations for guided bore installations associated with the Project. As discussed in section 6.1, the underlying surficial geology consists primarily of fine-grained lakebed and glacial sediments. WBI Energy's considerable pipeline/boring experience in the area has shown little to no need for such surveys due to the high continuity and consistency of the subsoil. The guided bore method is generally being employed to provide additional depth at the crossings, to maintain function of the ditches and roads during construction, and to minimize disturbance to these features. The majority of the guided bores associated with Project activities are short and shallow guided bores under roads, railroads, waterbodies, and wetlands. Generally, the majority of 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 sections 1.3.2.1 and 1.3.2.3 of Resource Report 1. WBI Energy will employ a qualified guided bore contractor to complete bore operations. The guided bore contractor will minimize risks by being prepared with the proper equipment, tools, and supplies prior to drilling and by closely adhering to the measures described in WBI Energy's *Guided Bore Drilling Fluid Monitoring and Operations Plan* to monitor drill activities and immediately respond to any abnormal conditions or inadvertent returns.

6.8 Cumulative Impacts

Section 1.10 of Resource Report 1 defines a cumulative impact and describes the general scope of the cumulative impact analysis. This section describes the potential cumulative impacts on geological resources from the Project combined with the past, present, and reasonably foreseeable future actions (RFFA) identified in appendix 1I and figure 1.10-1 of Resource Report 1. The location, proposed schedule, and a description of each RFFA are provided in appendix 1I of Resource Report 1.

Impacts on geologic resources will be limited to the period of active construction and will include temporary disturbance of slopes within the Project's right-of-way resulting from grading

[1] Refers to upland areas where WBI Energy would obtain landowner permission and approval from the Federal Energy Regulatory Commission through the variance process prior to use.

and trenching operations. The overall effects of construction and operation of the proposed Project facilities on geological resources are anticipated to be minor. WBI Energy will minimize impacts by returning contours to preconstruction conditions to the extent practicable with the exception of the proposed aboveground facility sites where grading and filling will be required to create a safe and stable land surface to support the facilities.

There are six past, present, and RFFAs that fall within the Project's geographic scope for geological resources. An assessment of the potential for cumulative effects on geologic resources from these projects is provided below.

- MDU Distribution System for Kindred: The distribution system will be built to provide natural gas to industrial and residential customers in Kindred. The area of overlap between the distribution system and the Project would be anticipated to occur within the workspace required to construct the MDU—Kindred Border Station. The distribution system would be constructed in 2024 and may cause the soil surface to become more prone to wind and water erosion in the areas affected by both projects and may also result in additional soil compaction.

- MDU Distribution System for Wahpeton: The distribution system will be built to provide natural gas to customers in Wahpeton. The area of overlap between the distribution system and the Project would be anticipated to occur within the workspace required to construct the MDU—Wahpeton Border Station. The distribution system would be constructed in 2024 and may cause the soil surface to become more prone to wind and water erosion in the areas affected by both projects and may also result in additional soil compaction.

- MDU Distribution—Farm Tap Service: The locations of any farm taps that would be built off the mainline are still unknown and it is possible that cumulative impacts could occur in areas affected by both projects, similar to what was described for the MDU—Kindred and MDU—Wahpeton Border Stations.

- Power lines: Power lines are anticipated to be built to serve non-jurisdictional facilities at the proposed MDU—Kindred and MDU—Wahpeton Border Stations. The area of overlap between the power lines and the Project would be limited to the workspace used for construction of the MDU—Kindred and MDU—Wahpeton Border Stations; because they will be constructed in a similar time frame as the Project, the soil could become more prone to wind and water erosion in the areas affected by both projects and may also result in additional soil compaction.

- Ongoing agricultural activities: Agricultural activities are expected to continue throughout the life of the Project. The Project would contribute to a cumulative impact on surficial geology by disturbing lands that are also commonly disturbed by agricultural activities.

- NDDOT 9, NDDOT 10, and NDDOT 19: These NDDOT highway construction and maintenance projects cross the Project—NDDOT 9 crosses the Project at MP 6.0, NDDOT 10 crosses the Project at MP 0.7, and NDDOT 19 crosses the Project at MP 5.9. Although each of these road crossings will occur within the geographic scope for cumulative impacts, the Project will cross each of these paved roads using a bore

method, effectively eliminating the potential for cumulative impacts on surficial geological resources. Additionally, all of these projects will have been completed prior to the start of the Project.

WBI Energy will implement mitigation measures to avoid or mitigate the Project's impact on geological resources as described in section 6.7, which will include—but not be limited to—implementing best management practices, regrading contours, and revegetating disturbed areas to minimize soil erosion. The Project, therefore, will generate limited temporary impacts on geological resources. While both the Project and the RFFAs could contribute to impacts on geological resources within the overlapping construction areas during pipeline construction and restoration, these impacts would be temporary and highly localized. As a result, the Project (in combination with other RFFAs) is not expected to have a significant cumulative impact on geological resources.

6.9 References

Anderson, F.J. 2005. "A Highlight of Engineering Geologic Issues in Fargo, North Dakota." *North Dakota Geological Survey Newsletter* Volume 32, Number 1. Available online: https://www.dmr.nd.gov/ndgs/documents/newsletter/2005Winter/pdf/engineering%20issues.pdf. Accessed: December 1, 2021.

Baker, C.H., Jr. 1967. "Geology and Ground Water Resources of Richland County, Part I—Geology." *North Dakota Geological Survey Bulletin 46*. Available online: https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/north_dakota/richlandND1975/richland.pdf. Accessed: November 19, 2021.

