December 2016

Northern Natural Gas Company **Docket No. CP16-487-000**

Cedar Station Upgrade Project

Environmental Assessment

Washington, DC 20426

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas Branch 4
Northern Natural Gas Company
Cedar Station Upgrade Project
Docket No. CP16-487-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared an environmental assessment (EA) for the Cedar Station Upgrade Project, proposed by Northern Natural Gas Company (Northern) in the above-referenced docket. Northern requests authorization to construct approximately 7.86 miles of natural gas pipeline in Dakota County, Minnesota in order to fulfill its contractual obligation with Northern States Power Company, a Minnesota Corporation (NSP-MN) to increase the delivery pressure to NSP-MN's existing Black Dog Generating Station from 400 pounds per square inch gauge (psig) to 650 psig. As part of NSP-MN's process of reducing its carbon footprint, it has increased its use of natural gas-fired generation.

The EA assesses the potential environmental effects of the construction and operation of the Cedar Station Upgrade 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.

The Cedar Station Upgrade Project includes the following facilities:

- approximately 7.86 miles of new 20-inch-diameter pipeline loop;[1]
- a new pig[2] launcher and takeoff valve setting at Northern's existing Rosemount Junction facility;
- a new pig receiver, tie-in valve setting, and modification of existing regulators at Northern's existing Cedar Meter Station; and
- various piping within the Cedar Station boundaries.

[1] A pipeline "loop" is a segment of pipe installed adjacent to an existing pipeline and connected to the existing pipeline at both ends.
[2] A "pig" is an internal pipeline tool used to clean a pipeline and/or to inspect for damage or corrosion.

The FERC staff mailed copies of the EA to federal, state, and local government representatives and agencies; elected officials; Native American tribes; potentially affected landowners and other interested individuals and groups; and newspapers and libraries in the Project area. In addition, the EA is available for public viewing on FERC's website (www.ferc.gov) using the eLibrary link. A limited number of copies of the EA are available for distribution and public inspection at:

Federal Energy Regulatory Commission
Public Reference Room
888 First Street NE, Room 2A
Washington, DC 20426
(202) 502-8371

Any person wishing to comment on the EA may do so. Your comments should focus on the potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they would 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 **January 9, 2017**.

For your convenience, there are three methods you can use to file your comments with the Commission. In all instances please reference the project docket number (CP16-487-000) with your submission. The commission encourages electronic filing of comments and has expert staff available to assist you at 202-502-8258 or efiling@ferc.gov.

(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 brief, text-only comments on a project;

(2) You can also file your comments electronically 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 must select the type of filing you are making. If you are filing a comment on a particular project, please select "Comment on a Filing"; or

(3) You can file a paper copy of your comments by mailing them to the following address:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE, 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 (18 CFR § 385.214).[3] Only intervenors have the right to seek rehearing of the Commission's decision. The Commission grants 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. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP16-487). 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. The eLibrary link also provides access to the texts of 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 http://www.ferc.gov/docs-filing/ferconline.asp.

[3] See the previous discussion on the methods for filing comments.

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TECHNICAL ACRONYMS AND ABBREVIATIONS

A-Line	Existing 16-inch-diameter Rosemount Junction to Minneapolis No. 1 Branch Line
AQCR	air quality control regions
BMPs	best management practices
Cedar Station	Northern's existing Cedar Meter Station
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
Commission	Federal Energy Regulatory Commission
dBA	A-weighted decibel
DOT	U.S. Department of Transportation
DWSMA	Drinking Water Supply Management Area
EA	environmental assessment
EI	environmental inspector
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ETWS	extra temporary workspace
FERC	Federal Energy Regulatory Commission
GHG	greenhouse gas
HCA	high-consequence area
HDD	horizontal directional drill
L_{dn}	day-night sound level
L_{eq}	equivalent sound level (average sound level for a specific time period)
LHRP	Lebanon Hills Regional Park
MNDNR	Minnesota Department of Natural Resources
MNDOC	Minnesota Department of Commerce
MP	milepost
MPCA	Minnesota Pollution Control Agency
NAAQS	National Ambient Air Quality Standards
NAC	noise area classification
NEPA	National Environmental Policy Act
NGA	Natural Gas Act
NLEB	northern long-eared bat
NO_2	nitrogen dioxide
NOI	*Notice of Intent to Prepare an Environmental Assessment for the Cedar Station Upgrade Project, Request for Comments on Environmental Issue, and Notice of Public Scoping Meeting*
Northern	Northern Natural Gas Company
NO_x	nitrogen oxides
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSA	noise sensitive area
NSP-MN	Northern States Power Company, a Minnesota Corporation
NWI	National Wetlands Inventory

OCC	Operations Communications Center
PAB	palustrine aquatic bed wetlands
PEM	palustrine emergent wetlands
PFO	palustrine forested wetlands
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan*
PM	particulate matter
PM_{10}	particulate matter with a diameter less than 10 microns
$PM_{2.5}$	particulate matter with a diameter less than 2.5 microns
Procedures	FERC's *Wetland and Waterbody Construction and Mitigation Procedures*
Project	Cedar Station Upgrade Project
psig	pounds per square inch gauge
PSS	palustrine scrub-shrub wetlands
PUB	palustrine unconsolidated bottom wetlands
PWI	Minnesota Public Waters Inventory
SCADA	supervisory control and data acquisition
Secretary	Secretary of the Commission
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Stormwater Pollution Prevention Plan
TCP	traditional cultural property
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WCA	Wetland Conservation Act

A. PROPOSED ACTION

1. Introduction

The staff of the Federal Energy Regulatory Commission (Commission or FERC) has prepared this environmental assessment (EA) to assess the environmental impacts of the natural gas pipeline facilities proposed by Northern Natural Gas Company (Northern). We[1] prepared this EA in compliance with the requirements of the National Environmental Policy Act (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.

On July 29, 2016, Northern filed an application in Docket No. CP16-487-000 under Section 7 of the Natural Gas Act (NGA) and Part 157, Subpart F of the Commission's regulations requesting a Certificate of Public Convenience and Necessity (Certificate) that would authorize Northern to construct and operate a natural gas pipeline and related facilities in the cities of Eagan and Rosemount, Dakota County, Minnesota. The proposed facilities are referred to as the Cedar Station Upgrade Project (Project) and are described in section A.5. Prior to filing its application, Northern participated in the Commission's Pre-filing Process under Docket No. PF15-32-000.

Our EA is an integral part of the Commission's decision on whether to issue Northern a Certificate to construct and operate the facilities. Our principal purposes of 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;
- assess reasonable alternatives to the proposed action that would avoid or minimize adverse effects to the environment; and
- identify and recommend specific mitigation measures, as necessary, to avoid or minimize environmental impacts.

The FERC is the federal agency responsible for authorizing interstate natural gas transmission facilities under the NGA, and is the lead federal agency for the preparation of this EA in compliance with the requirements of NEPA. Major federal, state, and local permits, approvals, and consultations for the Project are presented in section A.9.

2. Project Purpose and Need

Northern's stated purpose of the Project is to fulfill its contractual obligation to provide increased gas pressure to Northern States Power Company's (NSP-MN) Black Dog Generating Station. In order to do this, Northern proposes to construct a new 20-inch-diameter pipeline to

[1] "We," "us," and "our" refer to the environmental staff of the Commission's Office of Energy Projects.

provide NSP-MN's Black Dog Generating Station with a delivery pressure of 650 pounds per square inch gauge (psig) at the existing Cedar Meter Station (Cedar Station).

The project's need is established by the FERC, under Section 7(c) of the NGA, when 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 Commission bases its decisions on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed Project.

3. Scope of this Environmental Assessment

The topics addressed in this EA include geology, soils, groundwater, surface waters, wetlands, fisheries, wildlife, vegetation, special species of concern, cultural resources, socioeconomics (including transportation and traffic), air quality, noise, land use, recreation, aesthetics, reliability and safety, cumulative impacts, and alternatives. The EA describes the affected environment as it currently exists, discusses the environmental consequences of the Project, and compares the Project's potential impact with that of various alternatives. The EA also presents our recommended mitigation measures.

The environmental consequences of constructing and operating the Project would vary in duration and significance. Four levels of impact duration were considered: temporary, short-term, long-term, and permanent. Temporary impacts generally occur during construction with the resource returning to preconstruction conditions immediately after restoration or within a few months. Short-term impacts could continue for up to three years following construction. Impacts were considered long-term if the resource would require more than three years to recover. A permanent impact could occur as a result of any activity that modifies a resource to the extent that it would not return to preconstruction conditions during the life of the Project, such as the construction of a new aboveground facility. An impact would be considered significant if it would result in a substantial adverse change in the physical environment.

4. Public Review and Comment

On September 28, 2015, Northern requested approval to initiate the FERC's pre-filing process for the Project. We approved Northern's request October 9, 2015, in Docket No. PF15-32-000. On October 26, 2015, we participated in an open house (community informational meeting), sponsored by Northern, to explain our environmental review process to interested stakeholders. On February 23, 2016, we issued a *Notice of Intent to Prepare an Environmental Assessment for the Planned Cedar Station Upgrade Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meeting* (NOI). The NOI was published in the Federal Register[2] and was sent to more than 200 parties including federal, state, and local officials; agency representatives; conservation organizations; local libraries and newspapers;

[2] See Federal Register Volume 81, Number 40, dated Tuesday, March 1, 2016, pages 10612 – 10615.

Native American tribes; property owners affected by the proposed facilities; and other interested stakeholders. In response to the NOI, the Commission received comments from Dakota and Goodhue Counties, Thomas Lake Country Homes Homeowners Association, Winnebago Tribe of Nebraska, Minnesota Department of Natural Resources, and over 350 concerned landowners/stakeholders.

We conducted a public scoping meeting March 15, 2016, in Eagan, Minnesota to provide an opportunity for agencies and the general public to learn more about the Project and to participate in the environmental analysis by identifying issues to be addressed in the EA. The transcripts of the oral comments and all written scoping comments are part of the public record for the Project and are available for viewing on the FERC Internet website (http://www.ferc.gov).[3] We also conducted site visits of the Project area on October 27, 2015, and March 14, 2016. During pre-filing, we held biweekly agency calls typically attended by the U.S. Army Corps of Engineers (USACE) and Minnesota Department of Natural Resources (MNDNR).

The majority of comments from stakeholders expressed concerns with the construction of the Project in proximity to residences in the Thomas Lake Countryhomes Association neighborhood. In addition, we also received numerous comments regarding concerns with Northern's proposed route through Lebanon Hills Regional Park (LHRP). In response to these comments, Northern has refined the design of the Project within these areas and incorporated these design changes into its proposal. Northern's proposed route no longer traverses the Thomas Lake Countryhomes Association neighborhood and we believe this reroute adequately addresses the concerns raised during the pre-filing process. Additionally, Northern's route through LHRP would be installed via the horizontal directional drilling (HDD) method for nearly the entire park crossing. The relevant and substantive environmental issues raised during the public scoping process are summarized in table A-1 and discussed in the appropriate EA sections below.

5. Proposed Facilities and Location

Northern proposes to construct the following facilities:

- about 7.86 miles of 20-inch-diameter pipeline loop[4];
- a pig[5] launcher and takeoff valve setting at milepost (MP) 0.0 within the existing Rosemount Junction facility boundaries;
- a pig receiver, tie-in valve setting, and modification of existing regulators within the existing Cedar Station boundaries (MP 7.86); and

[3] Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number excluding the last three digits in the "Docket Number" field (i.e., PF15-32). Select an appropriate date range.

[4] A pipeline "loop" is a segment of pipe installed parallel to an existing pipeline.

[5] A "pig" is an internal pipeline tool used to clean a pipeline and/or to inspect for damage or corrosion.

- a 10-foot-long segment of 12-inch-diameter pipeline to replace an existing pipe of the same size and diameter and about 260 feet of 10-inch-diameter pipeline to replace about 105 feet of 8-inch-diameter bypass pipeline, both within the Cedar Station boundaries, to facilitate tie-ins of the new pipeline to existing station piping.

The maximum allowable operating pressure for the Project would be 1,055 psig. All of the facilities would be owned and operated by Northern. Figure A-1 shows an overview map of the Project location. Topographic maps of the Project area are included as appendix A.

Table A-1: **Issues Identified in Comments Received During Project Scoping**

Issue/Summary of Comment	EA Section Addressing Comment
FISH, WILDLIFE, AND VEGETATION	
Snapping, painted, and banded turtle nesting sites along ponds in the Project area	B.3.3; B.3.4
CULTURAL RESOURCES	
Potential for Native American artifacts to be discovered during construction	B.5.3
LAND USE, VISUAL RESOURCES, AND RECREATION	
Visual impacts on residences within the Thomas Lake Countryhomes Association property	No longer affected by Project
Lebanon Hills Regional Park – impacts on park visitors, removal of trees, disruption of soil, routine maintenance from pipeline operations	B.4.2
Loss of mature trees resulting in long-term loss of privacy in residential areas	B.4.3, B.4.4
Decrease in property values, increase of insurance rates	B.4.3
AIR QUALITY AND NOISE	
Loss of mature trees resulting in long-term increase in exposure to noise within residential areas	B.4.3, B.4.4,
Effects of vibrations resulting from the Project	B.7.2.3
RELIABILITY AND SAFETY	
Lifespan of the pipe	A.7.4
Acid-soil impacts on the pipe	A.7.1.1
ALTERNATIVES	
Alternatives that avoid Thomas Lake Countryhomes Association	No longer affected by Project
Alternatives to crossing Lebanon Hills Regional Park	C.2.1

The pipeline would originate at Northern's existing Rosemount Junction facility in Rosemount and extend to Northern's existing Cedar Station facility in Eagan, all in Dakota County, Minnesota. As outlined below, of the 7.86 miles of pipeline, approximately 96 percent of the route would be collocated with existing pipeline and powerline corridors, or would parallel and abut existing transportation infrastructure.

- 4.05 miles would be collocated with Northern's existing 16-inch-diameter Rosemount Junction to Minneapolis No. 1 Branch Line MNM80201 A-line (A-line) easement.
- 2.14 miles would be collocated within NSP-MN's existing transmission line right-of-way.

- 1.09 miles would be installed parallel to transportation corridors (State Highway 77 and Thomas Lake Road).
- 0.44 mile near MP 2.2 is not collocated with existing infrastructure; however, this pipeline segment would be installed using the HDD method of construction (see section 7.2.1, below).

More than 70 percent of the Project would be installed via trenchless construction methods (i.e., HDD and conventional boring). Northern would use existing access roads to construct the pipeline and would not need to create any new access roads.

6. Non-Jurisdictional Facilities

Under Section 7 of the NGA, the Commission is required to consider, as part of its decision whether to approve facilities under its jurisdiction, all factors bearing on the public convenience and necessity.

Occasionally, projects have associated facilities that do not come under the jurisdiction of the FERC. These "non-jurisdictional" facilities may be integral to the need for the project or they may be merely associated as a minor, appurtenant component of the jurisdictional facilities that would be constructed and operated as part of the project. Northern intends to install certain facilities under section 2.55(a) of the Commission's regulations, including the pig launcher/receiver, the pipeline tie-over and take-off valve settings, and the modification of the regulator valves. Those facilities would be constructed within the workspaces proposed as part of the Project; therefore, their impacts are considered within this environmental review.

In order to receive the supply of natural gas at the requested pressure, NSP-MN would construct approximately 2.1 miles of new 16-inch-diameter pipeline from the Cedar Station into its existing Black Dog Generating Station in Burnsville, Minnesota. Additionally, NSP-MN plans to install a new valve setting at the Cedar Station and a new regulator facility inside the Black Dog Generating Station. Construction of NSP-MN's pipeline and associated facilities is expected to begin in 2017. The pipeline, although still in the preliminary design phase, would likely cross both public and private easements. The current design of this pipeline has the route collocated with road and transmission line rights-of-way for its entirety; and, it also includes multiple HDDs.

The Commission has no jurisdiction over NSP-MN's new pipeline and associated facilities, as a result, the Commission is not required to evaluate the feasibility of NSP-MN's planned facilities. However, we have included construction and operation of NSP-MN's planned facilities in our cumulative impacts analysis in section B.9.

7. Construction, Operation, and Maintenance Procedures

Facilities described in this section would be designed, constructed, tested, operated and maintained in accordance with the U.S. Department of Transportation (DOT) regulations in 49 CFR 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards* and other applicable Federal and state regulations. During all phases of this Project,

Northern would follow the applicable Occupational Safety and Health Administration requirements. The requirements set forth in the aforementioned acts have been or would be provided to Northern's employees engaged in the planning, construction, maintenance, and operation of the Project and would be provided to Northern's construction contractors and third-party inspectors. These employees and contractors have been or would be instructed to follow these requirements, as applicable, when planning, installing, and operating the facilities.

7.1 Pipeline Construction

Northern has adopted the FERC's current (2013) versions of the *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures) and the *Upland Erosion Control, Revegetation and Maintenance Plan* (Plan) as its own for the Project.

Northern would compile and employ certain construction procedures which it would include in an Environmental Construction Procedures manual. This manual will be issued to Northern's employees and contractors, as applicable. The manual will compile the multiple construction and mitigation plans, including, but not limited to, the following documents:

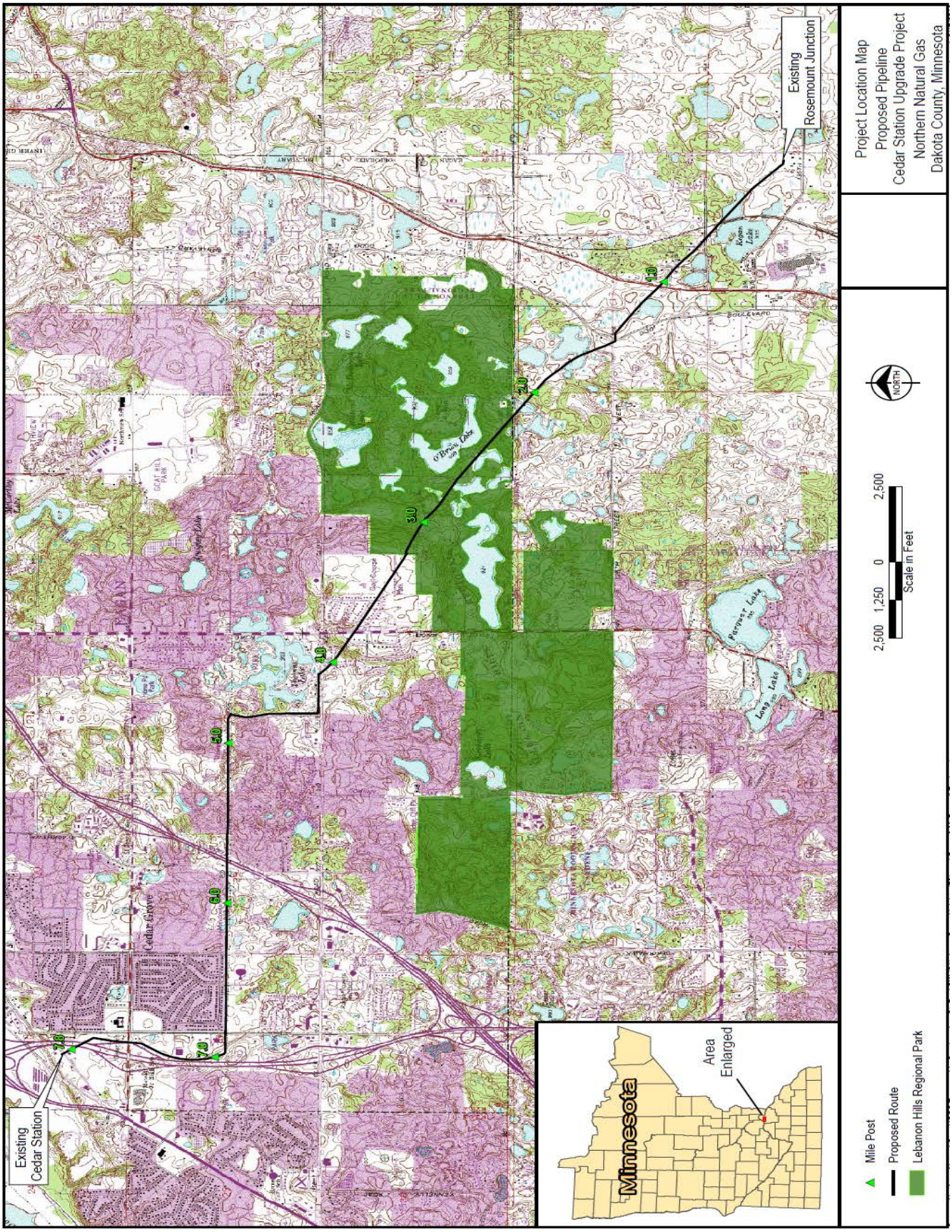
- FERC's *Plan and Procedures*[6];
- *Northern's Spill Prevention, Containment, and Countermeasures Plan* (SPCC Plan);
- Northern's *Plan for Inadvertent Release of Drilling Mud* (see appendix B); and
- Northern's *HDD Contingency Plan*.

The Plan and Procedures would provide guidance for minimizing erosion of disturbed soils and transportation of sediments off the right-of-way and into sensitive resources (wetlands, waterbodies, and residential areas) and which represent best management practices (BMPs)/mitigation measures to be implemented during construction and operation.

The SPCC Plan describes and provides guidance for hazardous materials management, preventative measures to avoid spills, and mitigation measures (including containment, clean-up, disposal, and reporting) that would be employed in the event of a spill.

[6] The FERC Plan and Procedures are a set of construction and mitigation measures that were developed to minimize the potential environmental impacts of the construction of pipeline projects in general. The FERC Plan can be viewed on the FERC internet website at http//www.ferc.gov/industries/gas/enviro/plan.pdf. The FERC Procedures can be viewed on the FERC internet website at http//www.ferc.gov/industries/gas/enviro/procedures.pdf.

Figure A-1: Project Location Map (not to scale)



The HDD Contingency Plan and the Plan for Inadvertent Release of Drilling Mud Plan describe the HDD process and drilling fluid system, monitoring, and actions Northern would implement in the event of an inadvertent release of drilling fluid,[7] drill failures, or other issues associated with drilling.

Throughout the permitting process, various regulatory agencies, including the FERC, USACE, U.S. Fish and Wildlife Service (USFWS), State Historic Preservation Office (SHPO) and various state and local agencies may require additional resource protection measures. These additional measures would be finalized prior to construction and detailed in the applicable federal, state and local permits. Unless otherwise specified by the landowner or land managing agency, specifications in the Environmental Construction Procedures Manual would be implemented along the entire length of the Project as a general construction document.

Construction activities, storage of construction materials and equipment, and construction access would be limited to the Project areas shown on the figures and as described in this EA.

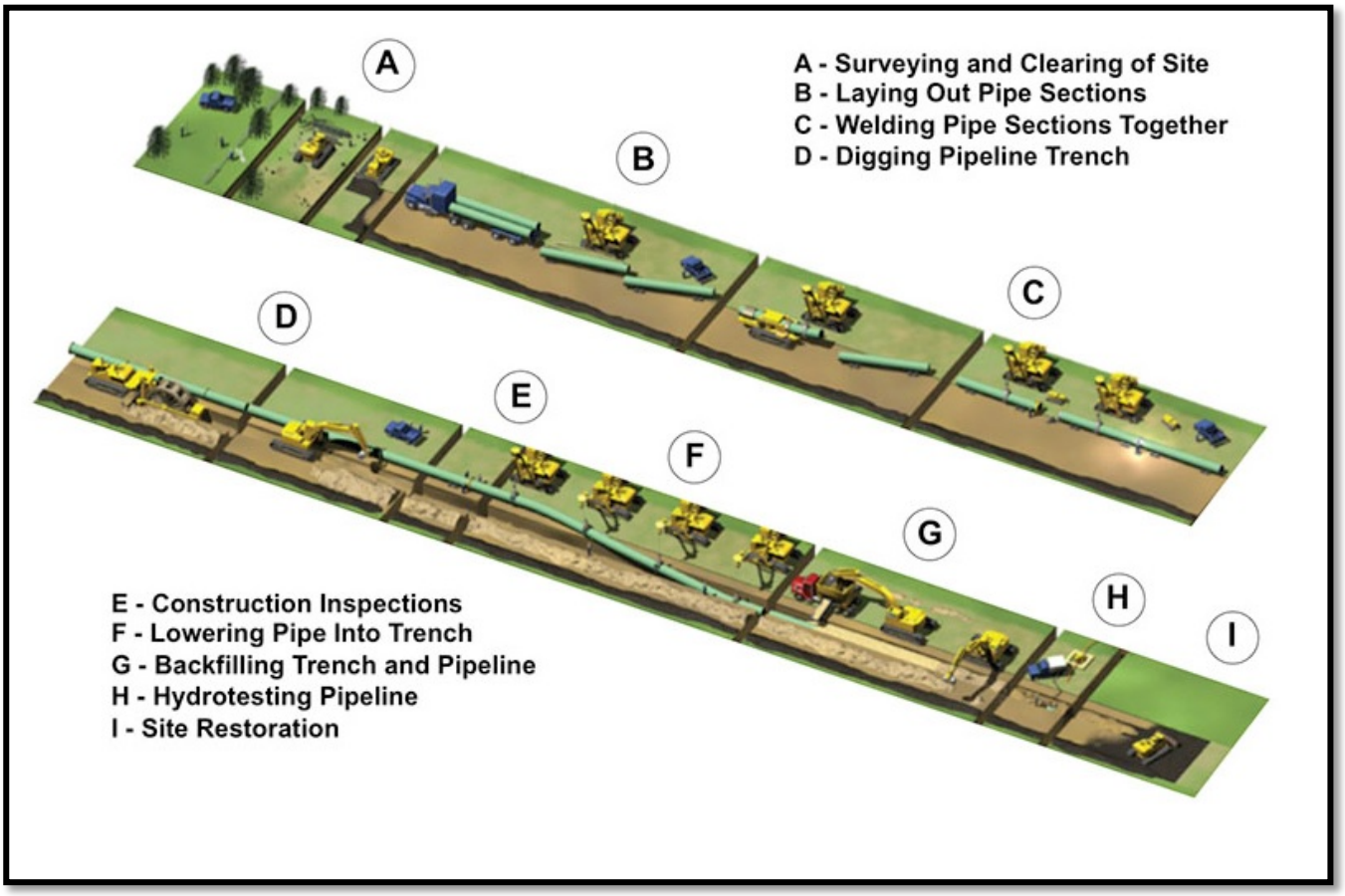
7.1.1 General Pipeline Construction

The phases of general pipeline construction occur sequentially, as depicted in figure A-2. Prior to construction, Northern would survey the route and stake the pipeline centerlines, foreign pipeline and utility crossings, and workspace limits, along with wetland boundaries and other environmentally sensitive areas. Clearing crews would cut vegetation and remove it from construction workspaces. These crews would also remove trees from the right-of-way and would take the trees off-site for timber, chip them on-site, and either remove or spread the chipped vegetation across the right-of-way within upland areas in a manner that would not inhibit revegetation. After clearing, the grading crew would grade upland portions of the construction right-of-way to create a safe and level work surface. Environmental crews would install temporary erosion controls, where necessary, to minimize erosion and maintain these controls throughout construction.

Trench excavation is necessary to bury the pipeline. Excavation of the trench would follow clearing and grading of the right-of-way. The trench would be excavated with a rotary trenching machine, track-mounted backhoe, or similar equipment. Northern does not anticipate that blasting would be required; however, in the unlikely event that rock substrates are encountered at depths that interfere with conventional excavation or rock-trenching methods, blasting may be used as necessary.

[7] An inadvertent release occurs when the drilling fluid seeps from the HDD borehole into fractures in the surrounding soil or rock and follows a path of least resistance. The drilling fluid movement may occur in any direction; it may flow outward parallel to the ground surface and never reach the surface or upwards to the ground surface.

Figure A-2: General Pipeline Construction Sequence



The bottom of the trench would be excavated as wide as required for the diameter of the pipe and safe construction practices. The sides of the trench may be sloped for safety, with the top of the trench wider at tie-in locations. The trench would be excavated to a sufficient depth to allow the typical design depth of 48 inches in accordance with 49 CFR 192.327, which establishes a minimum 36 inches of cover for most pipelines in Class 1, 2, and 3 locations. In areas where the new pipeline is collocated with Northern's existing pipeline, adequate separation would be maintained between the two pipelines to provide sufficient room for the use of standard overland pipeline construction methods and ready access for maintenance operations or in the event of an emergency.

Excavated subsoil would typically be stockpiled along the right-of-way on the side of the trench away from the construction traffic and pipe assembly area. Subsoil would be stockpiled separately from topsoil. This segregation of topsoil and subsoil would be maintained throughout the construction of the Project.

The stringing crew would deliver the pipe to the cleared and graded right-of-way where the pipe would be placed on skids adjacent to the trench in a single, continuous line. Once the pipe is strung, welding crews would weld the pipe together prior to lowering it into the ditch. Welding would be conducted in compliance with 49 CFR 192 (*Transportation of Natural and*

Other Gas by Pipeline Minimum Federal Safety Standards) and American Petroleum Institute Standard 1104 *Welding of Pipelines and Related* Facilities and Northern's company specifications. Completed welds would be inspected to ensure compliance with 49 CFR Part 192, and all pipe welds would be coated to prevent corrosion. Inspectors would check the entire pipe for defects in the coating and repair the coating as needed before installation in the trench. Next, the crews would dewater the trench as necessary in accordance with applicable permits and the trench would be cleaned of debris. The crews would lower the pipeline into the trench, and install trench barriers or breakers as required before backfilling at specified intervals to prevent water movement along the pipeline. After the pipe is positioned in the trench, crews would backfill the trench with the previously excavated material. Previously graded areas would be returned to original contours, although a slight crowning at the top of the trench may be left to allow for settling of soil air pockets. Excess soil may be spread evenly within uplands in the right-of-way, and in accordance with landowner and agency requirements.

After backfilling, pipeline segments would be hydrostatically tested in sections to ensure the system is free from leaks and meets safety requirements at operating pressures. Water for hydrostatic testing would be obtained from municipal sources. The water in the pipe segments would be pressurized and held for a minimum of 8 hours and conducted in accordance with 49 CFR 192 and applicable permit conditions. Any leaks detected would be repaired and the pipe segment retested. Upon completion of hydrostatic testing, the water would be hauled offsite and discharged to a municipal system.

After the completion of backfilling, areas disturbed by Project construction activities would be graded and cleaned up of any construction trash/debris. Northern would implement BMPs, including the installation of temporary and permanent erosion control devices. Such devices include site-specific contouring, permanent slope breakers, mulch, and reseeding or sodding to stabilize disturbed soils. If additional soil is needed, Northern would acquire it from an acceptable borrow pit. The erosion control measures used would be in accordance with the and the Plan and Procedures and the Project Stormwater Pollution Prevention Plan (SWPPP). Northern would consult with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and landowners concerning seed-mixes and applications of other soil additives following construction. Northern would restore areas disturbed by construction to pre-construction conditions to the extent practicable.

Markers showing the location of the pipeline would be installed at fence and road crossings to identify Northern as the owner and convey emergency information in accordance with applicable government regulations, including DOT safety requirements.

Northern would install a low-voltage cathodic protection system to supplement the external coating protecting the buried pipeline from corrosion, including from acidic soils. Furthermore, a properly applied and maintained external pipeline coating serves as a barrier by insulating the pipeline from the surrounding soil.

Although soil surveys may indicate how corrosive an environment may be, the final cathodic protection system design requires an assessment of actual pipe-to-soil potentials. Based

on these measurements, the cathodic protection systems would be put in service within one year of construction, in accordance with DOT requirements.

Northern proposes to begin construction in April 2017, with a proposed inservice date of November 1, 2017.

7.2 Specialized Construction Procedures

7.2.1 Horizontal Directional Drilling and Conventional Boring

HDD is a method to install pipelines across residential areas, roads, other utility crossings, or sensitive areas such as wetlands and waterbodies. The HDD method is designed to avoid or limit disturbance to the ground surface between the entry and exit points of the crossing. The HDD method consists of drilling a small-diameter pilot hole under the sensitive area and enlarging the hole through successive reamings until it is large enough to accommodate a prefabricated segment of pipe. The position of the drill head is electronically monitored, and directional corrections are made if needed to maintain the desired alignment. In the process of drilling and/or reaming the hole, a slurry of drilling mud is circulated through the drilling tools to lubricate the drill bit, remove drill cuttings, and promote drill hole stability. Drilling mud primarily consists of bentonite, a non-toxic, naturally occurring sedimentary clay. Northern would only use additives to the drilling mud that are included in the *American National Standards Institute/NSF International STD 60 Certified Well Drilling Aids and Well Sealants* list (Minnesota Department of Health, 2016). Northern's contractor would be responsible for hauling off and disposing drilling fluids at pre-approved disposal sites.

Pipe sections would be staged and welded within the temporary workspace area on the opposite side of the crossing and then pulled-back through the drilled hole. The successful use of the HDD method results in no planned impact on the feature being crossed. However, the potential exists for drilling mud escape through underground voids or fractures and it can reach the surface, which is known as an inadvertent return. In the event of an inadvertent release of drilling mud, Northern would implement the measures in its *Plan for Inadvertent Release of Drilling Mud*, such as continuous monitoring, containment, and clean-up, to limit impacts.

While all HDDs have the potential to be unsuccessful, the determining factors depend on the location of the HDD and include soil conditions not conducive to boring, caving of the borehole, loss of the drill string in the borehole, loss of drilling mud circulation and pullback refusal. Many of these issues can be avoided or mitigated by making appropriate adjustments to the operation of the HDD equipment as outlined in Northern's HDD Contingency Plan. In the event the adjustments do not correct the problem, the borehole may be moved to an adjacent location within a previously approved workspace. Northern contracted a professional consultant to design the HDDs and develop an HDD Feasibility Study. The study confirms that the HDDs have a high probability of success, although there is the possibility for inadvertent returns in some areas. Northern's HDD Contingency Plan addresses what to do if a drill fails or is otherwise unsuccessful.

Northern would also make use of conventional boring at some features. This trenchless construction technique avoids surface disturbance by boring under a feature (such as a road), but is typically only utilized for short distances. Construction of a bore begins by excavating entry and exit bore pits on either side of the crossing. A boring machine would then be lowered into one pit and a horizontal hole would be bored to a diameter slightly larger than the diameter of the pipe at the depth of the pipeline installation. The pipeline section would then be pushed through the bore to the opposite pit. If additional sections are required to span the length of the bore they would be welded to the first section of pipeline in the bore pit before being pushed through.

Northern proposes to use trenchless methods to minimize impacts on public roadways, residential areas, forested areas, wetlands/ponds, and recreational areas. Table A-2 provides the crossing locations, length, and features that would be avoided by each trenchless crossing. None of the HDDs would take place directly underneath residences. Both types of trenchless installation methods typically require extra workspace at both the entrance and exit of the drill or bore. The majority of extra workspaces in appendix E are needed for that specific reason.

7.2.2 Waterbody and Wetland Crossing Construction

Northern proposes to traverse all palustrine unconsolidated bottom wetlands (PUB) and palustrine aquatic bed wetlands (PAB) (i.e., ponds) within the permanent right-of-way using HDD. This method would avoid direct impacts on these wetlands/waterbodies. However, one PAB wetland would be impacted by the pullback associated with the HDD of Highway 77. Northern would only directly impact palustrine emergent wetlands (PEM) by construction of the pipeline. No palustrine scrub-shrub (PSS) or palustrine forested (PFO) wetlands would be impacted by construction.

To avoid excessive disruption of wetland soils and the native seed and rootstock within the wetland soils, grading, topsoil segregation, and excavation would be limited to the area immediately over the trench line. Topsoil segregation over the trench line would occur if the wetland soils are not saturated at the time of construction. If soils are saturated, Northern would use timber mats to construct the pipeline. Trench plugs would also be installed at the boundaries of the wetlands to maintain the hydrology of the wetland. Northern would rely on the existing seedbank to restore the wetland vegetation, and would conduct noxious weed monitoring after construction. Wetland crossings and restoration would be completed in accordance with all applicable permits and the Procedures. For the wetland impacted by the HDD pullback, Northern would mat over the wetland areas and install erosion control devices to limit the impact.

Table A-2: Proposed Trenchless Construction Locations for the Project				
Crossing Drawing Reference / (Bore) or HDD Number for Noise Analysis	**Reference MPs for Sections (approximate)**		**Approximate Crossing Distance in Feet**	**Features Avoided by HDD[1]**
	Begin MP	**End MP**		
SSP-001 P4-1 / HDD #1	0.30	1.05	3,929	Wetlands, Progressive Railroad crossing, 130th Street, Blanca Avenue, 128th Street, Bolivia Avenue, residential area
SSP-002 P4-2 / HDD #2	1.05	1.29	1,295	S. Robert Trail (State Route 3), residential area, wetlands
P4-3 (Bore)	1.47	1.50	161	Dodd Boulevard
SSP-04 P4-4 / HDD #3	1.51	1.84	1,766	McAndrews Road, forested wetlands
SSP-005 P4-5 / HDD #4	1.95	3.03	5,664	Lebanon Hills Regional Park, 120th Street, forested wetlands
SSP-006 P4-6 / HDD #5	3.05	3.28	1,326	Forested area in Lebanon Hills Regional Park
P4-7 (Bore)	3.30	3.37	379	Interlachen Drive
SSP-08 P4-8 / HDD # 6	3.49	4.24	3,944	Interlachen Drive, residential areas, Pilot Knob Road, Cliff Road
SSP-010 P4-10 / HDD #7	4.49	4.66	903	Thomas Lake Circle, Thomas Lake Pointe Road
P4-11 (Bore)	4.79	4.82	130	Thomas Lake Road
SSP-012 P4-12 / HDD #8	4.95	5.24	1,512	Recreational trail in Downing Park, wetland
P4-13 (Bore)	5.28	5.32	224	Johnny Cake Ridge Road
P4-14 (Bore)	5.50	5.51	96	Woodgate Lane
SSP-015 P4-15 / HDD #9	5.66	6.00	1,781	Interstate 35, Blackhawk Road, wetland
SSP-16 P4-16 / HDD #10	6.01	6.20	913	Recreational trail in Meadowland Park and a wetland
P4-17 (Bore)	6.29	6.32	136	Rahn Road
P4-18 (Bore)	6.48	6.50	96	Sandstone Drive
SSP-019 P4-19 / HDD #11	6.74	6.93	1,003	Wetland, Nichols Road
SSP-020 P4-20 / HDD #12	7.07	7.28	1,102	Area between northbound lane of Cedar Avenue and rear of Glory Church
SSP-021 P4-21 / HDD #13	7.40	7.60	1,017	Diffley Road and commercial area
SSP-022 P4-22 / HDD #14	7.61	7.84	1,189	North and southbound lanes of Cedar Avenue (Highway 77)
Total distance crossed			**28,566 ft / 5.39 miles**	

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With the exception of two locations, extra temporary workspace (ETWS) (workspace beyond the permanent and temporary construction easements) would be in upland areas at least 50 feet from wetland boundaries. In accordance with section VI.B.1.b of the Procedures, Northern has filed information where it states it can not maintain a 50-foot setback of ETWS from a wetland. Table A-3 provides the justifications regarding Northern's request to place ETWS within 50 feet of two wetland boundaries. We have reviewed these locations and find them acceptable. Additional information regarding wetlands affected by the Project and wetland crossing procedures is discussed in section B.2.3.

Table A-3: Wetlands within 50 feet of Extra Temporary Workspace for the Project

Wetland ID	Milepost	Wetland Type	Acreage of Impact	Explanation
W-68	0.0	Palustrine emergent wetland	0.00	Wetland is within the Rosemount Junction facility where ETWS is needed for the installation of the pig launcher. This wetland falls within Northern's property making the avoidance of working within the 50 foot buffer impracticable. Appropriate BMPs would be utilized around the boundaries of the wetland to minimize the likelihood of sedimentation.
W-48	7.7	Palustrine aquatic bed wetland	0.12	Wetland is within pullback area for Highway 77 HDD. Both the wetland, trees, and Highway 77 constrain the construction in this area, causing the pullback area to be within the wetland. Northern would place matting within the wetland to avoid rutting the area.

7.2.3 Road and Railroad Crossings

Northern proposes to cross 29 public roads and a railroad utilizing HDD or conventional bore. These methods would minimize impacts on transportation to the greatest extent possible by avoiding the need to open cut these features. Should any temporary road closures or detours be required, Northern would place traffic warning signs, detour signs, and other traffic control devices as required by regulation. Crossings would be completed in accordance with the requirements of road crossing permits. Table A-4 summarizes the crossing locations by milepost, along with the surface type and anticipated construction crossing methods.

7.2.4 Residential Areas

As currently designed, there are approximately 30 residences within 50 feet of the active construction corridor. Where residences are within 25 feet of the edge of the construction corridor, Northern would reduce the construction corridor width as practicable to limit inconvenience to property owners. Northern would utilize the HDD method where practicable, to minimize surface disturbance in proximity to residences. Northern has also collocated the Project along and within existing rights-of-way where feasible to avoid creating new rights-of-way to the extent practicable. Table B-10 in section B.7 lists residences and buildings within 50 feet of the planned workspace. During construction in narrow areas, Northern would endeavor to limit impacts on residences and residential areas and to perform clean-up as soon as practicable

following construction. Site-specific residential drawings of areas within 25 feet of the defined construction corridor are provided in appendix C. We encourage the owners of each of these residences to provide us comments on the plan for their property. Construction measures to minimize impacts in residential areas are further described in section B.4.3. Measures that Northern would implement for noise impacts from any HDD are discussed in section B.7.2

Table A-4: Public Roads and Railroad Crossed by the Project

Road/Railroad Name	Approximate MP	Surface Type	Anticipated Crossing Method	Secondary Crossing Method
Progressive Rail Inc.	0.52	Railroad	HDD	None
130th Street	0.65	Paved	HDD	None
Blanca Avenue West	0.71	Gravel	HDD	None
128th Street West	0.87	Gravel	HDD	None
Bolivia Ave. West	0.87	Gravel	HDD	None
South Robert Trail (SR-3)	1.04	Paved	HDD	None
Dodd Blvd.	1.43	Gravel	Bore	HDD
McAndrews Rd. (Hwy 38)	1.46	Paved	HDD	None
120th Street West	2.19	Gravel	HDD	None
Interlachen Dr.	3.27	Paved	Bore	HDD
Interlachen Dr.	3.53	Paved	HDD	None
Fairway Hills Dr.	3.54	Paved	HDD	None
Pilot Knob Rd.	3.79	Paved	HDD	None
Eriks Blvd.	3.85	Paved	HDD	Bore
Richards Ct.	4.00	Paved	HDD	None
Thomas Ln.	4.02	Paved	HDD	None
Cliff Rd. (Hwy 32)	4.09	Paved	HDD	None
Lake Park Dr.	4.11	Paved	HDD	None
Thomas Lake Circle Rd.	4.54	Paved	HDD	None
Thomas Lake Pointe Rd.	4.65	Paved	HDD	None
Thomas Lake Rd.	4.83	Paved	Bore	HDD
Johnny Cake Ridge Rd.	5.33	Paved	Bore	HDD
Woodgate Ln.	5.53	Paved	Bore	HDD
Interstate 35	5.75	Paved	HDD	None
Blackhawk Rd.	5.85	Paved	HDD	None
Rahn Rd.	6.32	Paved	Bore	HDD
Sandstone Dr.	6.51	Paved	Bore	HDD
Nicols Rd.	6.82	Paved	HDD	None
Diffley Rd.	7.48	Paved	HDD	None
Cedar Ave. (Hwy 77)	7.73	Paved	HDD	None

7.2.5 Active Cropland

Construction in agricultural areas would be conducted in accordance with the Plan and Procedures. To conserve topsoil, Northern would conduct full right-of-way topsoil removal in actively cultivated and rotated cropland and improved pasture. A maximum of 12 inches of topsoil would be segregated. The topsoil and subsoil would be stored in separate windrows on the construction right-of-way and would not be allowed to mix. Where the existing topsoil is less than 12 inches deep, the actual depth of the topsoil would be removed and segregated. Soil fertility and other characteristics are further discussed in B.1.2. Agricultural areas crossed by the Project are identified in B.4.1, along with proposed mitigation measures.