Bluemle, J.P. 1983. "Geologic and topographic bedrock map of North Dakota." *North Dakota Geological Survey Miscellaneous Map MM-25*. Available online: https://www.dmr.nd.gov/ndgs/documents/Publication_List/pdf/MisMaps/MM-25.pdf. Accessed: December 1, 2021.

Bluemle, J.P. 2021. "North Dakota Note 5: Glacial Lake Agassiz." *North Dakota Geological Survey*. Available online: https://www.dmr.nd.gov/ndgs/ndnotes/agassiz/. Accessed: December 1, 2021.

Bluemle, J.P., and B. Biek. 2007. "No Ordinary Plain: North Dakota's Physiography and Landforms." *North Dakota Geological Survey North Dakota Notes Number 1*. Available online: https://www.dmr.nd.gov/ndgs/ndnotes/ndn1.htm. Accessed: November 19, 2021.

Chandler, V.W. 2020. "Minnesota at a Glance: Earthquakes in Minnesota." *Minnesota Geological Survey*. Available online: https://cse.umn.edu/mgs/earthquakes. Accessed: December 1, 2021.

Clayton, L., S.R. Moran, and W.B. Bickley, Jr. 1976. "Stratigraphy, Origin, and Climatic Implications of Late Quaternary Upland Silt in North Dakota." *North Dakota Geological Survey Miscellaneous Series Number 54*. Available online: http://library.nd.gov/statedocs/GeologicalSurvey/MS-5420150219.pdf. Accessed: November 19, 2021.

ESRI. 2021. *ArcGIS Online Map Services*. Available online: https://livingatlas.arcgis.com/en/home/. Accessed: November 19, 2021.

Godt, J.W. 1997. "Landslide Overview Map of the Coterminous United States." *United States Geological Survey Open-File Report 97-289*. Available online: https://pubs.er.usgs.gov/publication/ofr97289B. Accessed: November 19, 2021.

Hoganson, J. 2006. "Prehistoric Life of North Dakota." *North Dakota Geological Survey*. Available online: https://www.dmr.nd.gov/dmr/paleontology/prehistoric-life-north-dakota-map. Accessed: November 19, 2021.

Klausing, R.L. 1968. "Geology and Ground Water Resources of Cass County, North Dakota, Part I—Geology." *North Dakota Geological Survey Bulletin 47*. Available online: https://www.swc.nd.gov/info_edu/reports_and_publications/county_groundwater_studies/pdfs/Cass_Part_I.pdf. Accessed: November 19, 2021.

Murphy, E. 2017. "Landslides in North Dakota." *North Dakota Geological Survey Department of Mineral Resources Newsletter*. Available online: https://www.dmr.nd.gov/ndgs/documents/newsletter/2017Winter/Landslides%20in%20North%20Dakota.pdf. Accessed: November 19, 2021.

Murphy, E. 2021. "Mineral Resources of North Dakota: Sand and Gravel." *North Dakota Geological Survey*. Available online: https://www.dmr.nd.gov/ndgs/mineral/nd_sandnew.asp. Accessed: December 1, 2021.

North Dakota Department of Mineral Resources. 2021. *Oil and Gas Division—Oil and Gas GIS Shapefiles*. Available online: https://www.dmr.nd.gov/OaGIMS/viewer.htm. Accessed: November 19, 2021.

North Dakota Department of Transportation (NDDOT). 2020. *Landmarks*. Available online: https://gishubdata-ndgov.hub.arcgis.com/datasets/NDGOV::ndgishub-landmarks-nddot/about. Accessed: November 19, 2021.

North Dakota Geological Survey (NDGS). 2021a. *North Dakota Landslide Maps*. Available online: https://www.dmr.nd.gov/ndgs/landslides/. Accessed: November 19, 2021.

NDGS. 2021b. *Surface Geology*. Available online: https://gishubdata-ndgov.hub.arcgis.com/datasets/ndgishub-surface-geology/explore. Accessed: November 19, 2021 and April 27, 2022.

North Dakota Public Service Commission (NDPSC). 2021. *Abandoned Mine Lands*. Available online: https://gishubdata-ndgov.hub.arcgis.com/datasets/NDGOV::ndgishub-abandoned-mines/about. Accessed: November 19, 2021.

Rukstales, K.S., and M.D. Petersen. 2019. *Data Release for 2018 Update of the United States National Seismic Hazard Model: United States Geological Survey data release, https://doi.org/10.5066/P9WT5OVB*. Available online: https://www.sciencebase.gov/catalog/item/5cbf47c4e4b0c3b00664fdef. Accessed: November 19, 2021.

Schwert, D.P. 2003. "A Geologist's Perspective on the Red River of the North: History, Geography, and Planning/Management Issues." *Proceedings 1st International Water Conference, Red River Basin Institute, Moorhead*. Available online: https://www.ndsu.edu/fargo_geology/documents/geologists_perspective_2003.pdf. Accessed: December 1, 2021.

Shultz, S.D. 1999. *The Feasibility of Wetland Restoration to Reduce Flooding in the Red River Valley: A Case Study of the Maple (ND) and Wild Rice (ND) Watersheds*. Available online: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.38.849&rep=rep1&type=pdf. Accessed: December 1, 2021.