Topsoil and subsoil would be tested for compaction following construction in all agricultural areas. The contractor would plow subsoil in accordance with the soil compaction mitigation procedures described in the Plan. Once plowing of the subsoil is complete, the segregated topsoil would be returned to the right-of-way. The size, density, and distribution of rock on the construction work area shall be similar to adjacent areas not disturbed by construction.. Following completion of major construction, the grade would be restored, as near as practicable, to the original contours.

Temporary access roads within agricultural fields would be restored, as near as practicable, to preconstruction conditions in adherence with the Plan and Procedures. Specific construction procedures for access roads within agricultural areas include topsoil removal in conjunction with grading activities and subsoil plowing prior to topsoil replacement.

7.2.6 Blasting

The Project, as planned, would require no blasting. If it is found that blasting may be required, a geotechnical analysis of the area would be performed beforehand and Northern would develop a blasting plan, and file that information with FERC prior to blasting. Blasting would be performed in accordance with applicable regulations.

7.3 Construction Environmental Compliance

Consistent with our guidelines, Northern would provide pre-construction environmental training to all Northern and contractor personnel whose activities may impact the environment during pipeline and facility construction. Construction contractors would receive environmental training applicable to their job duties and construction management and environmental inspectors (EIs) would receive all Project-specific information. The training program would focus on the Plan and Procedures; Project-specific Certificate and other permit conditions; regulatory requirements, such as those pertaining to endangered species, cultural resources, or wetlands; and other Project-specific mitigation plans.

An EI would be designated by Northern during active construction and restoration. The EI would be responsible for quality assurance and compliance with any mitigation measures, other applicable regulatory requirements, and company specifications. The EI would have peer status with all other activity inspectors. The EI would have the authority to stop activities that

violate the environmental conditions of the FERC Certificate, all other permits, or landowner requirements and to order corrective action.

In addition, FERC staff would inspect the Project throughout construction to independently verify compliance with the Commission's order. FERC staff would continue to monitor and inspect the vegetation along the Project route until restoration and revegetation are deemed successful.

7.4 Operation, Maintenance, and Safety Controls

Northern would operate and maintain the proposed facilities in compliance with DOT regulations provided in 49 CFR 193, FERC directives in 18 CFR 380.15, and maintenance requirements in the Plan and Procedures. Project facilities would be marked and identified in accordance with applicable regulations. In accordance with 49 CFR 192, the pipeline would be inspected for leakage as part of scheduled operations and maintenance. Northern would also participate in the local Gopher State One Call system in Minnesota. These standards are in accordance with the National Pipeline Safety Act of 1968, as amended. Operational activity on the pipeline would be limited primarily to maintenance of the right-of-way and inspection and repair and cleaning of the pipeline itself. Northern would conduct periodic aerial and ground inspections. Northern would use public roads to gain access to the right-of-way for maintenance and inspection activities but would work with landowners if temporary access were required.

The right-of-way would be revegetated; however, large brush and trees would be periodically removed. Trees or deep-rooted shrubs could damage the pipeline's protective coating, obscure periodic surveillance, or interfere with potential repairs. Therefore, the frequency of the vegetation maintenance would depend upon the vegetation growth rate. In upland areas, routine vegetation maintenance would be conducted on the permanent pipeline easement with a frequency of not more than once every 3 years, in accordance with the Plan. In addition, a 10-foot-wide strip over the pipeline may be maintained in an herbaceous state by mowing, cutting, and trimming on an annual basis. Vegetation maintenance would normally not be required in agricultural cropland or grazing areas. Wetlands would be crossed using HDD and Northern would not maintain (i.e., by routine mowing) its right-of-way within wetlands once the Project is operational. Northern also would not maintain its new easement within the LHRP. Northern would not conduct routine vegetation maintenance between HDD entry and exit points, but it would prevent encroachments in these areas.

Herbicides would be used only in accordance with applicable agency requirements and with landowner approval. Northern would use only chemicals approved for such use by the U.S. Environmental Protection Agency (EPA).

Northern would place pipeline markers at the intervals required by the DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA).

Northern has developed a pipeline integrity management program to improve pipeline safety along its entire pipeline system. This program was implemented to comply with the

prescriptively based requirements of 49 CFR Part 192, Subpart O. Northern implements the program through the following:

- assessing the integrity of pipelines in HCAs and other areas;
- improving integrity management data systems within the company;
- increasing the integrity and reliability of the pipeline system; and
- improving the government's role in reviewing the adequacy of integrity programs and plans.

The new pipeline would be incorporated into Northern's integrity management program. A well-constructed, well-maintained, regularly inspected, and cathodically protected pipeline could last indefinitely.

8. Land Requirements

As provided in table A-5, construction of the Project would affect a total of approximately 149.01 acres. Only 18.65 acres would be newly acquired easement for the Project; 12.0 acres would be cleared for construction. 9.80 acres would undergo vegetation maintenance during operation, and the remaining 8.85 acres would be easement obtained, but would not be maintained during operation, such as between the entry and exit points of the HDDs.

Northern is requesting a 100-foot-wide construction right-of-way for areas where it proposes to install the pipeline using the traditional upland construction method. In areas where Northern does not currently have an existing maintained right-of-way, Northern requests a 50 foot-wide permanent right-of-way (with some exceptions where Northern would acquire less). The majority of the pipeline would be constructed and operated within existing maintained utility rights-of-way. Northern would utilize its existing A-Line right-of-way for collocation of the Project to the extent practicable, including utilization of the existing permanent easement for construction and operation. This also includes areas where Northern proposes to install the pipeline using HDD, minimizing the need for a maintained permanent easement. There would be many areas along the route where the new easement overlaps an existing maintained easement, resulting in no change in land use. Additionally, in areas where the pipeline is installed using HDD, Northern would leave all existing vegetation intact and would not perform vegetation maintenance in that area. Northern would not establish a permanently maintained corridor between HDD entry or exit points, but it would have an easement in these areas. Cross sectional drawings showing the construction right-of-way configurations are in appendix D.

Once construction is complete, Northern would require 18.65 acres of land for operation: 4.08 acres of land would be converted to permanent pipeline right-of-way from some other land use; 5.72 acres are already part of an existing easement and would return to pre-construction conditions. The remainder of land impacted during construction would be returned to its pre-construction land uses. No areas within the LHRP would require conversion of land use to permanently maintained pipeline corridor.

Table A-5: Project Land Requirements					
Project Component	**Proposed Activity**	**Length (miles) or Number of Sites**	**Construction Work Area (acres)[1]**	**Land Required for Operation (acres)[2] (Maintained)**	**New Permanent Easement Total (acres)**
Pipeline construction right-of-way	Installation of new pipeline, general workspace along construction corridor	7.86 miles	38.94	9.80	18.65
Extra temporary workspace	Extra workspace at HDD entry/exit points, utility crossings, road and railroad crossings and points of inflection	61 sites	41.37	0.00	0.00
Access roads	Access from public roadways to the pipeline construction workspace[3]	10 sites	4.44	0.00	0.00
Existing Facilities	Existing aboveground facility sites owned by Northern – minor modifications within Rosemount Junction and Cedar Station	2 sites	5.66	0.00	0.00
Staging areas	Temporary storage and staging of construction equipment; contractor yards	12 sites	58.60	0.00	0.00
		Total Acres:	**149.01**	**9.80**	**18.65[4]**

[1]The construction work area includes all areas that would be disturbed by construction, including the temporary and permanent rights of way, ETWS, staging areas, and access roads.
[2] Permanent impact includes areas that would become part of Northern's new easement and could be maintained. In some areas, Northern has acquired its new easement from an existing utility easement (such as a power line corridor).
[3] Where access roads intersect or traverse other workspaces, impact acreages were included under that Project component.
[4] Northern would acquire 18.65 acres of land for the new pipeline, of which about 12 acres would be cleared during construction. About 8.85 acres would not undergo routine vegetation clearing during operation. The remaining 9.80 acres required for permanent operation of the new pipeline easement consists of 5.72 acres that are currently part of existing rights-of-way. Therefore, only 4.08 acres of newly acquired easement would be converted from some other land use category to maintained pipeline right-of-way as a result of the Project.

Construction of the Project would require use of ETWS areas beyond the temporary construction right-of-way. Northern also identified 12 staging areas that would be used for pipe storage, staging of equipment and materials, and temporary contractor offices and parking. Northern proposes to use 10 access roads. The ETWS and access roads are included as part of the overall temporary construction impacts, and are identified in appendix E. Although Northern has identified areas where ETWS and access roads would be required, additional or alternative areas could be identified in the future due to changes in site-specific construction requirements. Northern would be required to file information on each of those areas for our review and approval prior to use.

9. Permits, Approvals, and Regulatory Requirements

The Project would require numerous regulatory reviews and approvals. Table A-6 provides a summary of the major permits and consultations, as well as the expected dates for

filing or completing those requirements. Northern would be responsible for obtaining all necessary permits, regardless if they appear in the table or not.

Table A-6: Permits, Approvals, and Consultations Required for the Project		
Permit/Approval	**Administering Agency**	**Status**
Federal		
Certificate of Public Convenience and Necessity	FERC	NGA Section 7 Application filed July 29, 2016
Endangered Species Act Section 7 Consultation	USFWS	Completed July 1, 2016
Rivers and Harbors Act, Section 10; Clean Water Act, Sections 404 (dredge/fill) and 401 (water quality certification)	USACE, St. Paul District and Minnesota Pollution Control Agency	Application submitted July 11, 2016
Section 106 National Historic Preservation Act Consultation	Minnesota SHPO	Revised Phase I Cultural Resources Survey Report and request for concurrence submitted July 11, 2016. Response received August 23, 2016
State		
State Listed Threatened & Endangered Species Consultation	MNDNR	Concurrence received June 22, 2016
License to Cross Public Waters	MNDNR	Complete: Application submitted July 8, 2016. MNDNR issued a waiver on July 22, 2016.
License to Cross Public Lands	MNDNR	Application submitted November 2016
Water Appropriation General Permit (trench dewatering)	MNDNR	Permit to be obtained prior to construction, if needed
National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Discharge from Construction Activities	Minnesota Pollution Control Agency	Permit to be obtained prior to construction
NPDES Trench Dewatering Permit	Minnesota Pollution Control Agency	Permit to be obtained prior to construction
Archaeological Reconnaissance Survey License for State Owned Lands	Minnesota Office of the State Archaeologist	Complete. Site numbers issued by Office of State Archaeologist in January 2016
Local		
Wetland Conservation Act Consultation/Determination	Dakota County Soil & Water Conservation District (City of Eagan as Local Governing Unit	Completed September 20, 2016
	Dakota County Soil & Water Conservation District (City of Rosemount as Local Governing Unit	Completed September 6, 2016

Table A-6: Permits, Approvals, and Consultations Required for the Project		
Permit/Approval	**Administering Agency**	**Status**
Road Crossing	Minnesota Department of Transportation	Application to be submitted December 2016
Road Crossing	Dakota County Department of Transportation	Application to be submitted December 2016
Road Crossing	City of Eagan	Application to be submitted December 2016
Road Crossing	City of Rosemount	Application to be submitted December 2016
Railroad Crossing	Progressive Railroad	Application to be submitted December 2016
Conditional Use	City of Rosemount	Approved, May 19, 2016

B. ENVIRONMENTAL ANALYSIS

Construction and operation of the Project would have temporary, short-term, long-term, and permanent impacts. As discussed throughout this EA, temporary impacts are defined as occurring only during the construction phase. Short-term impacts are defined as lasting between one and three years. Long-term impacts are defined as lasting three years or more. Permanent impacts are defined as lasting through the life of the Project.

1. Geology and Soils

1.1 Geology

The Project area is within the generally flat-lying to gently rolling Western Lake section of the Central Lowlands Physiographic Province. The area is covered by deep and well-drained or excessively drained silt loams and sandy loams that formed from outwash and glacial till material.

The soils are underlain by Ordovician Period sedimentary rocks consisting primarily of dolostone from the Shakopee Formation (Mossier, 2000). Depth to bedrock ranges from approximately 150 to 300 feet from the soil surface. The topography is mostly gently rolling hills, oftentimes with small bodies of water in the low-lying areas. The elevation ranges from approximately 900 to 1,100 feet above mean sea level, with the highest point near the center of the Project.

An assessment of mineral resources within approximately 0.25 mile of the Project area was conducted using aerial photographs, U.S. Geological Survey (USGS) topographic maps and the USGS Minnesota State Minerals Information website. Based on a review of these sources, no mineral resources are within 0.25 mile of the Project area.

Data from the USGS Earthquake Hazards Program were used to assess the potential for seismic ground motions for this Project. The USGS map illustrates levels of horizontal shaking that have a 2 percent probability of exceedance in 50 years. The levels are depicted on a scale of 0 to 64+ as a percentage of peak acceleration due to gravity, where zero indicates the lowest hazard and 64+ indicates the highest hazard. According to the USGS, the Project area is in an area of low seismic risk, where the peak acceleration due to gravity has a value of 2 percent. Additionally, an assessment of the potential for landslides or slope failure was conducted using USGS landslide incidence and susceptibility data. These data are depicted as a percentage of the area that is susceptible to a landslide. According to these data, the Project is in an area of low landside incidence, which means that less than 1.5 percent of the area could be susceptible to slope failure.

An assessment of MNDNR karst feature inventory data showed that no known karst features are within the Project area. In the event a karst feature is encountered in the Project area, Northern would stop work and consult with the MNDNR for appropriate mitigation measures.

A review of existing paleontological information for the State of Minnesota was conducted by Northern. Based on data reviewed for the State of Minnesota, paleontological studies or unique paleontological resources are not known to exist within the Project area.

Geology Impacts and Mitigation

There are no known mines, karst conditions, volcanic activity, or areas of steep terrain in the Project area; therefore, there would be no potential for sink holes or landslides and no interference with mineral resource extraction from Project construction or operation. No known active faults are mapped along the pipeline route; therefore, no hazards due to faulting are anticipated. Similarly, the magnitude of earthquakes recorded in the Project area is relatively low, and ground vibration is not expected to pose a problem for a modern welded-steel pipeline. In the absence of faulting and at most, low magnitude earthquake potential, there would be negligible hazards due to soil liquefaction. Based on the results of Northern's geotechnical investigative study, the Project, as planned, would not require blasting. If it is found that blasting may be required, Northern would develop a blasting plan for submittal to FERC prior to implementation. Therefore, we conclude there would be negligible impact on geological resources or impacts from geological hazards on the Project facilities.

1.2 Soils

Soil series that have the potential to be impacted by the pipeline corridor were identified using the NRCS Soil Survey Geographic Database of Dakota County, Minnesota. Potential impacts on soils from the Project are generally associated with soil limitations and certain soil characteristics, as described below. Northern completed geotechnical surveys and investigative soil studies in March 2016.

Soils along the pipeline corridor are deep and well- or excessively drained, with silt loam and sandy loam textures at the surface. These soils impacted by the Project are formed from outwash or glacial till parent materials.

Prime Farmland

Prime Farmland is a special classification of highly productive cropland that is recognized and described by the NRCS. Prime Farmland soils are defined by the USDA as those best suited for growing food, feed, forage, fiber, and oilseed crops (USDA NRCS, 2005). Soil map units designated as prime farmland do not have to be actively cultivated to receive this designation.

The Project crosses three farmland classes as defined by the NRCS. Two of these classes are considered to be Prime Farmland: (1) Farmland of Statewide Importance and (2) Prime Farmland. The third class crossed by the Project is Not Prime Farmland.

The soils classified as Prime Farmland within the Project area are currently being used for a variety of purposes including agriculture, residential, and other urban land uses. Temporary impacts on soils classified as Farmland of Statewide Importance and Prime Farmland would

occur during construction of the Project. Areas used for agriculture would be allowed to return to pre-construction conditions following construction. Topsoil segregation would be utilized to minimize potential impacts on farmland from construction. No permanent impacts on prime farmland are anticipated.

Soil Compaction

Soil compaction can occur by the repeated movement of heavy machinery across soils with the potential for compaction, particularly soils with high shrink-swell potential and poor drainage characteristics (e.g., soils with high clay content). These impacts can result in an increase in agricultural operating and labor costs, decreased productivity, and damage to field equipment.

Soil Erosion

Soil erosion potential is affected by the soil lithology, including mineralogy, grain size, texture, and organic content. Soil erosion potential is also influenced by slope and exposure to erosion mechanisms. Soil erosion potential increases in inverse proportion to the effectiveness of vegetation cover (i.e., soils with denser vegetation cover are less susceptible to erosion). Erosion potential is greatly increased by the removal of vegetation associated with construction activities.

The classification of a soil as highly erodible by the NRCS is directly related to the soil's susceptibility to erosion by water or wind. No soils within the Project area are characterized as having "severe" hazards for erosion by water. Soils within the Project area have wind erodibility group values ranging from 2 to 8, with 8 being the least susceptible to erosion by wind and 1 being the most susceptible.

There are no known locations containing contaminated soils within 0.5 mile of the Project route. If stained soils, groundwater sheen, or open trenches with suspect odors are encountered, the suspected soil would be tested for contamination. If contamination is confirmed, all activities in that area would cease and Northern's Environmental Department Project Manager would be notified. If the soils are considered hazardous, an experienced and certified hazardous waste contractor would be utilized to address the contamination issue and any safety issues arising from the contamination. All contaminated material would be handled and/or disposed of in accordance with the requirements of the state of Minnesota and other agencies, as applicable.

Soil Impacts and Mitigation

Potential soil impacts may occur as a result of construction activities including mixing of soil layers, compaction, rutting, erosion, and alteration of drainage patterns through mixing. Construction activities like clearing, grading, trenching, backfilling, heavy equipment traffic and restoration along the construction right-of-way have the potential to adversely impact natural soil characteristics (e.g., infiltration capacity, water storage and routing, root growth and nutrient levels), thus reducing soil productivity. Clearing removes protective vegetation cover

and exposes soil to the effects of wind, sun, and precipitation, which potentially increases soil erosion and the transport of sediment to sensitive resource areas.

In an effort to avoid or minimize impacts that could result from soil compaction, Northern would limit off-road traffic to only the areas necessary for construction of the Project. In areas of saturated wetlands, Northern would use timber mats during construction to prevent rutting or compaction. Northern would also limit the impact construction activity during periods of heavy rainfall and snowmelt to the extent practicable. Northern would test for compaction and till or implement other decompaction methods in any areas where compaction has occurred.

Grading has the potential to mix topsoil with subsoil, potentially resulting in long-term reduction of agricultural productivity and introduction of subsurface rocks to the soil surface. Trench excavation and backfilling have the potential to cause the following: mixing of topsoil and subsoil; and relocation of rock and/or gravel from subsoils into surface soils. These potential impacts can result in an increase in operating and labor costs, decreased agricultural productivity, and damage to agricultural field equipment.

To limit or avoid potential impacts on soil resources due to erosion, Northern would utilize erosion and sediment control measures in accordance with its SWPPP, which would incorporate the Plan and Procedures requirements including appropriate erosion control devices, such as silt fence and mulch. The SWPPP would be completed in conjunction with the National Pollutant Discharge Elimination System permit applications submitted to Minnesota Pollution Control Agency (MPCA) prior to construction. To reduce impacts on soils due to wind erosion, Northern would spray the active construction work area with water during dry conditions and as necessary and mulch slopes. Northern would also implement MPCA's BMPs including planting an annual cover crop on topsoil and subsoil areas left undisturbed for more than 14 days. Northern would also consult the MNDNR and the NRCS for other wind erosion BMPs.

After each segment of pipeline has been installed and backfilled, the areas disturbed by construction would undergo final grading. Original contours would be restored, as near as practicable. Non-cultivated land would be reseeded in accordance with individual landowner requirements or NRCS recommendations. Northern has also agreed to reseed areas with native forbs and grasses where the state-threatened Blanding's turtle could be present. Construction debris would be removed for proper disposal.

Impacts on soil resources would be limited through several factors including topsoil stripping, erosion control BMPs, soil compaction mitigation, and the revegetation guidelines referenced in the Plan and Procedures. The Plan and Procedures identify and specify BMPs that would be used to protect soil productivity and water quality by controlling soil erosion and the loss of topsoil and surface organic matter.

We conclude that Northern's adherence to implementation of the Plan and Procedures, and other BMPs as discussed above, would adequately minimize impacts on soils.