Simpson, H.E. 1929. "Geology and Groundwater Resources of North Dakota." *United States Geological Survey Water Supply Paper 598*. Available online: https://pubs.usgs.gov/wsp/0598/report.pdf. Accessed: November 19, 2021.

United States Department of Agriculture Natural Resources Conservation Service. 1975. *Soil Survey of Richland County, and Sheyenne National Grassland Area of Ransom County,*

North Dakota. Available online: https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/north_dakota/richlandND1975/richland.pdf. Accessed: November 19, 2021.

United States Department of Agriculture Natural Resources Conservation Service. 1985. *Soil Survey of Cass County Area, North Dakota*. Available online: https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/north_dakota/ND017/0/cass.pdf. Accessed: November 19, 2021.

United States Geological Survey (USGS). 1989. *The Severity of an Earthquake*. Available online: https://pubs.usgs.gov/gip/earthq4/severitygip.html. Accessed: December 1, 2021.

USGS. 2013. *National Elevation Dataset*. Available online: https://www.arcgis.com/home/item.html?id=8f792e8a257041baaa3b69edf94ab3f3. Accessed: December 1, 2021.

USGS. 2021a. *Earthquake Hazard Program Quaternary Fault Web Mapping Application.* Available online: https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf. Accessed: December 1, 2021.

USGS. 2021b. *Mineral Resources Data System*. Available online: http://tin.er.usgs.gov/mrds. Accessed: September 10, 2019.

USGS. 2021c. *2016 Minerals Yearbook North Dakota [Advance Release]*. Available online: https://prd-wret.s3.us-west-2.amazonaws.com/assets/palladium/production/atoms/files/myb1-2016-stati.pdf. Accessed: December 1, 2021.

APPENDIX 6A PLAN FOR UNANTICIPATED DISCOVERY OF PALEONTOLOGICAL RESOURCES DURING CONSTRUCTION

WBI ENERGY TRANSMISSION, INC.

Wahpeton Expansion Project

Appendix 6A

Plan for Unanticipated Discovery of Paleontological Resources During Construction

Draft

Docket No.
CP22-XXX-000

May 2022

WBI ENERGY TRANSMISSION, INC.
WAHPETON EXPANSION PROJECT
APPENDIX 6A
PLAN FOR UNANTICIPATED DISCOVERY OF PALEONTOLOGICAL RESOURCES DURING CONSTRUCTION

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ACRONYMS AND ABBREVIATIONS

EI	Environmental Inspector
WBI Energy	WBI Energy Transmission, Inc.

1.0 INTRODUCTION

This Plan for Unanticipated Discovery of Paleontological Resources During Construction was prepared for WBI Energy Transmission, Inc.'s (WBI Energy) proposed Wahpeton Expansion Project. This plan identifies procedures to be implemented in the event that previously unreported and unanticipated paleontological resources are found during construction of the proposed Wahpeton Expansion Project.

2.0 TRAINING

Prior to the commencement of construction, WBI Energy and contractor personnel will receive environmental training that will include instruction on the identification of paleontological resources and implementation of the procedures outlined in this plan.

3.0 UNANTICIPATED DISCOVERY OF PALEONTOLOGICAL RESOURCES

North Dakota Century Code Chapter 54-17.3-05 requires the reporting of all quaternary paleontological finds that potentially, or actually, contain cultural resources to the state historical society in addition to the State Geologist (State of North Dakota, 2016). Refer to the state historical society contact listed in the Plan for Unanticipated Discovery of Historic Properties or Human Remains during Construction (see appendix 4G of Resource Report 4).

WBI Energy will implement the following procedures if paleontological resources are discovered during construction:

1. The contractor will stop work in the immediate area of the find to protect the integrity of the find.

2. The contractor will notify WBI Energy's Environmental Inspector (EI) of the find. The contractor will not restart work in the area of the find until approved by the EI.

   Environmental Inspector:
   Name To be determined
   Cell: To be determined
   Email: To be determined

3. The EI will confirm the presence of paleontological resources and, upon confirmation, will notify WBI Energy's Designated Representative. The representative will notify the Federal Energy Regulatory Commission Project Manager of the find.

   WBI Energy Designated Representative:
   Name: To be determined
   Address: To be determined
   Phone: To be determined
   Cell: To be determined
   Email: To be determined

   Federal Energy Regulatory Commission Project Manager:
   Name: David Hanobic

Address: 888 First Street, Washington, DC 20426
Phone: 202-502-8312
Email: David.Hanobic@ferc.gov

4. Upon confirmation of the find and notifications, the EI will photograph the representative specimens of fossils identified at the site. The EI will prepare a brief written description that identifies the location of the potential fossil material along the route, the depth and apparent thickness of the stratum containing the fossil material, local topography, and other pertinent conditions or observations.

5. The WBI Energy Designated Representative will notify the State Geologist and, upon request, provide copies of the written and photographic documentation of the paleontological materials.

   State Geologist:
   Name: Edward Murphy
   Phone: 701-328-8000
   Email: emurphy@nd.gov

6. Once documentation of the find is completed, WBI Energy's Designated Representative will direct the EI to grant clearance to the contractor to resume work in the vicinity of the site.

4.0 REFERENCES

State of North Dakota. 2016. Chapter 54-17.3-05: Paleontological Resource Protection. Available online: https://statecodesfiles.justia.com/north-dakota/2016/title-54/chapter-54-17.3/chapter-54-17.3.pdf. Accessed: February 2022.

APPENDIX 6B BLASTING PLAN

WBI ENERGY TRANSMISSION, INC.

Wahpeton Expansion Project

Appendix 6B

Blasting Plan

Final

Docket No.
CP22-XXX-000

May 2022

WBI ENERGY TRANSMISSION, INC.
WAHPETON EXPANSION PROJECT
APPENDIX 6B
BLASTING PLAN

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
EI	Environmental Inspector
JSA	Job Safety Analysis
PPV	peak particle velocity
Project	Wahpeton Expansion Project
WBI Energy	WBI Energy Transmission, Inc.

1.0 INTRODUCTION

This Blasting Plan was prepared for WBI Energy Transmission, Inc.'s (WBI Energy) proposed Wahpeton Expansion Project (Project). No blasting is anticipated during construction of the Project. In the unlikely event that blasting is necessary to excavate the trench, WBI Energy will conduct blasting in accordance with pertinent regulations and this Blasting Plan. This Blasting Plan outlines the procedures and safety measures that WBI Energy's construction contractor will adhere to while implementing blasting activities along the pipeline rights-of-way.

2.0 OBJECTIVE

This Blasting Plan is intended to identify blasting procedures, including safety, use, storage, and transportation of explosives that are consistent with minimum safety requirements as defined by federal (e.g., Title 27 of the Code of Federal Regulations [CFR] Part 181, Commerce in Explosives; 49 CFR 177, Carriage by Public Highway; 29 CFR 1926.900 et seq., Safety and Health Regulations for Construction – Blasting and Use of Explosives; 29 CFR 1910.109, Explosives and Blasting Agents, Occupational Safety and Health Administration), state, and local regulations. Additionally, this plan is intended to address environmental aspects of blasting activities, and to identify areas of concern along the proposed pipeline route.

3.0 GENERAL REQUIREMENTS

Blasting operations shall be conducted by or under the direct and constant supervision of experienced personnel legally licensed, authorized, qualified, and certified to perform such activity in the jurisdiction where blasting occurs. Prior to any blasting activities, the contractor shall provide WBI Energy with appropriate information documenting the experience, licenses, and permits associated with blasting personnel.

Blasting-related operations including obtaining, transporting, storing, handling, loading, detonating, and disposing of blasting material; drilling; and ground-motion monitoring shall comply with applicable federal, state, and local regulations; permit conditions; and the construction contract.

Blasting for grade or trench excavation shall be used only after other reasonable means of excavation have been used and are unsuccessful in achieving the required results. WBI Energy may specify locations (e.g., foreign line crossings, nearby structures, etc.) where consolidated rock shall be removed by approved mechanical equipment such as rock-trenching machines, rock saws, hydraulic rams, or jack hammers in lieu of blasting.

Before blasting, a site-specific blasting plan must be submitted by its Contractor to WBI Energy for approval. The site-specific blasting plan will be reviewed by WBI Energy's Designated Representative. The engineer will analyze the data to determine the combined stress level of any nearby, affected pipeline and will make recommendations and/or forward approval to WBI Energy before blasting may commence.

Drilling and blasting shall be done with one of WBI Energy's Environmental Inspectors (EI) present. An EI's approval will be required to proceed prior to each blast. The EI's approval does not relieve the Contractor from responsibility or liability.

4.0 PRE-BLASTING REQUIREMENTS

Prior to the initiation of blasting operations, the Contractor shall comply with the following:

- The Contractor will obtain all required federal, state, and local permits relating to the transportation, storage, handling, loading, and detonation of explosives.
- The Contractor shall place all necessary “one calls” 48 hours prior to construction where one-call system(s) are in place.
- The Contractor shall be responsible for the protection of existing underground facilities.
- Before performing any right-of-way work, the Contractor shall verify with WBI Energy that affected property owners have been notified of the impending construction.

5.0 SITE-SPECIFIC BLASTING PLANS

The Contractor’s site-specific blasting plan shall include at a minimum the following information:

- Explosive type, product name and size, weight per unit, and density;
- Delay type, sequence, and delay;
- Use of non-electrical initiation systems for all blasting operations;
- Stemming material and tamping method;
- Hole depth, diameter, and pattern;
- Explosive depth, distribution, and maximum charge and weight per delay;
- Number of holes per delay;
- Dates and hours of conducting blasting;
- Distance and orientation to nearest aboveground structure;
- Distance and orientation to nearest underground structure, including pipeline;
- Procedures for:
    - Storing, handling, transporting, loading, and firing explosives;
    - Fire prevention;

  - Inspections after each blast;
  - Misfires, flyrock, and noise prevention;
  - Stray current accidental-detonation prevention;
  - Signs and flagmen;
  - Warning signals prior to each blast;
  - Where the pipeline route:
    - Parallels or crosses an electrical transmission corridor, cable or pipeline;
    - Parallels or crosses a highway or road;
    - Within or adjacent to treed areas;
    - Approaches within 100 feet of a water well or spring; and
    - Approaches within 1,000 feet of any residence, building, or occupied structure;
  - Notification prior to blasting; and
  - Disposal of waste blasting material;
  - Accounting for all blasting materials so that no blasting agents are unaccounted for or left abandoned.
- Seismograph company, names, equipment and sensor location;
- Copies of all required federal, state, and local permits;
- Blaster's name, company, copy of license, and statement of qualifications;
- Magazine type and locations for explosives and detonating caps;
- Typical rock type and geology structure (solid, layered, or fractured); and
- Pipeline location (milepost and stationing) and applicable alignment sheet numbers.