2. Water Resources

2.1 Groundwater

The Project is in the Metro Physiographic Province in Minnesota. The Metro Province is classified as having sand aquifers in generally thick (greater than 100 feet) sandy and clayey glacial drift overlying Precambrian sandstone and Paleozoic sandstone, limestone, and dolostone aquifers (MNDNR, 2001).

The Metro Province is underlain by three aquifer types: Quaternary sand aquifer, various sedimentary bedrock aquifers, and a Precambrian crystalline rock aquifer. The Project area is underlain by all three of these aquifer types (MNDNR, 2001).

Recharge of the aquifers is variable throughout the Metro Province due to factors such as precipitation, runoff, soil conditions, land use, topography and confining layers. Typical recharge rates to unconfined aquifers in Minnesota are 25 percent of precipitation. This equates to an approximate minimum of 6 inches of recharge per year in the Metro Province (USGS, 2007). The Metro Province is underlain by sandy, unconsolidated sediments and most recharge takes place in interstream areas. Most of the recharge is from precipitation entering the aquifers through the sediments. Some of the water moves downward through the sediment until it reaches bedrock.

Water quality from aquifers in the region is generally suitable for drinking and other uses. However, a 1999 MPCA groundwater quality report showed the Metro Province having varying objectionable levels of nitrates, chlorides, and volatile organic compounds (VOC). All VOC concentrations were below drinking water criteria. Nitrate contamination is a result of agricultural production, while chloride contamination is a result of road salt used during the winter. VOCs are commonly associated with fuel oils, gasoline, and solvents (MPCA, 1999).

The EPA considers a sole source as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas tend to have no alternative drinking water sources that could physically, legally, and/or economically supply those who depend upon the aquifer. No EPA-designated sole-source aquifers are beneath or within 80 miles of the Project (EPA, 2015a).

Several Drinking Water Supply Management Areas (DWSMA) are throughout the Project area. These areas are categorized by a vulnerability of high, moderate, or low. Vulnerability is an assessment of the likelihood for a potential contaminant source within the DWSMA to contaminate a public water supply well based on the aquifer's inherent geologic sensitivity and the chemical and isotopic composition of the groundwater (Minnesota Geospatial Information Office, 2015). The boundaries of a DWSMA are delineated by the boundary of a wellhead protection area. These locations can be seen on figure B-1 and are represented by the boundaries of the wellhead protection areas identified on the map. The DWSMA vulnerability rating for the Project area ranges from low to high (Minnesota Department of Health, 2014).

Two wellhead protection areas are within the Project area (figure B-1). Northern consulted with the Minnesota Department of Health and the City of Eagan concerning wellhead protection measures. Both the agency and the city indicated that no special construction techniques are required. The only requirement would be a 100-foot setback for construction activities near a public water supply well; however, no public wells are known to be within 100 feet of the Project. While no special construction restrictions are required within the wellhead protection areas, Northern's SPCC Plan and other BMPs would be implemented to reduce the likelihood that drinking water would become polluted.

No known protected watersheds or locally zoned aquifer protection areas are within the Project area. No blasting is anticipated for the Project.

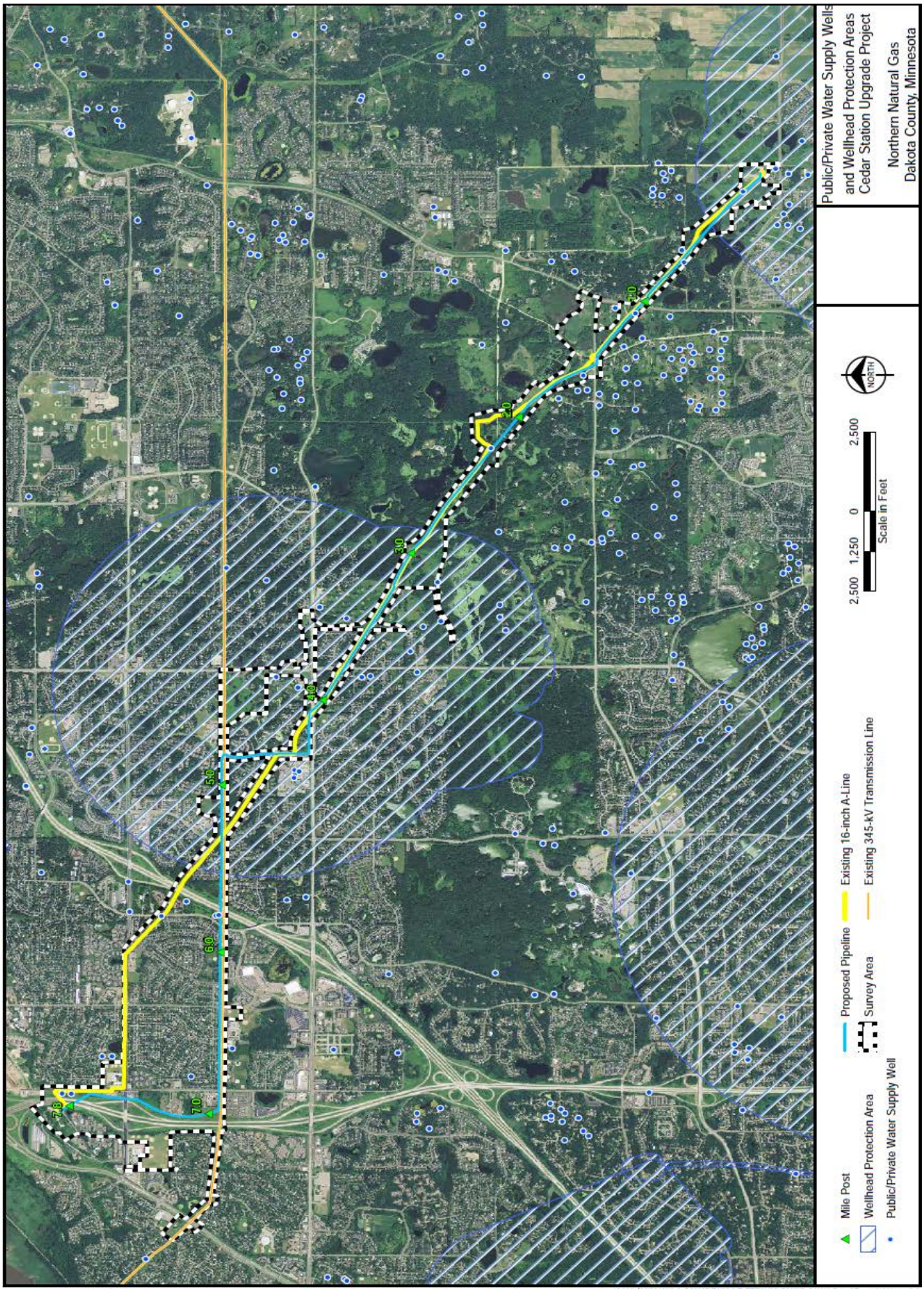
Public water supply wells are regulated by the Minnesota Department of Health. Northern utilized groundwater data from the Minnesota Department of Health to obtain information on public and private wells within 150 feet of the Project area (Minnesota Department of Health, 2015). Sixteen private wells are within 150 feet of the Project. No public wells are within 100 feet of the Project area; however, one public well is approximately 174 feet from the proposed centerline associated with the HDD near milepost 2.2. A summary of the well locations by milepost can be found in table B-1.

Table B-1: Private Water Supply Wells and Springs within 150 feet of the Project

Well Number	Use	Approx. MP	Approx. Distance from Construction Work Area (feet)	Approx. Distance from Centerline (feet)
186309	Domestic	0.15	0[1]	14
208396	Abandoned/Sealed	0.65	HDD	150
No. unknown	Domestic	0.65	HDD	98
No. unknown	Domestic	0.75	HDD	67
No. unknown	Domestic	0.95	HDD	55
207598	Domestic	1.00	0[1]	12
808477	Domestic	1.15	HDD	57
174698	Domestic	1.35	30	83
No. unknown	Domestic	1.41	48	106
No. unknown	Domestic	2.15	HDD	71
124304	Domestic	2.25	HDD	65
205600	Abandoned/Sealed	5.80	100	138
235613	Domestic	5.80	15	46
220408	Domestic	7.75	0[2]	121
235589	Domestic/Sealed	7.85	15	48
429883	Unknown	NA	126[3]	1,097

[1]Well is adjacent to or within the ETWS.
[2]Well is within HDD pullback area.
[3]Well is near an access road.

Figure B-1: Wellhead Protection Areas



Impacts and Mitigation

Construction of the pipeline would generally require the excavation of a trench between 5 and 6 feet in depth to allow for a minimum of 3 feet of soil cover. Northern conducted 34 soil borings along the Project route. Based on the results of the soil borings, the depth to groundwater ranged from 8 – 90 feet below ground level, with the average generally greater than 20 feet below ground level in areas where open trench construction is proposed. Therefore, the depth to groundwater is deeper than the trench excavations for open trench construction.

Impacts on groundwater would likely be limited to mainly construction and HDD activities. There is a chance that HDD construction associated from the Project could result in temporary impacts within the aquifers crossed by the HDD. Methods to mitigate potential impacts to groundwater from HDD activities include planning appropriate entry pit sump and fluid handling capacity, using the correct drilling fluid formula to allow for formation of an annular seal, and using inert as well as non-toxic drilling fluids. If temporary impacts occur, it would likely be limited to short-term turbidity visible in groundwater, as no hazardous chemicals would be used during the drilling process.

An inadvertent spill or release of fuel or hazardous materials during construction could also affect groundwater if not cleaned up appropriately. Soils contaminated by such spills or leaks could continue to leach and add contaminants to groundwater long after a spill has occurred. To minimize the risk of potential fuel or hazardous materials spills, Northern would implement its SPCC Plan, which includes preventive measures such as personnel training for proper handling of fuel and hazardous materials, equipment inspection, and refueling procedures to reduce the likelihood of spills. It also includes mitigation measures to reduce potential impacts should a spill occur. If contaminated soil or groundwater is encountered during construction, Northern would notify the affected landowner and coordinate with the appropriate federal and state agencies as applicable.

Soil compaction from construction can result in the inability of the soil to absorb water; however, Northern would address soil compaction if it occurs as described in the Plan.

Specific BMPs that Northern would implement to prevent impacts on groundwater resources including conducting refueling and storage of hazardous materials greater than 100 feet from a well, installing protective fencing around all wellheads in or adjacent to the construction work areas, and prohibiting overnight parking near wellheads. Northern would also implement its SWPPP in accordance with MPCA requirements. The SWPPP would be completed at a later date in concurrence with the National Pollutant Discharge Elimination System permit application process to address and mitigate potential pollutants at their sources associated with construction activities.

With landowner approval, Northern would conduct pre- and post-construction well testing for wells within 150 feet of the construction work areas (including the path of the HDDs) to determine whether impacts on water quality or yield occurred. The pre-construction testing would serve as a baseline for comparing any post-construction water well testing in the event a landowner suspects the well has been impacted. Water quality testing would include testing for

VOCs and polynuclear aromatic hydrocarbons. In the event the results indicate the well water quality or yield has been adversely impacted as a result of the Project, Northern would provide a clean water source to the landowner until a permanent solution is found. The damaged well would be restored to its former capacity and quality to the extent practical.

We find that by implementing the measures discussed above, Northern's SPCC Plan, and the Plan and Procedures, construction activities are unlikely to result in significant impacts on groundwater resources.

2.2 Surface Water

Northern completed an assessment of surface water resources in the Project area through field reconnaissance conducted by qualified wetland scientists during September 2015 and April 2016; and through a review of USGS topographic maps (1:24,000 scale), USGS National Hydrography Dataset, National Wetlands Inventory (NWI) data, and Minnesota Public Waters Inventory (PWI) data. The National Hydrography Dataset showed the presence of several ponds within the Project area that are classified by the USACE as PUB and PAB. The MNDNR holds jurisdiction over waters classified as Public Waters of Minnesota based on criteria in the Minnesota Statutes, Section 103G.005, subsection 15. According to the MNDNR's Protected Waters and Wetlands PWI maps, the ponds that would be traversed by the Project are considered public wetlands (MNDNR, 1996). The FERC generally considers ponds to be waterbodies (rather than wetlands) in accordance with its Procedures. Therefore, for the purposes of not counting these areas twice, and due to their Minnesota-specific NWI and PWI classifications, ponds and impacts on ponds are discussed in the wetland section (section B.2.3). All PUB and PAB wetlands would be crossed by the pipeline using HDD (described in section A.7.2.1); however, one workspace would be needed within a PAB wetland for the HDD pullback of the Highway 77 crossing, which is discussed in section B.2.3.

No sensitive or impaired waterbodies would be crossed by the Project. No waterbodies with contaminated sediments were identified. No public watershed areas would be crossed by the Project.

Northern anticipates obtaining hydrostatic test water from a municipal source. Northern anticipates needing 1,063,000 gallons of water for hydrostatic testing and up to 500,000 gallons of water for dust control, which would also come from municipal sources. The test water would be discharged to a municipal location. This would avoid impacts on surface waterbodies.

Potential ecological impacts from the inadvertent return of HDD drilling mud to surface water and wetland resources are mostly related to temporary sedimentation. If an inadvertent return were to occur in a wetland or waterbody, the drilling mud could temporarily reduce food availability, reduce the quality of spawning and rearing sites, smother or displace macroinvertebrates, or interfere with the development and function of fish gills. Northern has committed to use turbidity curtains if an inadvertent release of drilling mud occurs within a waterbody to minimize the spread of any turbidity.

If an inadvertent return were to occur in uplands, Northern would contain any drilling mud to prevent impacts on nearby waterbodies. The mud would be disposed of in accordance with the applicable landowner agreement. Northern has developed its *Plan for Inadvertent Release of Drilling Mud* to detail measures it would implement for the prevention, monitoring, and clean-up of inadvertent releases

By implementing the techniques outlined in the Plan and Procedures, the HDD crossing of all PUB/PAB wetlands/ponds discussed below, and Northern's *Plan for Inadvertent Release of Drilling Mud*, we conclude impacts on waterbodies would be avoided or adequately minimized.

2.3 Wetlands

The FERC defines a wetland as "any area that is not in actively cultivated or rotated cropland and that satisfies the requirements of the current federal methodology for identifying and delineating wetlands." The USACE and EPA jointly define wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (FERC, 2013; USACE, 1987).

Northern performed a desktop review of NWI data and aerial photography to identify potential wetlands, and subsequently conducted wetland delineation studies in September 2015 and April 2016 within the Project environmental survey corridor. The wetland delineation was conducted using the Routine On-Site Determination Method defined in the USACE Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region, Version 2.0 (USACE, 2010).

Northern is seeking a USACE Section 404 permit; specifically, a Regional General Permit 3 for temporary wetland impacts during construction. The MNDNR has jurisdiction over waters classified as "Public Waters" of Minnesota based on criteria in the Minnesota Statutes, Section 103G.005, subsection 15. Minnesota "public waters wetlands" include type 3, type 4, and type 5 wetlands as defined by USFWS' Circular No. 39 (1971). Permanent or temporary impacts on Public Waters Wetlands require a Public Waters Works Permit issued by the MNDNR. Northern initiated formal consultations with the MNDNR through the online MNDNR Permitting and Reporting System "MPARS" on July 8, 2016. All other waters that do not fall under the jurisdiction of either the USACE or Public Waters are jurisdictional under the state's Wetland Conservation Act (WCA). The WCA is administered through the Minnesota Board of Water and Soil Resources, but implemented through Local Government Units. The WCA states that wetlands must not be drained or filled, wholly or partially, unless replaced by restoring or creating wetland areas of at least equal public value under an approved replacement plan. No permits are required under the WCA; instead, a formal determination is provided by the Local Government Units. A joint application is submitted to both the USACE and MNDNR to determine what waters are jurisdictional under Section 404 of the Clean Water Act and those under the WCA. Northern filed its applications in July 8, 2016, for a Regional General Permit 3 that authorizes temporary impacts on wetlands under the jurisdiction of the USACE; the MNDNR's Public Waters Work Permit Program holds jurisdiction over wetlands classified as

"Public Waters Wetlands" on MNDNR's PWI maps. On July 22, 2016, the MNDNR waived its review of the Public Waters Wetlands application.

Table B-2 provides a complete list of all wetlands that would be crossed by the Project, including milepost, NWI and PWI classifications, crossing length, anticipated crossing method, and construction and operation impact acreages.

Table B-2: Wetlands Crossed by the Project

Wetland ID	Approx. Milepost	NWI Wetland Classification[1]	MNDNR Public Water Wetland[2]	Approximate Length of Crossing at Centerline (ft)[3]	Anticipated Crossing Method	Wetland Impacts (acres)[4]	
						Construction[5]	Operation
W-03	0.40	PEM	Yes	382	HDD	0.00	0.00
W-04	0.45	PUB	Yes	839	HDD	0.00	0.00
W-10	1.15	PEM	Yes	258	HDD	0.00	0.00
W-07	1.35	PEM	Yes	160	Open Cut	0.19[7]	0.00
W-20	1.65	PUB	Yes	239	HDD	0.00	0.00
W-61[6]	1.95	PAB	No	121	HDD	0.00	0.00
W-15	2.05	PEM	No	75	HDD	0.00	0.00
W-59	2.10	PUB	Yes	285	HDD	0.00	0.00
W-21	2.50	PUB	Yes	232	HDD	0.00	0.00
W-22	2.72	PUB	Yes	48	HDD	0.00	0.00
W-23	2.82	PEM	No	79	HDD	0.00	0.00
W-58	4.35	PEM	No	0	Side Wetland	0.002[8]	0.00
W-30	5.15	PUB	No	262	HDD	0.00	0.00
W-33	5.95	PUB	No	56	HDD	0.00	0.00
W-34	5.95	PEM	No	123	HDD	0.00	0.00
W-35	6.08	PEM	No	110	HDD	0.13[8]	0.00
W-36	6.12	PEM	No	0	Side Wetland	0.05[8]	0.00
W-37	6.15	PEM	No	95	HDD/Side Wetland	0.09[8]	0.00
W-38	6.16	PFO	No	0	Side Wetland	0.002[8, 9]	0.00
W-40	6.90	PEM	No	0	Side Wetland	0.07[8]	0.00
W-48	7.70	PUB	No	0	HDD Pull-Back	0.12	0.00
					TOTAL	**0.654**	**0.00[10]**

[1]Wetland classifications according to Cowardin (USFWS, 1979)
[2]PWI classifications for jurisdiction of Minnesota Public Waters Wetlands
[3]Length of crossing at centerline equal to "0" indicates wetland is not crossed by Project centerline but is within workspace.
[4]Construction acreage of wetland impacts is the total acres of wetlands disturbed during construction (which are within the permanent easement, temporary workspace, ETWS, or temporary access roads).
[5]All construction impacts are considered to be temporary in nature.
[6]Wetland was identified from road due to restricted access.
[7]0.17 acre would be impacted by temporary wetland matting, while 0.02 acre would be impacted from temporary open-cutting.
[8]Impact is from temporary wetland matting.
[9]W-38, a PFO wetland, is within an existing right-of-way; thus additional clearing of trees and vegetation is not anticipated.
[10]No permanent impacts or conversion are anticipated for PFO or PSS wetlands; thus, no operation impacts are anticipated.

Wetland types were assigned using the NWI classification system (Cowardin et al., 1979). PEM, PFO, PUB, and PAB wetlands were documented in the Project area. PEM

wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. PUB wetlands are characterized by the lack of large stable surfaces for plant and animal attachment. PAB wetlands are characterized by submerged or floating-leaved rooted vascular plants, free-floating vascular plants, submerged mosses, and algae. PFO wetlands are characterized by trees and larger shrubs.

Impacts and Mitigation

Construction of the Project would temporarily affect 0.65 acre of wetlands. Of this, 0.53 acre would occur within PEM wetlands, and 0.12 acre would occur within a PAB wetland as a result of the HDD pullback area associated with the Highway 77 crossing. There would be no impacts on PFO or PSS wetlands, as no wetlands of these types would be impacted; or, as with the case of wetland W-38, Northern would avoid clearing the forested portion (0.002 acre).

Northern would cross the majority of wetlands by HDD, avoiding surface impacts, and would restore other disturbed wetlands to preconstruction conditions without any permanent conversion of wetland type to upland.

The 0.12 acre of PAB wetland impact would be temporary and associated with the pullback of the Highway 77 HDD. The city of Eagan's Wetland Technical Evaluation Panel requested that Northern reclassify W-48 as a stormwater basin and not count this as a wetland impact for their permit application. Although the pullback could impact some aquatic species that utilize this habitat, based on the city of Eagan's Wetland Technical Evaluation Panel request, we anticipate that the impact on this stormwater basin would be minor, as it would revert to preconstruction conditions (i.e., a stormwater basin) following construction.

As discussed in section A.7.2.2, there would be two locations where Northern's proposed ETWS would be within 50 feet of wetland boundaries. One of the wetlands (wetland W-68) is less than 50 feet from an ETWS that is needed for installation of the pig launcher at the Rosemount Junction facility. The wetland is inside the existing facility fence line and would be protected using BMPs outlined in the Procedures. The second wetland (wetland W-48, a stormwater basin) is within a pullback area for an HDD needed to cross Highway 77, an arterial roadway. Northern adjusted the pullback design in order to minimize impacts on this wetland to the greatest extent feasible. Northern has filed the supporting information required by section VI.B.1.b of the Procedures and we have reviewed these locations and find the workspaces are justified.