6.0 MONITORING

During blasting operations, the Contractor will be required to monitor operations in the following manner:

- The Contractor shall provide seismographic equipment to measure the peak particle velocity (PPV) of all blasts in the vertical, horizontal, and longitudinal directions. Seismic monitoring can only be discontinued if: a) the blasting schedule and blasting performance consistently produce PPVs at the pipeline that are lower than the maximum allowable limit; and b) WBI Energy's Designated Representative provides written authorization.

- The contractor shall measure the PPV at the adjacent pipeline, any water wells or potable springs, and any aboveground structure within 150 feet of the blasting.

- The contractor shall complete the Blasting Log Record immediately after each blast and submit a copy to WBI Energy's Designated Representative.

7.0 LIMITS ON PEAK PARTICLE VELOCITY

The contractor is limited to a specified PPV of 4 inches per second measured adjacent to an underground pipeline that will be subject to approval by WBI Energy's Designated Representative.

For any aboveground structure (including water wells), the PPV shall not exceed 2 inches per second.

For all aboveground facilities within 150 feet of the blasting, the contractor shall provide additional seismograph equipment to determine the PPV at the aboveground facility. If the measured PPV at an existing pipeline or other structure exceeds the above limits, the contractor shall stop blasting activities immediately and notify WBI Energy. The site-specific Blasting Plan must be modified to reduce the PPV prior to any further blasting.

Note: Limits on PPV for surface structures are based on studies that established the limits at which plaster in homes will crack. The primary purpose of the limit is to prevent damage to homes. WBI Energy's EI may increase the limit for other structures such as steel transmission line towers, as appropriate. WBI Energy's EI may approve higher velocities for given site-specific conditions in advance.

8.0 SAFETY

8.1 PROTECTION OF ABOVEGROUND AND UNDERGROUND STRUCTURES

The Contractor will exercise control to prevent damage to aboveground and underground structures including buildings, pipelines, utilities, springs, and water wells. The following procedures will be implemented:

- If blasting occurs within 200 feet of identified water wells or potable springs, water flow performance, and water quality testing will be conducted before blasting. If a water well or spring is damaged, either the well owner will be compensated for damages or a new well will be provided. WBI Energy will provide an alternative potable water supply to the landowner until repairs occur.

- If blasting occurs within 200 feet of any aboveground structures, the contractor and WBI Energy's Designated Representative will inspect structures before and after blasting. In the unlikely event that damage occurs to an aboveground structure, the owner will be compensated.

- The contractor shall be responsible for all damage claims resulting from blasting.

- Blasting will not be allowed within 15 feet of an existing pipeline unless authorized by WBI Energy.

- Holes which have contained explosive material shall not be re-drilled. Holes shall not be drilled where danger exists of intersecting another hole containing explosive material.

- Blasting mats or padding shall be used on all shots where necessary to prevent scattering of loose rock onto adjacent property and to prevent damage to nearby structures and overhead utilities. In cases where such a procedure is not deemed to be feasible, an alternative procedure must be submitted for review by WBI Energy's personnel and the site in question must be visited and examined by WBI Energy's Designated Representative before any approval is granted.

- Blasting shall not begin until occupants of nearby buildings, stores, residences, places of business, places of public gathering, and farms have been notified by the contractor sufficiently in advance to protect personnel, property, and livestock. The contractor shall notify all such occupants at least 48 hours prior to blasting.

- Blasting in or near environmentally sensitive areas such as streams and wildlife areas may include additional restrictions as determined by WBI Energy.

- All blasting shall be subject to the following limitations:

    - Maximum PPV of 12.0 inches per second in any of three mutually perpendicular axes, measured at the lesser distance of the nearest facility or the edge of the permanent easement.

    - Maximum drill size shall be 2.5 inches unless approved by WBI Energy.

    - Maximum quantity of explosive per delay shall be governed by the recorded measurements as influenced by work site conditions.

    - Explosive agents and ignition method shall be approved by WBI Energy. ANFO (ammonium nitrate/fuel oil) and other free-flowing explosives and blasting agents are not acceptable and shall not be used.

    - Drill holes shall not be left loaded overnight.

- The drilling pattern shall be set in a manner to achieve smaller rock fragmentation (maximum 1 foot in diameter) in order to use as much as possible of the blasted

rock as backfill material after the pipe has been padded in accordance with the specifications. The proposed drilling pattern shall be submitted for approval by WBI Energy.

- Under pipeline crossings and all other areas where drilling and blasting is required within 15 feet of existing or third-party facilities:
    - Drill holes shall be reduced to a maximum of 2 inches or less in diameter.
    - The number of holes per blast shall be limited to three unless otherwise approved by WBI Energy.

8.2 PROTECTION OF PERSONNEL

The Contractor shall include in its procedures the applicable federal, state, county, and local safety requirements for blasting. The contractor's procedures shall address, as a minimum, the following requirements:

- Only authorized, qualified, and experienced personnel shall handle explosives.
- No explosive material shall be located where it may be exposed to flame, excessive heat, sparks, or impact. Smoking, firearms, matches, open flames, and heat-and-spark-producing devices shall be prohibited in or near explosive magazines or while explosives are being handled, transported, or used.
- A code of blasting signals shall be established, posted in conspicuous places, and utilized during blasting operations. Employee training shall be conducted on the use and implementation of the code.
- The contractor shall use every reasonable precaution including, but not limited to, visual and audible warning signals, warning signs, flag person, and barricades to ensure personnel safety.
- Warning signs, with lettering a minimum of 4 inches in height on a contrasting background, will be erected and maintained at all approaches to the blast area.
- Flaggers will be stationed on all roadways passing within 1,000 feet of the blast area to stop all traffic during blasting operations.
- All personnel not involved in the actual detonation shall stand back at least 1,000 feet and workers involved in the actual detonation shall stand back at least 650 feet from the time the blast signal is given until the "ALL CLEAR" has been sounded.
- An audible blasting signal (air horn or siren) shall be sounded 5 minutes before and after each blast.
- Blasting operations shall be conducted during daylight hours.

- No loaded holes shall be left unattended or unprotected. No explosives or blasting agent shall be abandoned. No loaded holes shall be left overnight.

- In the case of a misfire, the blaster shall provide proper safeguards for personnel until the misfire has been re-blasted or safely removed.

- WBI Energy may employ two-way radios for communication between vehicles and office facilities. The contractor shall advise WBI Energy and other pipeline contractors of any need to cease use of such equipment during blasting activities.

- All loading and blasting activity shall cease and personnel in and around the blast area will retreat to a position of safety during the approach and progress of an electrical storm irrespective of the type of explosives or initiation system used. This is a major safety precaution and will always be observed. All explosive materials, all electrical initiation systems, and all non-electric initiation systems are susceptible to premature initiation by lightning.

- Previous blast areas must be inspected to verify the absence of misfires. No drilling may commence until such inspection occurs. If a misfire occurs adjacent to a hole to be drilled, the misfire will be cleared by the blaster using whatever techniques are called for by the situation prior to commencement of drilling. If a misfire occurs at some distance from the drilling area, drilling may be stopped while clearing preparations are underway. When the misfire is to be cleared by reshooting, drilling will be shut down and personnel evacuated to a place of safety prior to detonation.

- All transportation of explosives will be in accordance with applicable federal, state, and local laws and regulations. Vehicles used to transport explosives shall be in proper working condition and equipped with tight wooden or non-sparking metal floor and sides. If explosives are carried in an open-bodied truck, they will be covered with a waterproof and flame-resistant tarpaulin. Wiring will be fully insulated to prevent short-circuiting and at least two fire extinguishers will be carried. The truck will be plainly marked to identify its cargo so that the public may be adequately warned. Metal, flammable, or corrosive substances will not be transported in the same vehicle with explosives. There will be no smoking and unauthorized or unnecessary personnel will not be allowed in the vehicle. Loading and unloading of explosives will be done carefully by competent, qualified personnel.

- No sparking metal tools will be used to open kegs or wooden cases of explosives. Metallic slitters will be used to open fiberboard cases, provided the metallic slitter does not come in contact with the metallic fasteners of the case. There will be no smoking, no matches, no open lights, or other fire or flame nearby while handling or using explosives. Explosives will not be placed where they are subject to flame, excessive heat, sparks, or impact. Partial cases or packages of explosives will be reclosed after use. No explosives will be carried in the pockets or clothing of personnel. The wires of an electric blasting cap shall not be tampered with in any way. Wires will not be uncoiled. The use of electric blasting caps will not be

permitted during dust storms or near any other source of large charges of static electricity. Uncoiling of the wires or use of electric caps will not be permitted near radio-frequency transmitters. The firing circuit will be completely insulated from the ground or other conductors.

- No electric wires or cables of any kind will be permitted near electric blasting caps or other explosives except at the time and for the purpose of firing the blast. All electric blasting caps, either singly or when connected in a series circuit, will be tested using a blasting galvanometer specifically designed for the purpose. Electric blasting caps used in circuit shall be of the same style or function, and of the same manufacture, and blasting shall be carried out in accordance with the manufacturer's recommendations. No attempt will be made to fire a circuit of electric blasting caps with less than the minimum current specified by the manufacturer. All wires to be connected will be bright and clean. All electric blasting cap wires will be short-circuited until ready to fire.

- No blast will be fired without a positive signal from the person in charge. This person will have made certain that all surplus explosives are in a safe place; all persons and vehicles are at a safe distance; and adequate warning has been given. Adequate warning of a blast will consist of but not be limited to the following:

    - Notification of the day and time given to railroads, highway departments, city engineer, county sheriff, utility owners etc., as applicable. Notification must be given at least 48 hours prior to blasting;

    - Notification of occupants of nearby buildings, stores, residences, places of business, places of public gathering, and farms. Notification must be given at least 48 hours prior to blasting;

    - Stopping vehicular and/or pedestrian traffic near the blast site; and

    - Signal given by an air horn, whistle, or similar device using standard warning signals.

- Only authorized and necessary personnel will be present where explosives are being handled or used.

- The condition of the hole will be checked with a wooden tamping pole prior to loading. Surplus explosives will not be stacked near working areas during loading. Detonating fans will be cut from spool before loading the balance of charge into the hole. No explosives will be forced into a bore hole past an obstruction. Loading will be done by a blaster holding a valid license or by personnel under his direct supervision.

- Fly-rock leaving the right-of-way shall be collected promptly, be subject to FERC's requirements (e.g., no operation of heavy equipment outside of the approved workspace without FERC's prior approval), and be disposed of at disposal sites approved by WBI Energy. This work shall not be left to the cleanup crew.

- No explosives or blasting agents shall be abandoned.