Impacts on wetlands that would be open cut or used as workspace for the HDD pullback area would be temporarily impacted during construction. The primary impact of Project construction on wetlands would be the potential alteration of wetland vegetation due to clearing, excavation, rutting, compaction, or mixing of topsoil and subsoil. Construction could also affect water quality within affected wetlands due to sediment loading, inadvertent releases of HDD drilling mud, or spills of fuel or other chemicals. Temporary construction impacts on wetlands could include the loss of herbaceous and small woody vegetation if present, wildlife habitat disruption, soil disturbance associated with grading and trenching, increases in sedimentation and turbidity, and hydrological profile changes.

Impacts on wetlands would be greatest during and immediately following construction where surface disturbance occurs. The majority of these effects would be short-term in nature and would cease when or shortly after the wetlands are restored and revegetated. Following revegetation, the wetland would eventually transition back into a community with functionality similar to that of the surrounding undisturbed wetlands. Herbaceous and woody vegetation would typically regenerate within 1 to 3 years. Northern would cross wetlands in accordance with state and federal permits and the Procedures. Measures that Northern would implement to minimize impacts on wetlands include:

- limiting the construction right-of-way width in wetlands to 75 feet;
- limiting construction equipment in wetlands to essential equipment;
- minimizing vegetation clearing in wetlands;
- installing erosion control devices and trench plugs to maintain hydrology as required;
- prohibiting refueling and storage of hazardous materials within 100 feet of wetlands;
- utilizing timber mats to avoid rutting;
- segregating wetland topsoil over the trench line in unsaturated wetlands;
- restoring preconstruction contours to the extent practicable; and
- conducting follow-up monitoring to document successful re-establishment of vegetation and hydrology.

We do not anticipate any permanent impacts on the function and value of wetlands within the construction workspace due to the use of HDDs, the lack of conversion of wetland type to upland, and the implementation of the Plan, Procedures. Northern would conduct all crossing of wetlands in compliance with USACE Section 404 permits terms and conditions.

Based on the use of HDD, the temporary nature of wetland impacts (including those utilized for workspace associated with the drill of Highway 77), and Northern's implementation of the Plan and Procedures, we conclude that wetland impacts associated with the construction and operation of the Project would be adequately minimized and not significant.

3. Vegetation, Fisheries, Wildlife, and Protected Species

3.1 Vegetation

The vegetation cover types impacted by the Project include:

- Agricultural – active farmed cropland (mainly corn and soybean).
- Forested upland – mixed hardwood forests, mixed evergreen and hardwood forests including wild sarsaparilla, smooth brome, red maple, silver maple, boxelder and quaking aspen.
- Open land – non-forested rangeland, pastureland, hayfields, non-agricultural fields, prairie, and open land in the early stages of succession that includes wild sarsaparilla, smooth brome, Kentucky bluegrass, fescue (*Festuca* sp.), reed canary grass, eastern cottonwood, red maple, and silver maple.

- Wetlands/Ponds – including reed canary grass, hybrid cattail, eastern cottonwood, black willow, and silver maple.

The Project would impact 118.79 acres of vegetation during construction; 11.81 acres of vegetated land would be permanent easement for the operational life of the Project.

About 17.3 acres of agricultural land and 95.5 acres of open land would be disturbed during construction of the Project. Both of these vegetation types would be allowed to revert to pre-construction conditions with no permanent change in vegetation type anticipated. Only 5.41 acre of forested land would be cleared for the Project. A majority of the forested area would be allowed to revegetate after construction, although this would represent a long term impact. All of the wetland vegetation impacted would be allowed to revert to preconstruction conditions; there would be no permanent conversion of wetland to upland.

Table B-3 summarizes the temporary construction and permanent operation impacts of the Project on each vegetation community type.

Table B-3: Vegetation Types Impacted by the Project

Vegetation Type	Affected Land (acres)						
	Permanent Right-of-Way	**Existing Above-ground Facilities**	**Temporary Workspace**	**Extra Temporary Workspace**	**Temporary Access Roads[1]**	**Temporary Staging Area**	**Total Construction Areas**
Agricultural	0	0	2.06	2.43	0	12.76	17.25
Forested upland	0.86	0	2.45	0.95	0.79	0.36	5.41
Open land	10.95	0	14.36	25.28	0	44.89	95.48
Wetlands	0	0	0.53	0.12	0	0	0.65
Total	**11.81**	**0**	**19.4**	**28.78**	**0.79**	**58.01**	**118.79**

Northern consulted with the USFWS and MNDNR to determine sensitive or protected vegetation within the Project area. One of the proposed access roads would traverse an area that has been recognized by the MNDNR as "oak forest mesic native plant community." Northern proposes to utilize this existing access road without improvements or modifications beyond the existing road bed; therefore, this native plant community would not be impacted by the Project.

Noxious weeds are opportunistic and are often nonindigenous plant species that readily invade disturbed areas, resulting in monocultures. Invasive species prevent native plants from establishing communities. Noxious weeds also degrade agricultural and natural resources including water, wildlife habitat, and recreational use. Northern obtained lists of noxious and invasive weeds that could be present from the USDA's Introduced, Invasive and Noxious Plants database (NRCS, 2016) and the Minnesota Department of Transportation (2015), and also conducted surveys. The following invasive and noxious weeds of concern could occur within the Project area: black swallow-wort; common teasel; cutleaf teasel; Dalmatian toadflax; giant

hogweed; Grecian foxglove; Japanese hops; oriental bittersweet; palmer amaranth; yellow starthistle; brown knapweed; and meadow knapweed. However, no noxious weed populations were identified within the environmental survey corridor.

Prior to construction, the pipeline right-of-way and workspaces would be cleared of vegetation to the extent necessary to allow for safe working conditions, resulting in direct impacts on vegetation. The clearing of forested areas/trees would result in a long-term impact, even in temporary work spaces. Erosion and sedimentation controls would be installed according to the FERC Plan following soil disturbance.

During operation, maintenance of the permanent pipeline right-of-way would be necessary to allow for visibility and access for pipeline monitoring and maintenance activities. However, due to the deeper installment depths for the HDD segments, Northern would not perform vegetation maintenance within these areas. In upland areas, where the pipeline is installed using standard open cut construction methods, the permanent right-of-way would be 50 feet wide. The right-of-way would be mowed every 3 years, and a 10-foot-wide corridor centered on the pipeline could be mowed at a frequency necessary to allow for periodic pipeline surveys. Northern would not conduct routine vegetation maintenance/mowing of its permanent easement within wetlands.

Northern would reseed disturbed areas according to written recommendations from local soil conservation authorities, landowners, or land managing agencies, and conduct post-construction monitoring of restoration and revegetation. Northern is proposing to use native seed mixes during restoration and revegetation, and would supplement seed mixes recommended by local soil construction authorities with native seeds available from reputable seed suppliers (excluding agricultural fields or where otherwise requested by landowners).

Within wetland areas, Northern would document occurrences of invasive species in the right-of-way; restoration would not be considered complete unless invasive and noxious weeds are shown to be absent, unless they are already abundant in the adjacent areas that were not disturbed by construction.

Northern would place Project staging areas in open, agricultural, and developed lands. Upgrades to existing aboveground facilities associated with the Project would be performed within Northern's existing facilities. Areas within temporary workspaces (including staging areas) would be returned to pre-Project conditions and allowed to revegetate after construction.

In general, the majority of impacts on vegetation types, such as agricultural, open lands, and wetlands, would be short-term, as these areas would be expected to return to preconstruction conditions within a year from the end of construction. Forested impacts, however, represent the greatest impact on vegetation types. Here, vegetation would take longer to return to pre-construction conditions. Although 5.41 acres of forested areas would be impacted during construction, less than 1 acre would be permanently maintained as non-forest for the life of the Project. This represents a very minor amount of permanent forest loss, as Northern has designed the Project to utilize HDDs to the extent practicable to avoid surface impacts.

To further minimize direct and indirect impacts on vegetation communities from construction and operation of the Project, Northern would follow the requirements of the Plan and Procedures, and:

- minimize vegetation clearing through collocation with existing rights-of-way where feasible (about 96 percent of the route);
- use existing roads for access to the Project to the extent possible (100 percent of access roads are existing);
- install temporary erosion control measures, such as slope breakers, sediment barriers, and mulch;
- visually inspect agricultural lands to ensure that crop growth and vigor in areas affected by construction are comparable to adjacent portions of the same field, or as otherwise agreed to by the landowner; and
- conduct annual monitoring and reporting to FERC to document the status of revegetation, until successful.

Revegetation would be considered successful when native vegetation cover and diversity within the disturbed areas are similar to adjacent, undisturbed lands. Northern would not maintain its corridor through wetlands and through the new easement within the LHRP. Within its existing easement within the LHRP, Northern would allow limited vegetation regrowth per agreement with Dakota County. Based on the acreage of each vegetation cover type impacted, the time for most vegetation to revert to preconstruction conditions, and Northern's proposed avoidance, minimization, and mitigation measures to limit Project impacts, we conclude that impacts on vegetation from the Project would not be significant.

3.2 Fisheries

The following fish species are commonly found in the small ponds and lakes along the Project route: black bullhead, black crappie, blue catfish, bluegill, largemouth bass, Northern pike, rock bass, smallmouth bass, and walleye. During Northern's September 2015 and April 2016 field surveys, no waterways were observed crossing or immediately adjacent to the environmental survey corridor. The small ponds and lakes within the proposed construction right-of-way are classified as PUB and PAB wetlands; however, these areas would be crossed using the HDD method. As a result, no waterways would be impacted by the pipeline. One workspace within a PAB wetland would be required for the pullback of the HDD for Highway 77, which could contain some aquatic species, although it was determined to be a stormwater basin as noted above.

All PUB and PAB wetlands that possess the characteristics needed to support fish species (i.e., size and depth of water) would be crossed using the HDD method. By utilizing HDD for all of these crossings, Northern would avoid direct impacts on fisheries during construction of the Project. However, if an inadvertent release of HDD drilling mud occurs within one of these wetlands, the resulting turbidity could affect water quality and impede fish movement, potentially increasing the rates of stress, injury, and/or mortality experienced by fishes. Northern's adherence to its *Plan for Inadvertent Release of Drilling Mud,* HDD Contingency

Plan, SPCC Plan, and the Plan and Procedures would minimize the potential for these impacts, as well as the response time for notification and clean-up, should an inadvertent release occur.

Impacts on fisheries from construction and operation of the Project are not anticipated due to the use of HDD for all crossings of PUB and PAB wetlands that are capable of supporting fish populations. Further, Northern would use a municipal water source for hydrostatic testing. We conclude that impacts on fisheries would not be significant.

3.3 Wildlife

Wildlife habitat types are based on the vegetation types in the Project area. The environmental survey corridor and surrounding vicinity is composed of a combination of developed areas, uplands, agricultural, open, and forest land and the species that inhabit these areas are typical of those found in the urban Upper Midwest habitat.

Game species such as white-tailed deer, wild turkey, and mourning doves occur within the Project area. The Minnesota River and surrounding wetland habitat is used by resident and migratory waterfowl species for breeding and migration. Other migratory birds and non-migratory birds utilize various habitats throughout the Project area. Undeveloped areas support non-game species such as opossum, cottontail rabbits, various rodents, and raccoons. Various other reptiles and amphibians utilize the wetlands, lakes, and ponds in the Project area.

The Minnesota Valley National Wildlife Refuge is approximately 0.5 mile northwest of the existing Cedar Station; however, no direct or indirect impacts are anticipated on the Refuge from the Project.

Impacts and Mitigation

Construction of the Project would have minor impacts on wildlife habitat, causing minor and localized impacts on wildlife populations. Construction activities may result in mortality of less mobile forms of wildlife such as small rodents and reptiles. In addition, construction activities may cause the temporary loss of habitat and the displacement of wildlife from the immediate vicinity of the Project, which could increase stress on wildlife adjacent to the Project. Project construction would require clearing of vegetation from the right-of-way, temporarily decreasing the amount of wildlife habitat and reducing protective cover and foraging habitat in the immediate Project area. Depending on the season, construction could also disrupt bird courting or nesting, including destruction of nests, eggs, and chicks within the construction work area. However, these would be short-term impacts (except along the permanently maintained pipeline right-of-way in forested areas) as all habitats would be allowed to reestablish, thus remaining available for wildlife habitat, post construction. Approximately 0.9 acre of forested lands would be part of the permanent easement that Northern would retain, although some of this is associated with HDDs and would not be cleared. The remaining acreage (4.55 acres) would be allowed to revert to forested lands after construction, representing a long-term impact. The non-forested areas temporarily impacted during construction would be restored per the Plan and Procedures and would be expected to return to preconstruction conditions not long after construction.

Northern proposes to use HDD for the majority of the Project. The pipeline corridor, between HDD entry and exit points, would not undergo routine vegetation maintenance (including within wetlands or within new easement through the LHRP) but would be monitored for encroachments on the right-of-way. By not clearing, grading, or performing ground disturbing construction activities for the majority of the area between HDD drill points, Northern would preserve the existing habitats. The route would also be collocated, and to the extent feasible, utilize for construction, existing pipeline and transportation rights-of-way. This would limit the impact on wildlife that would otherwise be created from a greenfield right-of-way. Overall, less than 5 acres of land would be permanently converted from some other land use to maintained right-of-way. By using existing corridors in mainly non-forested areas, Northern would limit impacts on wildlife that could occur from fragmentation. The majority of the areas where surface disturbance does occur would be allowed to revert to pre-construction conditions, which would only result in a temporary impact on wildlife species present.

Wildlife could also be impacted by the noise of HDD operations; however, this would only be a temporary impact during the construction of each HDD, as this noise would not continue once the HDDs are complete. Construction noise could cause wildlife to leave the area during construction. In general, the northwestern half of the route traverses urbanized areas that already undergo typical noise conditions of an urban setting. Noise impacts on wildlife in this area would be expected to be minimal because wildlife are likely habituated to urban noise conditions. The southeastern half of the Project is more rural. Here wildlife could experience noise to a greater degree in areas not regularly subject to human activities. During a site visit to the LHRP, noise from air traffic from the Minneapolis – St. Paul International Airport was evident as planes were flying directly over the park at lower altitudes. Impacts on wildlife resources within this area are expected to be minor and temporary as noise would only be generated during construction of the Project and some noise impacts from human activities are already evident. After construction and any HDDs are complete, we expect that wildlife would return to the area, as the availability of pre-construction habitat would generally remain the same.

We received comments regarding impacts on turtles that utilize the ponds and wetlands within the Project area. With the exception of some minor workspaces, the majority of impacts on wetlands and ponds would be avoided by use of the HDD crossing method. This would avoid or minimize direct impacts on turtles. Also, with two exceptions discussed above, workspaces would be more than 50 feet from the edge of wetlands or waterbodies, which would help prevent indirect impacts where upland construction occurs.

In conclusion, construction and operation of the Project would result in temporary, short-term, and long-term impacts on wildlife and wildlife habitat. These impacts are expected to be minor given the mobile nature of most wildlife in the area, the characteristics and habitat requirements of species known to occur in the Project area, the availability of similar habitat adjacent and near the Project, the minimal amount of forest clearing, the disturbed/urbanized nature of the majority of the Project the area, and the compatible nature of the restored right-of-way with species occurring in the area. Impacts would also be minimized by collocating the loop with existing rights-of-way, utilizing HDDs, and by implementing the restoration methods outlined in the Plan and Procedures. We conclude that impacts on wildlife would not be significant.

3.4 Protected Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy.

Federal agencies are required under Section 7 of the Endangered Species Act (ESA), as amended, to ensure that any actions authorized, funded, or carried out by the agency do not jeopardize the continued existence of a federally listed endangered or threatened species, or result in the destruction or adverse modification of the designated critical habitat of a federally listed species. As the lead federal agency potentially authorizing the Project, the FERC is required to consult with the USFWS to determine whether federally listed endangered or threatened species or designated critical habitat are found near the Project, and to evaluate each proposed action's potential effects to those species or critical habitats.

For actions involving major construction activities with the potential to affect listed species or designated critical habitat, the lead federal agency must report its findings to the USFWS in a Biological Assessment for those species that may be affected. If it is determined that the action is likely to adversely affect a listed species, the federal agency must submit a request for formal consultation to comply with Section 7 of the ESA. In response, the USFWS would issue a Biological Opinion as to whether the federal action would jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat.

Northern, as our non-federal representative for assisting us in complying with the ESA, consulted informally with the USFWS – Minnesota field office to determine whether any federally listed threatened or endangered species, federal species of concern, or designated critical habitats occur in the Project area. Northern also consulted the MNDNR regarding state listed species and habitats.

Federal and state-listed species that potentially occur within the environmental survey corridor, along with their associated habitats, are presented in table B-4. Consultation with the USFWS regarding federally listed species was initiated by Northern in September 2015 via the USFWS Information for Planning and Conservation online system. Similarly, Northern initiated consultation with the MNDNR regarding state-listed species in September 2015 via the Natural Heritage Information System (NHIS) database (figure B-2). NHIS records indicate that certain state-listed species are known to occur within the environmental survey corridor. One NHIS record for the red-shouldered hawk and one for oak forest mesic native plant community overlap Project access roads. Northern is not planning any major modifications to these existing roads. Minimal tree clearing may be needed in order to allow successful ingress and egress of required construction equipment. Qualified wildlife biologists would conduct presence/absence field surveys two days prior to any tree trimming or clearing activities.

Figure B-2: Natural Heritage Information System Map

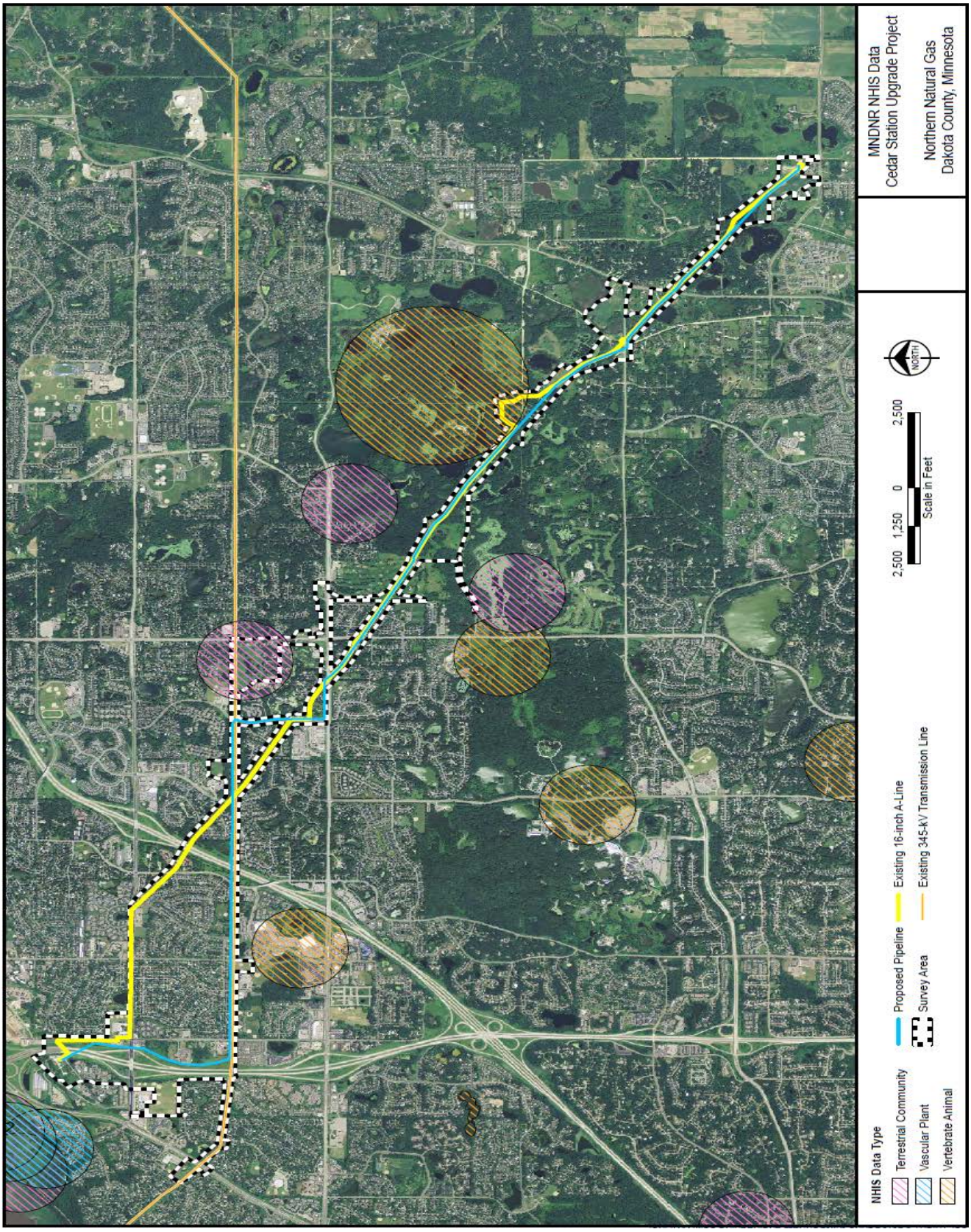


Table B-4: Special Status Species with Potential to Occur in the Project Area[1, 2]					
Common Name	**Species Name**	**Federal Status[3]**	**State Status[3]**	**Brief Habitat Description**	**Suitable Habitat Present[4]**
Birds					
Acadian flycatcher	*Empidonax virescens*	--	SC	Large tracts of mature, intact, closed-canopy deciduous forest	Within, adjacent to, and southeast of the LHRP
Bald eagle	*Haliaeetus leucocephalus*	--	SC	Mature forested areas near lakes and rivers	Within, adjacent to, and southeast of the LHRP
Cerulean warbler	*Setophaga cerulea*	--	SC	Large tracts of mature, intact, closed-canopy deciduous forest	Within, adjacent to, and southeast of the LHRP
Hooded warbler	*Setophaga citrina*	--	SC	Large tracts of mature, intact, closed-canopy deciduous forest	Within, adjacent to, and southeast of the LHRP
Loggerhead shrike	*Lanius ludovicianus*	--	T	Large undisturbed upland grasslands and agricultural areas	No suitable habitat was identified
Peregrine falcon	*Falco peregrinus*	--	T	Mature forested areas near lakes and rivers	Within, adjacent to, and southeast of the LHRP
Red-shouldered hawk	*Buteo lineatus*	--	SC	Large tracts of mature, intact, deciduous forest near wetlands or lakes	Within, adjacent to, and southeast of the LHRP
Trumpeter swan	*Cygnus buccinator*	--	T	Large waterbodies	No suitable habitat was identified
Insects					
Regal fritillary	*Speyeria idalia*	--	SC	Native prairie	No suitable habitat was identified
Mammals					
Northern long-eared bat	*Myotis septentrionalis*	T	SC	Caves, mines, urban dwellings, bridges, forest near wetlands.	Throughout Project area
Plants					
American ginseng	*Panax quinquefolius*	--	SC	Well-developed forest primarily with sugar maple, basswood and red oak.	No suitable habitat was identified
Beach-heather	*Hudsonia tomentosa*	--	SC	Large beaches	No suitable habitat was identified
Big ticktrefoil	*Desmodium cuspidatum var. longifolium*	--	SC	Well-developed forest primarily with sugar maple, basswood and red oak	No suitable habitat was identified
Clasping milkweed	*Asclepias amplexicaulis*	--	SC	Sparsely vegetated soil in savannas and upland prairies	No suitable habitat was identified
Clustered broomrape	*Orobanche fasciculata*	--	SC	Prairies and dunes	No suitable habitat was identified
Creeping juniper	*Juniperus horizontalis*	--	SC	Prairies and dunes	No suitable habitat was identified
Eared false foxglove	*Agalinis auriculata*	--	E	Native prairies	No suitable habitat was identified

Table B-4: Special Status Species with Potential to Occur in the Project Area[1, 2]					
Common Name	**Species Name**	**Federal Status[3]**	**State Status[3]**	**Brief Habitat Description**	**Suitable Habitat Present[4]**
Hair-like beak-rush	*Rhynchospora capillacea*	--	T	Calcareous fens	No suitable habitat was identified
Hill's thistle	*Cirsium pumilum var. Hillii*	--	SC	Southern dry prairies and southern dry savannas	No suitable habitat was identified
James' polanisia	*Polanisia jamesii*	--	E	Southern dry prairies and southern dry savannas	No suitable habitat was identified
Kittentails	*Besseya bullii*	--	T	Southern dry prairies, southern dry savannas and mesic forest	No suitable habitat was identified
Narrow-leaved pinweed	*Lechea tenuifolia var. Tenuifolia*	--	E	Southern dry prairies and southern dry savannas	No suitable habitat was identified
Ovate leaved skullcap	*Scutellaria ovata var. versicolor*	--	T	Well-developed forest primarily with sugar maple, basswood and red oak	No suitable habitat was identified
Plains wild indigo	*Baptisia bracteata var. Glabrescens*	--	SC	Southern dry prairies and southern dry savannas	No suitable habitat was identified
Prairie bush clover	*Lespedeza leptostachya*	T	T	Mesic to dry-mesic prairies	No suitable habitat was identified
Rattlesnake-master	*Eryngium yuccifolium*	--	SC	Prairies	No suitable habitat was identified
Rhombic-petaled evening primrose	*Oenothera rhombipetala*	--	SC	Sandy prairies and dunes	No suitable habitat was identified
Rock sandwort	*Minuartia dawsonensis*	--	SC	Sedimentary bedrock outcrops	No suitable habitat was identified
Sea-beach needlegrass	*Aristida tuberculosa*	--	SC	Sand savannas, sand prairies and dunes	No suitable habitat was identified
Small white lady's-slipper	*Cypripedium candidum*	--	SC	Mesic prairies, wet prairies, sedge meadows and calcareous fens	No suitable habitat was identified
Snow trillium	*Trillium nivale*	--	SC	Well-developed forest primarily with sugar maple, basswood and red oak	No suitable habitat was identified
Sterile sedge	*Carex sterilis*	--	T	Calcareous fens	No suitable habitat was identified
Sullivant's milkweed	*Asclepias sullivantii*	--	T	Mesic tallgrass prairies	No suitable habitat was identified
Tall nut-rush	*Scleria triglomerata*	--	E	Southern dry prairies and southern dry savannas	No suitable habitat was identified
Tubercled reinorchid	*Platanthera flava var. herbiola*	--	E	Wet prairies/ meadows, mesic prairie swales, and sandy or peaty habitats along the edges of marshes, swamps, or lakeshores	No suitable habitat was identified
Tuberous indian plantain	*Arnoglossum plantagineum*	--	T	Native prairies	No suitable habitat was identified

Table B-4: Special Status Species with Potential to Occur in the Project Area[1, 2]					
Common Name	**Species Name**	**Federal Status[3]**	**State Status[3]**	**Brief Habitat Description**	**Suitable Habitat Present[4]**
Twig-rush	*Cladium mariscoides*	--	SC	Calcareous fens	No suitable habitat was identified
Valerian	*Valeriana edulis var. ciliata*	--	T	Calcareous fens, wet meadows and moist prairies	No suitable habitat was identified
Water willow	*Decodon verticillatus*	--	SC	Boggy or marshy margins of lakes and slow-moving streams	No suitable habitat was identified
Whorled nut-rush	*Scleria verticillata*	--	T	Calcareous fens	No suitable habitat was identified
Reptiles					
Blanding's turtle	*Emydoidea blandingii*	--	T	Wetland complexes and adjacent sandy uplands	Within, adjacent to, and southeast of the LHRP
Gophersnake	*Pituophis catenifer*	--	SC	Sand prairies and bluff prairies	No suitable habitat was identified
North American racer (subspecies: blue racer)	*Coluber constrictor foxii*	--	SC	Deciduous forest, bluff prairies, grasslands, open woods, field edges, caves, gravel banks and rock outcrops	Within, adjacent to, and southeast of the LHRP
Mollusks					
Higgins Eye Pearlymussel	*Lampsilis higginsii*	E		Sand and gravel at the bottom of rivers	No suitable habitat was identified

[1]Additional species are listed in Dakota County, but are not applicable for the Project due to their required habitat of rivers or streams.
[2]Information from USFWS Information for Planning and Conservation (2016a), MNDNR NHIS (2016b), and MNDNR Rare Species Guide (2016c).
[3]E = Endangered; T = Threatened; SC = Special Concern

3.4.1 Federally Listed Species

Northern Long-Eared Bat

The northern long-eared bat (NLEB), also known as the northern myotis or northern long-eared myotis, was federally listed as threatened by the USFWS, effective May 4, 2015 (USFWS, 2015). The bat is medium sized with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. They spend winter hibernating in caves and mines with constant temperatures, high humidity, and no air currents. During the summer, they roost singly or in colonies underneath bark and in cavities and crevices of live or dead trees. Males and non-reproductive females may roost in cooler places such as caves or mines. The bats rarely roost in human structures.

NLEB exhibit delayed fertilization. After copulating, females store sperm during hibernation until spring. In spring, the females ovulate and the stored sperm fertilizes the egg. Pregnant bats migrate to summer areas and roost in small maternal colonies where they give birth to a single pup in May or early June to late July. NLEB feed on moths, flies,

leafhoppers, caddisflies, and beetles, which they catch while flying through understory of forested areas or by gleaning from vegetation.

NLEB have been negatively impacted by white-nose syndrome, impacts on hibernacula, loss or degradation of summer habitat (for example, from highway construction or commercial development), clearing of standing dead trees, and wind farm operation (USFWS, 2015). Critical habitat has not yet been designated for the species.

Potentially suitable habitat for the NLEB was observed sparsely throughout the environmental survey corridor in dead trees and snags. According to the USFWS Final 4(d) Rule (USFWS, 2016b), the Project qualifies under the following:

> *Incidental take from tree removal activities is not prohibited unless it results from removing a known occupied maternity roost tree or from tree removal activities within 150 feet of a known occupied maternity roost tree from June 1 through July 31 or results from tree removal activities within 0.25 mile of a hibernaculum at any time.*

There are no known NLEB hibernaculum or maternity roost trees within or adjacent to the construction corridor. Northern completed and submitted the NLEB 4(d) Rule Streamlined Consultation Form on June 1, 2016. Per USFWS's streamlined consultation process, after 30 days of no response, Section 7 consultation for the ESA is considered complete. No additional consultation or response from USFWS were received; therefore, consultation for the NLEB is complete.

Prairie Bush Clover

Prairie bush clover is a federally threatened prairie plant known to occur at scattered locations in the upper Midwest. The majority of plants occur in and near the Des Moines River valley of southwestern Minnesota and the nearby lakes region of northwestern Iowa. Preferred habitat of prairie bush clover includes tallgrass prairie with moderately damp to dry soils. In the early 1800s, native tallgrass prairie covered almost all of Illinois and Iowa, a third of Minnesota, and 6 percent of Wisconsin (USFWS, 2016c). The same habitat that is favored by the prairie bush clover is also considered prime cropland.

The species has become extremely rare because of the widespread conversion of its native prairie habitat to agricultural uses. The majority of surviving populations are in remnant prairies on steep slopes or in other isolated prairie habitats where cultivation is not feasible. Neither the prairie bush clover nor suitable habitat for this species was observed within the Project area. In its March 15, 2016 Habitat Assessment Report to the USFWS, Northern determined that the Project would have no adverse impact on the prairie bush clover. We have reviewed the information and agree that the Project would have *no effect* on the prairie bush clover. As per Section 7, no further consultation is necessary and our ESA responsibilities for this species have been fulfilled.

Higgins Eye Pearlymussel

The Higgins eye pearlymussel is a federally listed endangered freshwater mussel found in large, deep-water rivers with moderate currents (USFWS, 2016d). The mussel buries itself in sand and gravel at the bottom of rivers with only the edge of its partially opened shell exposed. Within the Project area, there are no large, flowing waterbodies with moderate currents, which this mussel depends on to eat, live, and reproduce. In its March 15, 2016 Habitat Assessment Report to the USFWS, Northern determined that the Project would have no adverse impact on the Higgins eye pearlymussel. We have reviewed the information and agree that the Project would have *no effect* on the Higgins eye pearlymussel. As per Section 7, no further consultation is necessary and our ESA responsibilities for this species have been fulfilled.

3.4.2 State-Listed Species

Red-Shouldered Hawk, Acadian Flycatcher, Cerulean Warbler, Hooded Warbler, and Peregrine Falcon

The red-shouldered hawk is listed as a species of special concern by the State of Minnesota. Preferred habitat includes deciduous woodlands, typically near rivers and swamps. These hawks construct stick nests in the main crotch of large, mature trees. Potentially suitable habitat for the red-shouldered hawk was observed within, adjacent to, and southeast of the LHRP. Additionally, an area was identified within the NHIS database that corresponds with the location of a proposed access road for the Project. During field surveys no red-shouldered hawks or nests were observed.

The Acadian flycatcher, Cerulean warbler, hooded warbler, and peregrine falcon could also be found within the same area. If selective tree clearing is necessary along the existing access road, Northern would conduct species-specific surveys along this access road two days prior to tree clearing. Northern would immediately consult with the MNDNR and the USFWS upon discovery of an active nest or areas of nesting activity. Northern would immediately cease all construction and ground disturbing activities within 100 feet of an active nest or areas of nesting activity for migratory birds and 0.25 mile for a raptor's nest. Safety fencing and signage would be installed. The setbacks would be established and the nest would be avoided during the breeding season up until the young have fledged. Should it become necessary to reduce the buffer from 100 feet, Northern would consult with the USFWS and the MNDNR and would not utilize any reduced buffer until the agencies provide concurrence. If this were to occur, Northern would provide record of the concurrence in the weekly report sent to FERC.

By implementing pre-construction surveys, avoidance measures such as the use of HDD within the LHRP, and adopting the buffers as needed if nests are found, we conclude impacts would be minimal on the red-shouldered hawk, Acadian flycatcher, Cerulean warbler, hooded warbler, and peregrine falcon.

Blanding's Turtle

Blanding's turtle, which averages between approximately 6 – 10 inches in length, is most easily characterized by its domed upper shell and its bright yellow chin and throat. The turtle's preferred habitat includes wetland complexes, shallow waters with rich aquatic vegetation, and adjacent sandy uplands. There are several small inundated wetlands (PAB, PUB ponds) within the Project area that contain potentially suitable habitat for Blanding's turtle. These areas are adjacent to and southeast of the LHRP. However, there are no known records of occurrence for this species within or near the environmental survey corridor.

North American Racer

The North American racer (subspecies blue racer) is state-listed as a species of special concern. Its limited distribution throughout Minnesota, due to habitat degradation, collection for pet trade, and den site destruction, make it vulnerable to local extirpation. Adults range in size from 3 – 5 feet in length (MNDNR, 2016c). The dorsal ground color ranges from blue or gray to brown. The chin and throat may be yellow or white with the rest of the ventral surface being white.

The North American racer's preferred habitats include deciduous forests, bluff prairies, grasslands, open woods, field edges, caves, gravel banks, and rock outcrops. Potentially suitable habitat for the racer is present within the Project area. These areas are adjacent to and southeast of the LHRP. However, there are no known records of occurrence for this species within or near the environmental survey corridor.

Conclusion for Blanding's Turtle and North American Racer

Northern proposes to use the HDD method to traverse all of the wetlands and ponds within the LHRP. In order to further reduce the likelihood of an impact to Blanding's turtle and North American racer, Northern plans to distribute informational flyers to all construction personnel that would help in the identification of these protected species. Northern would also encourage its contractors to use wildlife-sensitive erosion control materials when feasible. Additionally, an EI and/or monitor with knowledge of Blanding's turtle and the North American racer would be onsite throughout construction. Northern would also implement the measures on the *Blanding's Turtle Construction Flyer*, including reseeding areas with native forbs and grasses. Northern submitted a Habitat Assessment Report to the MNDNR, detailing the results of its surveys and the measures Northern would adopt to avoid or minimize impacts on sensitive species. The MNDNR responded on June 22, 2016, indicating that the identified measures would minimize disturbance on state-listed species, including Blanding's turtle and North American racer. We agree that impacts would be adequately minimized on these species.

3.4.3 Migratory Birds

Migratory birds are protected under the Migratory Bird Treaty Act (16 U.S. Code §§ 703-711). The Project is within Region 23 (Prairie Hardwood Transition) of the North American Bird Conservation Initiative. Region 23 is second only to the Prairie Pothole region in terms of

support of high densities of breeding waterfowl, including mallard, blue-winged teal, wood duck, and redhead (North American Bird Conservation Initiative, 2000).

The primary concern for impacts on migratory birds is mortality of eggs and/or young, as mature birds could avoid active construction. Tree clearing and ground disturbing activities could cause disturbance during critical breeding and nesting periods, potentially resulting in the loss of nests, eggs, or young. Northern's construction workspaces were designed to minimize the need for tree clearing by use of HDD. Northern would also reduce the potential for impacts on migratory birds by locating the Project along existing rights-of-way for 96 percent of the route. The USFWS stressed that if feasible, all clearing should take place prior to April 15. Assuming all regulatory approvals have been obtained, Northern would attempt to conduct the majority of construction-related tree clearing before this date. In addition, Northern would not perform vegetation maintenance activities between April 15 and August 1 during operation of the Project. If clearing activities would fall between the April 15 and August 1 timeframe, Northern would perform surveys for migratory birds two days prior to any clearing activities. Northern would immediately consult with the USFWS upon discovery of an active nest or areas of nesting activity. Northern would immediately cease all construction and ground-disturbing activities within 100 feet of an active nest or areas of nesting activity (100-foot buffer) for migratory birds and 0.25 mile (0.25-mile buffer) for a raptor's nest. Safety fencing and signage would be installed. Should it become necessary to reduce the buffer from 100 feet, Northern would consult with the USFWS and would not utilize any reduced buffer until the USFWS provides concurrence. Any such event and concurrence would be documented in the weekly report sent to FERC.

The Project is within the range of the bald eagle, which is federally protected under the Bald and Golden Eagle Protection Act in addition to the Migratory Bird Treaty Act. Bald eagles may utilize the Minnesota River corridor (approximately 1 mile northwest of Cedar Station) for fishing and nesting, but no nests were observed in the environmental survey corridor during field surveys. The USFWS recommends a 660-foot buffer between development activities and bald eagle nests to avoid disturbance of bald eagles and their young, which Northern would adopt if its pre-construction surveys find a bald eagle nest. The buffer would be established and no work would take place within the buffer until the nest has fledged or is no longer active. Given the lack of known occurrences and Northern's implementation of buffers, as needed, we conclude that the Project would not impact the bald eagle.

Based on the characteristics and habitat requirements of migratory birds known to occur in the Project area, the utilization of existing rights-of-way and HDDs, the amount of similar habitat adjacent to and in the vicinity of the Project, the commitment to conduct preconstruction surveys and adopt appropriate buffers if applicable, and Northern's implementation of the measures in the Plan and Procedures (including timing restrictions for maintenance mowing of the right-of-way during operation), we conclude that construction and operation of the Project would not have significant impacts on migratory bird populations.

4. Land Use and Visual Resources

4.1 Land Use

Land uses crossed by the Project are divided into seven categories based on vegetation cover or predominant use: agricultural, commercial/industrial, forested upland, residential, open land, wetlands, and paved roads. Each land use category is defined below.

- Agricultural – active farmed cropland and specialty crops (mainly corn and soybean)
- Commercial/industrial – buildings, facilities and businesses that focus on service, manufacturing, and distribution
- Forested upland – mixed hardwood forests, and mixed evergreen/hardwood forest
- Residential – rural and developed residential property
- Open land – non-forested rangeland, pastureland, hayfields, non-agricultural fields, existing rights-of-way, prairie, and open land in the early stages of succession
- Wetlands –PEM, PAB, and PUB
- Paved areas – concrete, asphalt, stone, or brick areas such as roadways, parking lots, or non-motorized paths

Northern proposes to utilize a 100-foot-wide nominal construction right-of-way in areas where the pipeline is installed by traditional upland construction methods, but would use a 75-foot-wide construction right-of-way in wetlands. Approximately 6.3 miles (80 percent) of the Project would be collocated with existing pipeline or transmission rights-of-way and 1.26 miles (16 percent) with existing transportation easements as detailed below:

- MP 0.0 – 2.0: collocated with Northern's existing A-Line;
- MP 2.3 - 4.5: collocated with Northern's existing A-Line;
- MP 4.5 – 4.8: collocated with Thomas Lake Road;
- MP 4.8 – 6.9: collocated with existing transmission line corridor; and
- MP 6.9 – 7.86: collocated with Highway 77.

Construction of the Project would disturb 149.01 acres, of which 58.60 acres would be utilized as staging areas. Specific details about location, dimensions, and land use types for ETWS are provided in appendix E. Table B-5 details temporary and permanent impact acreages by land use types.

The new permanent easement would require 18.65 acres; however, 8.85 would not be maintained during construction. Of the remaining 9.80 acres, only 4.08 acres would require conversion from one land use type to another. The remaining 5.72 acres are currently part of an existing right-of-way.

In upland areas, Northern proposes to maintain a 50-foot-wide corridor, with the exception of inside the LHRP, in wetlands, and also between HDD entry and exit points where Northern would not perform routine vegetation maintenance over its pipeline (but would monitor for encroachments). Routine vegetation maintenance in upland areas would not occur more frequently than once every 3 years.

Table B-5: Land Use Acreages Affected by the Project									
Land Use Category	**Construction Impact (acres)**							**Operation Impact (acres)**	
	New Permanent Right-of-Way Utilized for Construction[1]	**Existing Above-ground Facilities**	**Temporary Workspace**	**Extra Temporary Workspace**	**Temporary Access Roads[2]**	**Temporary Staging Area**	**Total Construction Area**	**Maintained Permanent Right of Way[3]**	**Non-Maintained Permanent Right of Way[4]**
Agricultural	0.00	0.00	2.06	2.43	0.00	12.76	17.25	0.00	0.28
Commercial/industrial	0.00	5.66	0.58	4.28	0.00	0.00	10.52	0.00	0.58
Forested upland	0.86	0.00	2.45	0.95	0.79	0.36	5.41	0.46	1.12
Residential	0.19	0.00	6.08	5.70	1.45	0.00	13.42	1.97	0.70
Open land	10.95	0.00	14.36	25.28	0.00	44.89	95.48	7.37	4.50
Wetlands (PEM, PAB, PUB)	0.00	0.00	0.53	0.12	0.00	0.00	0.65	0.00	1.14
Paved areas	0.00	0.00	0.88	2.61	2.20	0.59	6.28	0.00	0.53
Total	**12.00**	**5.66**	**26.94**	**41.37**	**4.44**	**58.60**	**149.01**	**9.80**	**8.85**

[1] Proposed new permanent right of way that would be impacted during construction (i.e., not crossed by HDD).

[2] Where access roads intersect or traverse other work spaces, impact acreages were included under that category and not included in the temporary access road acreage.

[3] Northern would acquire 18.65 acres of land for permanent operation of the new pipeline easement, of which only 9.8 would undergo routine vegetation clearing. Of the 9.8 acres of proposed right of way, 5.72 acres are currently part of an existing right of way (i.e., energy transmission or transportation corridor) that is currently maintained.