8.3 LIGHTNING HAZARD

A risk of accidental detonation caused by lightning strikes exists at any time the workplace is experiencing an electrical storm and there are loaded holes on site. If this hazard is judged to exist, work shall discontinue at all operations and workers will be moved to secure positions away from the loaded holes when an approaching storm front is within 5 miles. Furthermore, workers shall not return to the work site until the storm has passed and the closest point of lightning activity has moved at least 5 miles beyond the drilling area.

WBI Energy's blasting contractor shall have on site approved lightning detectors capable of measuring the degree of electrical activity as a storm approaches, and the distance to the storm front from the instrument on the right-of-way.

9.0 IN-WATER BLASTING

Underwater blasting is not anticipated to be required for the Project.

10.0 STORAGE REQUIREMENTS

All explosives, blasting agents, and initiation devices shall be stored in locked magazines that have been located, constructed, approved, and licensed in accordance with local, state, and federal regulations. Magazines shall be dry, well ventilated, reasonably cool (painting of the exterior with a reflective color) bullet and fire resistant and kept clean.

Initiation devices shall not be stored in the same box, container, or magazine with other explosives. Explosives, blasting agents or initiation devices shall not be stored in wet or damp areas; near oil, gasoline, or cleaning solvents; or near sources of heat radiators, steam pipes, stoves, etc. No metal or metal tools shall be stored in the magazine. There shall be no smoking, matches, open lights, or other fire or flame inside or within 50 feet of storage magazines or explosive materials. The loading and unloading of explosive materials into or out of the magazine shall be done in a business-like manner.

Magazines shall be kept locked at all times unless explosives are being delivered or removed by authorized personnel. Admittance shall be restricted to the magazine keeper, blasting supervisor, or licensed blaster. Magazine construction shall meet the requirements of ATF P5400.7 "Publication of Federal Explosives Laws and Regulations" (U.S. Department of Justice, Bureau of Alcohol Tobacco, Firearms and Explosives) and be in accordance with local, state, or federal regulations and the most recent edition of the Blasters Handbook.

Accurate and current records shall be kept of the explosive material inventory to ensure that oldest stocks are utilized first, regulatory requirements are satisfied, and to allow for immediate notification of any loss or theft. Magazine records shall reflect the quantity of explosives removed, the amount returned, and the net quantity used at the blasting site.

When explosive materials are taken from the storage magazine, they shall be kept in the original containers until used. Small quantities of explosive materials may be placed in day boxes,

powder chests, or detonator boxes. Any explosive material not used at the blast site shall be returned to the storage magazine and replaced in the original container as soon as possible.

Magazine locations shall be in accordance with local, state, or federal regulations. Where no regulations apply, magazines shall be located in accordance with the latest edition of the Blaster's Handbook and ATF P5400.7 "Publication of Federal Explosives Laws and Regulations" (U.S. Department of Justice, Bureau of Alcohol Tobacco, Firearms and Explosives).

Magazines shall be marked in minimum 3-inch-high letters with the words "DANGER - EXPLOSIVES" prominently displayed on all sides and roof.

11.0 GENERAL BLASTING PROCEDURE

The following lists of steps will be performed in all cases. These steps represent a minimum requirement and give a general order to the blasting procedure:

- A documented safety meeting will be held prior to any blasting activities. Everyone who is involved with the blasting in any form must attend. Job Safety Analysis (JSA) forms, the site safety plan, and the person in charge will be reviewed, discussed, and signed by all personnel on site. Safety rules and signaling shall be reviewed. Emergency response in the event of injuries or unplanned events will be part of the JSA and the site safety plan.
- Warning signs should be erected.
- Contact local first responders as needed or required.
- Contact any effected landowners or businesses as needed or required.
- Lightning detectors should be set up.
- Drilled holes should be measured accurately for depth and location.
- Seismic equipment should be set up to measure velocities near the pipeline and any structures 150 feet or less from the blast.
- Distances to any nearby structure (aboveground or belowground) suspected of being less than 200 feet from the blast shall be measured.
- Clear the blasting affected zone.
- Give the warning signal.
- Give the blast signal.
- Detonate the blast.

- After the blaster has checked for misfires and given the “ALL CLEAR” signal, Inspectors will inspect any aboveground or underground facilities for damage.

- Complete the Blasting Log Record.

APPENDIX 6C SUMMARY OF GUIDED BORE LOCATIONS

Appendix 6C
Wahpeton Expansion Project
Summary of Guided Bore Locations

Milepost	Feature Crossed	Length (feet)	Max Depth (feet)	Setbacks from Wetlands/Waterbodies (west or north bank/east or south bank)	Hours per Day of Drilling	Days of Drilling	Geologic Formation / Deposit Type [1]	Map Unit
0.74	35th St SE	193	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
1.23	Maple River	750	TBD	360 feet / 330 feet	24	4 to 6	Oahe / River Sediment	Qor
1.55	163rd Ave SE	231	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
2.67	164th Ave SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
3.67	165th Ave SE	134	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
3.85	Drainage Ditch	400	TBD	180 feet / 590 feet	12	2 to 4	Oahe / River Sediment	Qor
4.90	36th St SE[a]	388	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
5.14	BNSF Railroad[a]	461	TBD	N/A	12	3 to 5	Oahe / River Sediment	Qor
5.44	Driveway	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
5.94	Interstate 94[a]	766	TBD	N/A	24	4 to 6	Oahe / River Sediment	Qor
6.48	165th Ave SE	200	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
6.64	Drainage Ditch	450	TBD	230 feet / 200 feet	12	3 to 5	Oahe / River Sediment	Qor
7.19	38th St SE	179	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
8.19	39th St SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
8.36	165th Ave SE	160	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
9.24	40th St SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
10.03	Wetland	322	TBD	140 feet / 105 feet	12	2 to 3	Oahe / River Sediment	Qor
10.61	41st St SE	225	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
11.67	42nd Ave SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
12.15	166th Ave SE	156	TBD	N/A	12	2 to 3	Coleharbor / Proglacial Lake	Qcof
12.67	43rd St SE	96	TBD	N/A	12	1 to 2	Coleharbor / Proglacial Lake	Qcof
13.68	44th St SE[a]	245	TBD	N/A	12	2 to 3	Coleharbor / Proglacial Lake	Qcof
14.70	45th St SE[a]	320	TBD	N/A	12	2 to 3	Coleharbor / Proglacial Lake	Qcof
15.73	46th St SE[a]	120	TBD	N/A	12	2 to 3	Coleharbor / Proglacial Lake	Qcof
16.69	Red River RR	139	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
16.73	47th St SE	120	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
17.74	48th St SE	180	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor

Appendix 6C
Wahpeton Expansion Project
Summary of Guided Bore Locations

Milepost	Feature Crossed	Length (feet)	Max Depth (feet)	Setbacks from Wetlands/Waterbodies (west or north bank/east or south bank)	Hours per Day of Drilling	Days of Drilling	Geologic Formation / Deposit Type [1]	Map Unit
18.75	49th St SE/Wetland[a]	350	TBD	60 feet / 160 feet	12	2 to 3	Oahe / River Sediment	Qor
19.75	50th St SE[b]	294	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
20.82	51st St SE	162	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
21.82	52nd St SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
23.33	53rd St SE	143	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
24.15	Sheyenne River	750	TBD	330 feet / 385 feet	24	4 to 6	Oahe / River Sediment	Qor
24.72	County Rd 46	230	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
26.64	County Rd 26	104	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
27.65	167th Ave SE[a]	123	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
28.30	55th St SE[a]	300	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
29.30	56th St SE[b]	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
30.32	57th St SE	128	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
31.36	58th St SE[a]	413	TBD	N/A	12	3 to 5	Oahe / River Sediment	Qor
32.37	59th St SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
33.43	County Rd 2[a]	180	TBD	N/A	12	2 to 3	Oahe / Wind Blown Sediment	QTou
35.63	62nd St SE[a]	111	TBD	N/A	12	2 to 3	Oahe / Wind Blown Sediment	QTou
36.14	168th Ave SE	263	TBD	N/A	12	2 to 3	Oahe / Wind Blown Sediment	QTou
36.76	63rd St SE[a]	108	TBD	N/A	12	2 to 3	Oahe / Wind Blown Sediment	QTou
37.54	County Rd 1	130	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
38.54	170th Ave SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
39.87	Irrigation Drainage Unit /Ephemeral Stream	400	TBD	190 feet / 200 feet	12	3 to 5	Oahe / River Sediment	Qor
40.47	171st Ave SE	111	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
40.97	Interstate 29	500	TBD	N/A	24	3 to 5	Oahe / River Sediment	Qor
41.03	64th St SE[b]	400	TBD	N/A	12	3 to 5	Oahe / River Sediment	Qor
42.40	County Rd[a] 4	130	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor

Appendix 6C
Wahpeton Expansion Project
Summary of Guided Bore Locations

Milepost	Feature Crossed	Length (feet)	Max Depth (feet)	Setbacks from Wetlands/Waterbodies (west or north bank/east or south bank)	Hours per Day of Drilling	Days of Drilling	Geologic Formation / Deposit Type [1]	Map Unit
44.41	67th St SE	217	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
44.95	Pitcairn Creek	413	TBD	200 feet / 210 feet	12	3 to 5	Oahe / River Sediment	Qor
45.42	County Rd 6	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
46.42	69th St SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
47.97	Private Driveway	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
48.35	70th St SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
48.89	173rd Ave SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
49.89	174th Ave SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
51.10	Antelope/Wild Rice River	2,879	TBD	230 feet / 340 feet	24	8 to 12	Oahe / River Sediment	Qor
51.93	County Rd 81[a]	242	TBD	N/A	12	2 to 3	Coleharbor / Proglacial Lake	Qcof
52.93	177thAve SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
54.40	71st St SE	130	TBD	N/A	12	2 to 3	Oahe / River Sediment	Qor
55.41	72nd St SE[b]	96	TBD	N/A	12	1 to 2	Coleharbor / Glacial	Qcew
56.41	73rd St SE[b]	110	TBD	N/A	12	2 to 3	Coleharbor / Glacial	Qcew
57.00	Wild Rice River #2	630	TBD	290 feet / 930 feet	12	4 to 6	Oahe / River Sediment	Qor
57.49	74th St SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
57.57	Wild Rice River #3	640	TBD	300 feet / 310 feet	24	4 to 6	Oahe / River Sediment	Qor
57.72	178th Ave SE	96	TBD	N/A	12	1 to 2	Oahe / River Sediment	Qor
58.65	179th Ave SE[b]	148	TBD	N/A	12	2 to 3	Coleharbor / Glacial	Qcew
60.10	180th Ave SE[a]	257	TBD	N/A	12	2 to 3	Coleharbor / Glacial	Qcew

[a] This guided bore also crosses one or more wetlands.
[b] This guided bore also crosses a waterbody.

Notes
[1] North Dakota Geological Survey (2021b)