[4] Acreages in this column would be included in the new pipeline easement, but would not undergo routine vegetation clearing.

Agriculture

Northern would require about 17.3 acres of agricultural land for construction. The primary crops grown in the area are corn and soybean. During construction, Northern would maintain landowner access to fields and other agricultural facilities. Within actively cultivated or rotated croplands, managed pastures, and hayfields, topsoil would be stripped and stockpiled separately from the subsoil during grading. The entire topsoil layer, to a maximum depth of 12 inches, from either the full construction work area or over the pipeline trench would be excavated and stored separately from subsoil to prevent compaction and soil mixing. Following construction, crops would be visually inspected to ensure that crop growth and vigor in areas affected by construction is similar to those of adjacent portions of the same field, or as otherwise agreed to by the landowner. Landowners of agricultural land would be compensated for the loss of agricultural production in accordance with the terms of landowner agreements.

No specialty crops, such as orchards, conservation reserve program lands, or organic farms were identified within the Project area.

Currently, Northern is unaware of any irrigation or drainage systems that would be crossed. Northern will consult with landowners prior to construction in an effort to identify any known drain tile systems. Known drain tiles would be noted on the alignment sheets. Survey crews would mark the drain tile locations with highly visible flagging at each right-of-way edge and the centerline of the pipe. Previously undocumented drain tile discovered during grading or trenching also would be flagged at each right-of-way edge. If drain tiles are discovered during construction, work would be halted and the landowner would be notified. Any damaged drain tiles would be repaired or replaced to match pre-construction capacity.

Impacts on agricultural land would be short-term and temporary as the areas would be available for agricultural use immediately after construction. The majority of agricultural lands affected by the Project are associated with staging areas. These areas would be fully returned to their pre-construction conditions with no limitations on future land use. Any agricultural area present over the pipeline would also be returned to its pre-construction condition. Because Northern would implement our Plan and there would not be a long-term or permanent impact on agricultural land, we conclude that impacts on agricultural land would be minimal.

Forested Upland

The majority of forested land can be found at the beginning of the Project between MP 0.5 and MP 3.2. From MP 3.2 to the west, the pipeline continues through highly urbanized development with little to no forested uplands. The Project would impact 5.41 acres of forested upland. Only 1.6 acre is within the operational footprint of the Project, but only 0.46 acre would remain maintained right-of-way. In forested areas of the LHRP, Northern would install the pipeline by HDD, avoiding the need to clear the forested area above the pipeline and would not maintain its right-of-way (i.e., no mowing) within the LHRP.

Northern would clear approximately 4.55 acres of forested land for temporary uses (e.g., temporary workspace, temporary access roads), but would allow these areas to revert to their prior conditions following completion of construction.

The conversion of forested land to open land has the potential to impact its use as a visual buffer and reduce its aesthetic quality. In restored areas, regrowth to pre-construction condition would generally take 20 to 30 years for many species to reach maturity. Hardwood species, such as oaks, could take 50 years to reach maturity. Operational impacts on forested lands would occur on approximately 0.5 acre of the permanent right-of-way, where periodic vegetation maintenance activities would prohibit the re-growth of trees.

Northern has proposed a route that is collocated or adjacent to existing rights-of-way and includes HDDs for the majority of the route. These measures have reduced the amount of tree clearing required for the Project. Northern would allow areas outside of the permanent right-of-way to revegetate with trees, although as noted, this would be a long-term impact. Based on the minimal amount of permanent forest conversion and the use of HDDs and existing rights-of-way, we conclude impacts on forested lands would be minimal.

Residential

The Project generally follows existing rights-of-way through developed areas. About 13.42 acres of residential land would be disturbed by construction of the Project, and 2.7 acres would be required for operation. The majority of the pipeline would be installed by HDD within residential areas to minimize surface impacts. No HDDs would occur directly underneath any residential structures.

More details on the residences that fall within 50 feet of the edge of the Project construction area are provided in section B.4.3. Site-specific residential drawings for residences within 25 feet of the construction corridor can be found in appendix C.

Open Land

The majority of land crossed by the Project is open land (about 95.5 acres). Only 11.87 acres of open land would be required for operation, the majority of which is made up of existing pipeline and transmission corridors; but only 7.37 acres would be maintained by Northern. Temporary construction corridor, workspaces, and the permanent right-of-way would be allowed to revert to open land use following the completion of the Project. Once construction is completed, these areas would be seeded and allowed to return to pre-construction conditions. Northern would conduct routine vegetation maintenance on a 50-foot-wide strip centered over the pipeline with a frequency of not more than once every three years. No permanent impacts on open land as a result of the Project are anticipated. Therefore, impacts on open land would be minimal.

Wetlands

Only a minor amount of wetland would be temporarily impacted by the Project (0.65 acre), as these areas would be allowed to revert to pre-construction conditions. Wetland impacts are more fully detailed in section B.2.3. No permanent impacts on wetlands are anticipated from the Project.

Commercial/Industrial

About 10.5 acres of commercial/industrial land would be impacted by the Project. Where the route parallels Highway 77, the corridor crosses a mixed-use commercial/industrial area running along the back side of nine different establishments, including a landscaping/nursery business, a church, a discount clothing store, and a gas station. As the route would be behind these commercial areas, no direct impacts, besides construction noise, would be anticipated during construction. Northern does propose to use a portion of one parking lot for the HDD of Highway 77.

Northern would install all aboveground valves, pig launchers/receivers, and cathodic protection with the boundaries of its existing facilities or its existing right-of-way. At the Rosemont Junction facility, Northern would relocate its fence line to the property border from its current offset. Because Northern would install its aboveground facilities within existing fence lines and not impact the businesses along Highway 77 directly, we conclude that the Project would only have minimal impacts on commercial and industrial land.

Paved Areas

Northern would cross all public road crossings by HDD or conventional bore. Northern would cross or utilize 6.28 acre of paved areas during construction. Where paved areas are used as extra workspace or staging areas, the pre-construction use would be limited during construction. Access road use that it part of this calculation would not result in any change from the current use. Paved areas would be returned to pre-construction conditions following use, or as specified in landowner agreements.

Recreational or Public Lands

The Project does not cross any wilderness areas, wildlife management areas, wilderness study areas, National or State Wild and Scenic Rivers, or scenic byways. The Project is not within a coastal zone management area and does not cross any natural area boundaries or designated state, federal, or conservation land.

Table B-6 lists recreational and/or public areas would be crossed by the Project. Construction activities across these areas would only result in temporary impacts, including a lack of access during the construction period. Access to trails could be impeded during construction for safety reasons. Once it is safe to utilize the trail, Northern would allow access to continue. In the event the trails, or any other portion of the public recreations areas, are damaged during construction, Northern would immediately repair these areas to pre-construction

conditions following site stabilization. Dust and noise could also impact recreational users during construction, but there would not be any permanent noise or dust impacts on these recreational areas after construction is complete. Northern is coordinating the closure of the trails with the City of Eagan and is working with the City of Eagan on a signage plan during trail closures. Northern also is coordinating with Dakota County on the closure of trails within the LHRP. Dakota County has agreed to create trail detours around Project construction areas. No trail closures are anticipated in the City of Rosemount.

Northern would take special precautions to minimize impacts on public school lands. The majority of work within these areas is currently proposed for summer months when school is not in session; however, Northern would not restrict access to adjacent school properties or facilities. Safety or exclusion fencing and warning signs would be installed to alert the public in areas where public access is within 50 feet of the construction work area and also in areas where an open trench is present.

Although limited impacts on recreational uses would be anticipated, they would be short-term and the measures discussed above would minimize impacts on these areas and ensure restoration to preconstruction conditions.

Table B-6: Public Land and Designated Recreation, Scenic or Other Sensitive Land Use Areas

Milepost Range	Name of Area	Crossing Length (miles)	Acreage Affected by Construction[2]
2.25 – 2.66	County – parks (LHRP)	0.42	0.00
2.66 – 2.70	Community Center	0.04	0.00
2.70–3.27	County – parks (LHRP)	0.57	5.41
4.58 – 4.65	Cities – parks, playgrounds	0.07	0.00
4.79 – 5.29	Cities – parks, playgrounds	0.50	12.06
5.26 – 5.29	Public schools – SD #196	—	0.13
5.43 – 5.49	Cities – parks, playgrounds	0.06	0.79
5.51 - 5.55	Cities – parks, playgrounds	—	0.42
7.11 – 7.27	ISD #191	—	0.69

[1]Cells with "—" denote no permanent pipeline crossing through the area, only a temporary construction crossing.
[2]Temporary construction impacts only; construction would not cause permanent impacts.

4.2 Lebanon Hills Regional Park

Throughout scoping, we received comments on the impact of the Project on the LHRP. This park, at approximately 2,000 acres, is the largest in the Dakota County park system. Through the Lebanon Hills Visitor Center, the park offers interactive nature displays, courses, and programs. Figure A-1 provides the overall Project route as well as boundaries of the LHRP. The LHRP contains about 19 miles of summer hiking trails, 10 miles of equestrian trails, 11 miles of single-lane mountain bike trails, many lakes for year-round activities, and recreation and environmental education programs (Dakota County Parks, 2016).

The LHRP was formed as part of a regional park system as a result of population concentrations in the Twin Cities Metro Area. The Regional Park system was created as a way to accommodate the need for enjoyment of outdoor recreation and the use of open space within a natural setting. The mission of the LHRP, according to the LHRP Master Plan adopted March 17, 2015, is to enrich lives by providing high quality recreation and education opportunities in harmony with natural resource preservation and stewardship.

Northern's existing easement and pipeline existed prior to the creation of the LHRP. Since the creation of the park, Northern has maintained and operated a 16-inch-diameter pipeline through it. Northern's proposed new pipeline would cross about 1 mile of the LHRP. Northern consulted with Dakota County Parks to develop a plan for the installation of the new 20-inch-diameter pipeline, the use of temporary workspace and access near Buck Pond, and the continued operation and maintenance of the its existing pipeline and new easement. On March 8, 2016, the Dakota County Physical Development Committee granted approval for Northern and Dakota County Parks to execute an agreement for the new pipeline and the future operation and maintenance of the pipeline.

Alternative routes that would avoid or cross the LHRP at a different location are evaluated in section C.4.2.

Table B-7: Acreage Affected by Construction and Operation of the Pipeline within the Lebanon Hills Regional Park

Land Type	Construction Right-of-Way[1]	New Permanent Right-of-Way[2]
Forested upland	0.00	0.13
Open land	4.42	0.00
Wetland	0.00	0.00
Existing Access Roads	1.40	0.00
Total Acres:	**5.82**	**0.00**

[1] Construction right-of-way includes the pipeline corridor, temporary workspace, ETWS, staging areas, and access roads requiring modification.

[2] Permanent right-of-way is based on the permanent easement maintained by Northern once the Project is in operation. With the exception of 0.13 acre of new permanent easement (which would not be maintained), the remainder of the permanent easement would be contained within the pre-existing maintained right-of-way. Northern also plans to relinquish 0.13 acre of existing easement back to Dakota County.

Construction activities in the LHRP would result in the disturbance of 4.42 acres. . Northern consulted with Dakota County park officials to develop a construction plan to mitigate impacts on the LHRP. This plan includes the following construction methods/measures:

- utilizing HDD for almost 100 percent of the Project within the LHRP;
- minimizing extra temporary workspaces to 2.54 acres of currently disturbed area (prairie restoration area);
- facilitating the prairie restoration project with Dakota County after construction;
- collocating 4,827 feet (90 percent) of the pipeline within Northern's existing A-Line easement;

- relinquishing a portion of Northern's existing easement to offset the new easement requirements, resulting in zero net permanent easement impact to the Park (however, the pipeline in this new easement, between approximate MPs 2.24 and 3.27 would be installed by HDD);
- limiting tree removal to the extent practicable during construction (Northern does not anticipate clearing any mature trees and estimates 58 trees with trunks 3-inch-diameter or less would need to be removed.); and
- continue working with Dakota County to facilitate increased plantings within Northern's existing easement. Northern estimates that approximately 750 trees and 750 shrubs can be planted within its pipeline easement, allowing increased vegetation on 10 acres within the Park.

Northern has committed to construct the pipeline by using HDD and minimizing the size of the workspace in an effort to avoid impacts on the majority of the park. Public access would be restricted in the area of Buck Pond and at the western edge of the Park where Northern would utilize ETWS to support the HDD. Park officials would provide detours for any trails that are closed. Northern would use the existing maintenance road within the LHRP without any widening. Once construction has been completed Northern would restore the HDD sites and temporary workspaces in accordance with its agreement with Dakota County. Northern would not maintain the pipeline corridor within the LHRP once construction is complete. Northern has come to an agreement with Dakota County concerning the route across the LHRP in an effort to substantially reduce impacts on the park. Based on the construction and restoration methods proposed by Northern within the LHRP, we conclude impacts on the LHRP would be minimized to the extent practicable.

4.3 Residential Areas

There are 30 residences, 7 businesses, 1 apartment building, and numerous other unoccupied buildings (shed or garages) within 50 feet of the construction work areas. Table B-10 identifies each of these residences and buildings by approximate milepost and distance from the active construction work area. Site-specific construction plans for residences within 25 feet of the workspace are provided in appendix C.

Temporary impacts on residential areas may include disturbance of lawns; removal of fences and other minor residential accessory structures; removal of trees and shrubs; disturbance of streets, driveways, and sidewalks; disruption of household utilities; and the noise and general annoyance of construction activities.

Northern has developed residential construction plans for four residences within 25 feet of the proposed construction work area (see appendix C). These plans show the typical construction area to be disturbed and the installation of construction safety fence. Additional measures that would be implemented at these properties are described below. We encourage the owners of each of these residences to provide us comments on the plan for their property.

Table B-8: Existing Residences and Buildings within 50 feet of the Construction Work Area				
Approximate Milepost	**Distance from Centerline (feet)**	**Distance from Active Construction Work Areas**	**Structure Type**	**Residential Site Specific Plan (RSSP) Reference[1]**
NA[2]	1,752	47	House	-
0.02	26	0	Maintenance Shed	-
0.02	40	0	Maintenance Shed	-
0.09	34	10	Shed	-
1.03	87	46	House	-
1.18	174	41	House	-
NA[2]	3,760	25	Business	-
1.42	100	50	House	-
1.51	164	26	House	-
2.00	234	26	Farm Shed	-
3.15	1,057	28	House	-
3.31	66	10	House[3]	RSSP-004
3.32	32	2	House[3]	RSSP-004
3.33	63	18	House[3]	RSSP-004
4.21	32	42	House	-
4.23	57	26	House	-
4.23	85	2	Detached Garage	
4.25	3	N/A	Abandoned Shed	-
4.25	101	42	House	-
4.26	40	26	Detached Garage	-
4.26	133	33	House	
4.47	55	7	Abandoned Shed	RSSP-008
4.50	33	9	House[4]	RSSP-008
4.66	104	26	Apartment	-
5.05	540	46	House	-
5.31	140	34	Shed	-
5.33	116	12	Shed	-
5.41	116	28	Shed	-
5.46	174	47	Shed	-
5.48	157	30	House	-
5.51	170	45	House	-
5.52	171	44	House	-
5.53	70	36	House	-
5.53	184	41	House	-
5.55	24	0	Shed	-
5.59	205	42	House	-
5.62	210	48	House	-
5.64	210	49	House	-
5.82	71	47	House	-
6.18	68	43	House	-
6.20	67	42	House	-
6.24	14	0	Shed	-
6.25	67	42	House	-
6.27	67	42	House	-

Table B-8: Existing Residences and Buildings within 50 feet of the Construction Work Area				
Approximate Milepost	**Distance from Centerline (feet)**	**Distance from Active Construction Work Areas**	**Structure Type**	**Residential Site Specific Plan (RSSP) Reference[1]**
6.29	55	30	Shed	-
6.31	33	8	Detached Garage	-
6.33	67	42	House	
6.37	71	46	Detached Garage	
6.40	70	45	Detached Garage	
6.44	65	40	Detached Garage	
6.47	64	39	House	-
6.52	67	42	Shed	
6.53	57	32	Shed	-
6.54	96	21	Transformer Enclosure	
6.62	57	32	Shed	
6.63	53	28	Detached Garage	-
6.65	66	42	Detached Garage	-
6.70	63	39	Detached Garage	
6.76	35	11	Shed	
6.77	38	14	Detached Garage	
6.82	161	21	Detached Garage	-
7.39	82	31	Business	-
7.40	93	39	Business	-
7.41	78	47	Business	-
7.50	72	4	Business	-
7.57	36	13	Business	-
7.85	423	29	Business	-

[1]Residences without a referenced RSSP are greater than 25 feet from work area, or an RSSP is not required because the structure is uninhabitable.

[2] Structure is adjacent to staging area that is not adjacent to the pipeline route.

[3]Workspace is within the existing maintained pipeline right-of-way.

[4] Northern has obtained landowner consent via temporary workspace agreement.

To minimize impacts on residences, Northern, in consultation with landowners, would implement mitigation measures in residential areas as necessary, including the following:

- install safety fencing along the edge of the construction corridor when adjacent to residences for a distance of 100 feet on either side of the residence, where public access is within 50 feet of the construction work area, and around equipment, such as that used for HDD to and warn people of possible danger in these areas;
- preserve as many trees as practicable on residential properties;
- trim tree branches rather than clearing entire trees (when feasible) on the working side to allow for safe operation and passage of construction equipment and dispose of vegetation removed as negotiated with the landowner;
- restore or replace lawns and landscaping to pre-construction conditions in accordance with Northern's right-of-way encroachment limitation, provided it would not

jeopardize the future integrity of the pipeline or impede access by pipeline personnel for operation and maintenance activities;
- repair, as necessary, fences and other structures within the construction work area as negotiated with the landowner;
- segregate topsoil where appropriate or as negotiated with the landowner;
- maintain utility service during construction activities;
- construct only during daylight hours, except where special conditions dictate (i.e., delays due to weather, HDD activities, other special construction techniques);
- expedite clean-up and backfill as soon as practical after pipeline installation;
- spray the construction right-of-way with water to reduce potential fugitive dust in residential areas during extremely dry conditions;
- consult with landowners for property-specific measures to avoid or minimize impacts;
- limit the disturbance and noise associated with residential construction (construction activities would be limited to 7:00 am to 7:00 pm), except where special conditions or construction measures (such as HDD) dictate, in which case appropriate noise mitigation measures would be utilized; and
- revegetate at the first seasonal opportunity.

Northern would repair or compensate for any Project-related damages to residential properties.

Northern has also developed an Environmental Complaint Resolution Procedure that provides landowners whose properties would be crossed with directions for identifying and resolving issues or concerns during construction and restoration of the Project. Northern would mail a letter to each affected landowner prior to construction that includes Northern's toll-free telephone number and instructions on lodging a complaint or asking a question. Northern also will include FERC's Landowner Helpline telephone number for the landowner to call in the event the landowner is not satisfied with the response using Northern's environmental complaint resolution process.

For each problem/concern received, Northern will include the following information in its weekly report that is filed with the FERC:

- the date of the call;
- the ID number of the certificated alignment sheet for the affected property;
- a description of the problem/concern; and
- an explanation of how and when the problem was addressed and resolved, how it will be resolved, or why it has not been or cannot be resolved.

We have reviewed Northern's Environmental Complaint Resolution Procedures and find it acceptable.

Concerning proposed or future developments, Northern would coordinate with city and county officials. Currently, Phase 6 of the Dakota Path residential development, at approximate MP 3.5, is projected to start in late 2016 or early 2017, although grading activities already

occurred in 2015. Remaining work for this area includes new home construction, laying of sod, and planting of ornamental trees. The existing A-Line corridor already traverses this development, which was formerly a golf course. Northern is proposing an HDD and would stay within the existing A-Line easement in this area; therefore, impacts on this development should be avoided. Additional information regarding Dakota Path is included in the cumulative impacts section.

We received comments on increased noise because of tree clearing. In areas where trees are cleared there could be a long-term increase in noise if the residential area is separated from a road by a tree buffer that is removed. However, the majority of the Project would be constructed using HDDs to cross through residential areas and under major roads or highways, leaving buffering vegetation intact. Northern would also attempt to leave trees intact in residential areas, where possible. Any noise increase would depend on the type of tree, the season, and many other factors affecting how sound attenuates. Based on our review of the current developed nature of the area, we do not believe that tree clearing would result in any significant noise impacts on residential areas.

Based on the measures committed to by Northern as discussed above, the use of existing rights-of-way and HDDs for the majority of the Project, we conclude that only minimal impacts on residential areas would occur. Further, Northern's Environmental Complaint Resolution Procedure Plan would promote resolution of landowner issues, should any occur.

Property Values and Insurance Rates

We received comments regarding the potential effect of the Project on property values, including the devaluation of adjacent property and landowners having to pay increased insurance premiums for Project-related effects. We note that Northern's existing A-Line System itself includes numerous locations where residential and commercial developments were purchased and/or constructed on properties that abut the pipeline right-of-way and occurred after the pipeline was built.

The easement acquisition process is designed to provide fair compensation to the landowner for the company's right to use the property for pipeline construction and operation. In addition, affected landowners who believe that their property values have been negatively impacted could appeal to the local tax agency for reappraisal and potential reduction of taxes. It is not anticipated that the Project would negatively impact property values outside the proposed pipeline right-of-way or meter station boundaries.

Land values are determined by appraisals, which take into account objective characteristics of the property such as size, location, and any improvements. The potential impact of a pipeline on the value of a tract of land would be related to many tract-specific variables, including the size of the tract, the current value of the land, the utilities and services available or accessible, the current land use, and the values of the adjacent properties. However, subjective valuation is generally not considered in appraisals. That is not to say that the presence of a pipeline, and the restrictions associated with a pipeline easement could not influence a potential buyer's decision to purchase a property. If a buyer is looking for a property for a

specific use, which 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 sub-surface structures would likely not find the property suitable, but a farmer looking for land for grazing or additional cropland could find it suitable for their needs. This would be similar to other buyer-specific preferences that not all homes have, such as close proximity to shopping, relative seclusion, or access to high quality school districts.

We are not aware of any situations where property owners' insurance rates have increased as a result of the location or proximity of aboveground or below ground high pressure natural gas pipeline facilities, nor are we aware of any situation where a landowner's ability to obtain insurance was affected.

4.4 Visual Resources

The primary land use category crossed by the Project is open land. The topography of the area affected by the Project is generally flat with heavily forested areas, wetlands, lakes, and residential neighborhoods.

Visual impacts would be greatest during construction, with both heavy equipment and disturbed soils present along the right-of-way. Most impacts would be short-term and temporary and would be reversed once post-construction restoration and revegetation have been completed. Permanent visual impacts would be limited to the conversion of preconstruction land use categories to Northern's new permanent easement, especially in forested areas that would be maintained as open land. Northern would reduce visual impacts in residential areas by maintaining existing hedgerows, landscaping, and other vegetation buffers, as practicable. Northern would also construct much of the Project, including across most of the LHRP, using the HDD method, which would minimize tree clearing and other visual impacts both during and after construction between the drill entry and exit points.

Northern would not construct any aboveground facilities outside the boundaries of its existing Rosemont Junction and Cedar Station facilities, limiting any visual impact from aboveground facilities to existing areas of current natural gas infrastructure. Northern would install visible pipeline markers and cathodic protection test stations along the right-of-way after construction. Most of these areas follow existing rights-of-way that are similarly marked. Based on the above, no significant visual impacts are expected.

5. Cultural Resources

Section 106 of the National Historic Preservation Act, as amended, requires the FERC to take into account the effects of its undertakings on properties on, or eligible for listing on, the National Register of Historic Places (NRHP), and afford the Advisory Council on Historic Preservation an opportunity to comment. Northern, as a non-federal party, is assisting us in meeting our 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 800.2(a)(3).

5.1 Survey Results

Northern conducted a cultural resources survey for the Project, including the pipeline right-of-way, ETWS, staging areas, and access roads, and provided the resulting report (Shaver et al., 2016) to the FERC and the Minnesota SHPO. The survey included background research, archaeological survey, and architectural survey. An approximately 300-foot-wide corridor was surveyed for the pipeline, and a 50-foot-wide corridor was surveyed for access roads. A total of 380 acres was surveyed. A combination of pedestrian survey and shovel testing was utilized in areas of high probability for cultural resources. These areas included a 150-meter buffer around current or historic water bodies or water sources and prominent landforms. Additionally, a 100-meter buffer around the locations of known historic buildings or structures and a 100-meter buffer around previously recorded archaeological sites were surveyed.

As a result of the survey, two new archaeological sites (21DK0103 and 21DK0104) were recorded. Site 21DK0103 was a historic occupation scatter likely associated with a residential building and structures. In addition to the historic scatter, the site had surface features, a windmill and possible pump house, and a modern garage. Site 21DK0104 was a historic occupation scatter. Both sites were unevaluated for NRHP eligibility, and avoidance was recommended. Northern indicated it would avoid Sites 21DK0103 and 21DK0104 through the use of the HDD construction method. In addition, one previously recorded archaeological site (21DK0079) was revisited and recommended as not eligible for the NRHP. The survey report also summarized the results of a Traditional Cultural Properties (TCP) survey (see section 5.2).

One architectural resource was identified. The Project crosses the potentially NRHP-eligible Chicago, Milwaukee, and St. Paul Railroad (DK-RSC-073). The railway line extended 69 miles between Minneapolis and Owatonna, Minnesota. The roadbed was graded in 1858-1859, and the tracks were laid between 1864 and 1865. Avoidance was recommended for this resource. Northern indicated it would avoid the railway by using HDD.

In a letter dated May 27, 2016, the Minnesota SHPO commented on the survey report and requested additional information. Northern provided a revised report to the FERC and SHPO. In a letter dated August 23, 2016, the SHPO agreed with the eligibility recommendations in the report, and that sites 21DK0103, 21DK0104, and the railroad should be avoided. We agree also. The SHPO also requested that Northern confirm avoidance of these resources. Northern provided the SHPO with this confirmation.

5.2 Native American Consultation

In October 2015, Northern mailed letters to 27 Native American tribes, providing Project details and requesting any comments regarding the Project. Tribes contacted included the Bad River Band of Lake Superior Chippewa Indians of Wisconsin; Bah Kho-je Iowa Tribe of Oklahoma; Citizen Potawatomi Nation; Flandreau Santee Sioux Tribe of South Dakota; Forest County Potawatomie Community of Wisconsin; Ho Chunk Nation of Wisconsin; Iowa Tribe of Kansas and Nebraska; Lac Vieux Desert Band of Lake Superior Chippewa Indians; Lower Sioux Indian Community in the State of Minnesota; Meskawakie Nation-Sac and Fox Tribe of the Mississippi in Iowa; Miami Tribe of Oklahoma; Minnesota Chippewa Tribe; Ne ma ha ki – Sac

and Fox Nation of Missouri in Kansas and Nebraska; Peoria Tribe of Oklahoma; Posoh Mawanew Weyak-Menominee Indian Tribe of Wisconsin; Prairie Band Potawatomi Nation; Prairie Island Indian Community in the State of Minnesota; Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin; Red Lake Band of Chippewa Indians; Sa ki wa ki - Sac and Fox Nation of Oklahoma; Santee Sioux Nation, Nebraska; Shakopee Mdewakanton Sioux Community of Minnesota; Sisseton and Wahpeton Tribe of Sioux of the Sisseton Reservation, South Dakota; Sisseton Wahpeton Oyate of the Lake Traverse Reservation, South Dakota; Spirit Lake Tribe, North Dakota; Upper Sioux Community, Minnesota; and Winnebago Tribe of Nebraska.

Of the tribes contacted, the Sisseton Wahpeton Oyate of the Lake Traverse Reservation, and the Rosebud Sioux Tribe expressed interest in the Project. In November 2015, surveyors from the Sisseton Wahpeton Oyate of the Lake Traverse Reservation and Rosebud Sioux Tribe conducted a TCP survey for the Project. Three potential TCPs were identified, including one stone circle and two depressions. On January 13, 2016, Northern representatives met with the Sisseton Wahpeton Oyate of the Lake Traverse Reservation, and the Rosebud Sioux Tribe. During the meeting, HDD construction methods were discussed as an acceptable means to avoid the sites. The stone circle is approximately 92 feet outside of the area of potential effect. In addition, the pipeline would be installed via HDD in this area, as well as in the area of the two depressions. However, a workspace for stringing HDD pull sections is in the area of the two depressions. Northern indicated it would place protective matting in this area to avoid impacts during construction, and the Sisseton Wahpeton Oyate have agreed this is acceptable. Northern would also provide the TCP report to the FERC and SHPO, if allowed by the tribe. In its August 23, 2016 letter, the SHPO requested additional information regarding the two depressions. Northern provide additional information to the SHPO, but has not yet filed the SHPO's comments on the information, or the SHPO's comments on Northern's proposed protective measures for the two depressions. No responses to Northern's letters have been received from the remaining tribes.

We sent our NOI to these same tribes. In response to our NOI, the Winnebago Tribe of Nebraska indicated that construction should proceed, but requested to be notified if burial sites or other cultural properties were found during construction. The Unanticipated Discoveries Plan (see below) provides for notification of tribes in the event of a discovery. No other responses have been received.

5.3 Unanticipated Discoveries Plan

Northern developed an Unanticipated Discoveries Plan to be implemented in the event that previously unidentified archaeological sites or human remains are encountered during construction of the Project. This plan provides for the notification of interested parties, including the FERC, SHPO, Office of the State Archaeologist, and interested Native American tribes, in the event of a discovery. We requested revisions to the plan. Northern provided a revised plan which we find acceptable.

5.4 Compliance with the National Historic Preservation Act

Northern has not yet filed the SHPO's comments on the additional information regarding the two depressions identified in the November 2015 TCP survey, or on Northern's proposed protective measures for the two depressions. Therefore, **we recommend that Northern <u>not begin Project construction until</u>:**

Northern files with the Secretary of the Commission (Secretary):

a) the SHPO's comments on the additional information regarding the two depressions, and on Northern's proposed protective measures for the two depressions;
b) the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties would be adversely affected; and
c) the FERC staff reviews and the Director of the Office of Energy Projects (OEP) notifies Northern in writing that construction may proceed.

All material 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: "CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE."

6. Socioeconomics

The Project is within Dakota County, Minnesota. The major towns in the Project area, Rosemount and Eagan, are home to approximately 22,998 and 66,084 persons, respectively (U.S. Census Bureau, 2015a).

Employment

Based on the U.S. Bureau of Labor Statistics, the April 2015 average unemployment rate for Minnesota was 3.7 percent, with an unemployment rate of 3.3 percent for Dakota County.

Northern estimates an average workforce of 75 people throughout the construction phase of the Project, including inspection personnel. Attempts would be made to hire local and regional construction workers to the extent possible, provided these workers possess the necessary skills and experience for pipeline construction. If workers from outside the region move into the area, local hotels, restaurants and shops may experience a temporary increase in business, which may result in the need to hire additional help on a temporary basis. Therefore, a temporary lowering of unemployment rates for the region is possible. Upon completion of construction, no new permanent staff beyond those already working for Northern would be required to operate the new pipeline facilities. Because there would be no new permanent hires, it is unlikely that local businesses would detect a continued increase in business once construction activities are completed. Overall, no short- or long-term effects on employment are expected.

Transportation

Northern would utilize existing roadways for right-of-way access, and local roads would experience higher levels of traffic from construction workers, equipment, and materials delivery during morning and evening peak travel periods. A temporary increase in traffic is expected from commuter (worker) traffic and from the transportation of equipment and materials for construction. The initial construction staging, which would involve transporting the bulk of the construction equipment and materials to areas along the Project route, and the daily transportation of additional equipment and materials may temporarily affect local transportation systems. Traffic patterns could occasionally be affected because the route would encounter a number of roads and intersections. The transportation of equipment and materials would be consolidated through planning and coordination to limit the number of separate vehicle trips.

Housing

Construction of the Project would require a peak workforce of approximately 150 workers. As previously stated, Northern anticipates the majority of workers would travel temporarily from outside of the immediate Project area. The 2014 rental housing vacancy rates in Dakota County was 1.9 percent (Dakota County, 2016). There are eleven hotels, five campgrounds, and thirteen apartment complexes in or near the Project area (Google Maps, 2015).

Based on the number of available rental units, hotels/motels, recreational vehicle parks, and campgrounds in the Project area, it is anticipated that there would be sufficient housing available for the peak Project workforce. However, the presence of the construction crews could cause a minor, temporary impact on the availability of hotels/motels in the area. Because the workforce would only be in the area for up to seven months, any impacts would be temporary. Operation of the Project would not require new full-time workers. Impacts on housing would be negligible in the Project area.

Tax Revenue

The construction and operation of the Project would result in increased tax revenues to the State of Minnesota, Dakota County, and other local taxing authorities. Once in operation, Northern would pay ad valorem taxes based on the assessed value of the pipeline facilities. This would result in a minor increase in the amount of taxes paid to Dakota County, which could result in a net benefit to the county.

Services

The Project is just outside of Minneapolis, in the suburbs within Dakota County. This area contains adequate police, fire, ambulance, and other public services, such as schools, to handle the temporary increase in construction personnel (approximately 150 workers) that might relocate to the area during construction. Therefore, any impact on county services is expected to be minimal.

The Project does not involve the construction of significant aboveground facilities and would not have an appreciable impact on socioeconomic factors within the Project area.

7. Air Quality and Noise

7.1 Air Quality

The Project would result in air pollutant emissions through short-term construction activities. The long-term impact would be a reduction in air pollutant emissions as the purpose of the Project is to provide an increased capacity of natural gas to the Black Dog Generating Station so that it can continue to convert from coal-burning operations to natural gas.

7.1.1 Existing Air Quality

Federal and state air quality standards are designed to protect human health. The EPA has developed National Ambient Air Quality Standards (NAAQS) for criteria air pollutants such as oxides of nitrogen (NO_x) and carbon monoxide (CO), sulfur dioxide (SO_2), and inhalable particulate matter ($PM_{2.5}$ and PM_{10}). $PM_{2.5}$ includes particles with an aerodynamic diameter less than or equal to 2.5 micrometers, and PM_{10} includes particles with an aerodynamic diameter less than or equal to 10 micrometers. The NAAQS were set at levels the EPA believes are necessary to protect human health and welfare. VOCs and hazardous air pollutants (HAP) are also emitted during fossil fuel combustion.

Greenhouse gases (GHGs) occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels. These gases are the integral components of the atmosphere's greenhouse effect that warms the earth's surface and moderates day/night temperature variation. The EPA has expanded its definition of air pollution to include six well-mixed GHGs, finding that the presence of these GHGs in the atmosphere endangers public health and public welfare currently and in the future. The principle GHGs that would be emitted by construction and operation of the Projects facilities are carbon dioxide (CO_2) and methane, primarily from construction equipment and as fugitive emissions along the pipeline. GHGs are non-toxic and non-hazardous at normal ambient concentrations, and there are no applicable ambient standards or emission limits for GHG under the Clean Air Act. Emissions of GHGs are typically expressed in terms of CO_2 equivalents (CO_{2e}). Impacts from GHG emissions (climate change) are discussed in more detail under the Cumulative Impacts section of this EA.

If measured ambient air pollutant concentrations for a subject area remain below the NAAQS criteria, the area is considered to be in attainment with the NAAQS. A portion of Dakota County is a nonattainment area for the 2008 lead standard. This area is bounded by Lone Oak Road (County Road 26) to the north, County Road 63 to the east, Westcott Road to the south, and Lexington Avenue (County Road 43) to the west. The Project would not be within this nonattainment area; therefore, the air emissions from Project construction would not be subject to the nonattainment emissions thresholds. Dakota County is classified as an attainment area for all other NAAQS pollutants (EPA, 2015b).

7.1.2 Regulations

The Clean Air Act is the basic federal statute governing air pollution in the United States. We have reviewed the following federal requirements and determined that they are not applicable to the proposed Project:

- New Source Review;
- Title V;
- National Emissions Standards for Hazardous Air Pollutants;
- New Source Performance Standards;
- Greenhouse Gas Reporting Rule; and
- General Conformity of Federal Actions

7.1.3 Construction Emissions

Construction of the Project would result in intermittent and temporary emissions of criteria pollutants. These emissions generally include fugitive dust (PM_{10} and $PM_{2.5}$) generated from soil-disturbing activities, such as earthmoving and wind erosion of disturbed areas, and vehicle traffic during construction. The amount of dust generated during construction would be a function of precipitation, vehicle numbers and types, vehicle speeds, and roadway characteristics. Dust emissions would be greater during dry periods and in areas of fine-textured soils. The emission estimates for construction activities are summarized in table B-9.

Construction results in combustion emissions from diesel- and gasoline-fueled vehicles used in various construction activities. As listed in table B-9, combustion-related emissions would include nitrogen oxides (NO_x), CO, VOC, SO_2, PM, small amounts of HAPs, and GHGs. The EPA requires manufacturers of on- and off-road engines to certify their products to engine emission standards based on the year of manufacture. For diesel engines, the emission standards have been phased in over the past two decades in four steps, referred to as Tier 1 to Tier 4. The engine must comply with the emission standards throughout its life. In 2010, the EPA required the sulfur concentration in diesel fuels be lowered from historical concentration of 500 parts per million to 15 parts per million (ultra-low sulfur diesel fuel), which allows diesel engines to meet current Tier 4 emission requirements. Proper maintenance of construction equipment and use of low-sulfur diesel fuel would reduce engine emissions during Project construction. To reduce emissions from internal combustion engines, idling of construction vehicles would be limited.

Pipeline construction would generally take place during daylight hours. This schedule would allow equipment operators to assess the presence of fugitive emissions and to implement abatement measures, as needed. However, tie-ins, hydrostatic testing, and HDDs may extend beyond daylight hours to ensure mechanical efficiency. Once begun, the HDD crossings may be conducted continuously (24 hours per day) until completed. Northern would employ dust control measures such as watering access roads, storage piles, and disturbed surfaces during construction and restoration. Additional measures that would be implemented include imposing a vehicle speed restriction on unpaved roads, using gravel tracking pads at egress points to remove dirt from tires and tracks, and restoring disturbed areas following construction.

The Project construction schedule would determine the period of time in which construction-related emissions would occur and also the total quantity of emissions. Construction is scheduled to begin in April 2017 and extend through October 2017, with an in-service date of November 1, 2017. Through the implementation of the work practices described above and given the short duration of the construction activities, the temporary emissions during construction of this Project would be minor, and the impact of these emissions would be localized. Therefore, we conclude these emissions would not have a significant impact on regional air quality.

Table B-9: Summary of Construction Emissions

Description	Emissions (tons per year)								
	Criteria Pollutants						GHGs (as CO_2e)	Formaldehyde	Total HAPs
	NO_x	CO	VOCs	SO_2	PM_{10}	$PM_{2.5}$			
Engine emissions	44.46	10.85	3.40	0.02	1.78	1.73	2,090.41	0.40	0.67
Unpaved roads – pipeline installation	--	--	--	--	10.57	1.06	--	--	--
Earthmoving	--	--	--	--	1.37	0.28	--	--	--
Total emissions	**44.46**	**10.85**	**3.40**	**0.02**	**13.72**	**3.07**	**2,090.41**	**0.40**	**0.67**

7.1.4 Operational Emissions

Northern does not propose any new compression or changes to compressor stations or operating emission sources as part of the Project; therefore, no permitting actions are required. However, operation of the Project would result in fugitive gas emissions along the pipeline. These fugitive emissions consist of CO_2 and methane. The operational fugitive emissions are summarized in table B-10. The small quantity of fugitive operational emissions would not have a significant impact on local or regional air quality. Also to be considered is the purpose of the Project: to increase the delivery pressure of natural gas provided to Northern's customer, NSP-MN as it continues to convert its fuel source from coal to natural gas. By displacing the use of coal-burning generation with natural gas, the cumulative impact on air quality would be a considerable benefit. Additional details regarding the cumulative reduction of emissions from the Black Dog Generating Station are included below.

Table B-10: Summary of Operational Fugitive Emissions

Description	Pollutant (tons per year)		
	CO_2	Methane	Total CO_2e
Fugitive pipeline emissions	0.03	0.09	2.28

7.1.5 NSP-MN Project at Black Dog Generating Station

The purpose of the Project is to provide higher delivery pressures to NSP-MN for service to its peaking facility, the Black Dog Generating Station, allowing NSP-MN to continue its portfolio conversion from coal to natural gas, resulting in a reduction in GHG emissions. In a presentation at a recent public meeting, NSP-MN detailed air quality benefits from the

conversion: particulates would be reduced by 98 percent; SO_2 and mercury emissions would be reduced entirely; NO_x emissions would be reduced by 99 percent; and CO_2 emissions would be reduced by 83 percent.

In the May 25, 2016 EA prepared by the Minnesota Department of Commerce (MNDOC), it was explained that the Black Dog Unit 6 Project along with the decommissioning of coal-fired Unit 3 and coal-fired Unit 4, would result in a net emission decrease from the Black Dog Generating Station.[8] Because the Black Dog Unit 6 is designed as a peaking facility, and would only operate at times of high electric demand (e.g., hot summer afternoons, or to offset fluctuations in intermittent or variable generation sources, such as solar and wind), it would not operate continually. Table B-11 provides the expected emission levels for Unit 6 and net emissions when considered with other contemporaneous coal to nautral gas conversion projects at Black Dog Generating Station. The MNDOC EA further explains that air dispersion modeling analysis was conducted and determined that emissions from Unit 6 will not cause or contribute to a violation of the state or federal air quality standards.

Table B-11: Estimated Potential Annual Air Emissions and PSD Thresholds for the Black Dog Unit 6 Project

Pollutant	Limited Potential to Emit (Tons per Year)	Net Emissions Increase for Entire Black Dog Generating Facility (Tons per Year)	PSD Major Modification Threshold (Tons per Year)
Particulate Matter (PM)	10.26	10.26	25
PM less than 10 Microns (PM_{10})	10.26	10.26	15
PM less than 2.5 Microns ($PM_{2.5}$)	10.26	-44.9	10
Nitrogen Oxide (NO_x)	103.5	-6,017	40
Sulfur Dioxide (SO_2)	10.98	10.98	40
Carbon Monoxide (CO)	177.3	-18.49	100
Volatile Organic Compounds (VOC)	22.02	22.02	40
Lead	0.00158	0.00158	0.6
Carbon Dioxide Equivalent (CO_{2e})	378,000	-1,200,000	75,000
Sulfuric acid Mist	0.00135	0.00135	7

Source: Black Dog Unit Six Project, EA filed in MNDOC Docket No. E002/GS15-834, May 25, 2016, p.54.
PSD = prevention of significant deterioration

Based on the information obtained from MNDOC's EA for the Black Dog Unit 6 Project and other contemporaneous conversion projects, any contribution on air quality by the related conversions would result in a net benefit on local air quality and on emissions of GHGs.

[8] Black Dog Unit Six Project, EA filed in MNDOC Docket No. E002/GS15-834, May 25, 2016, p.53.

In consideration of our analysis above, we conclude that construction and operation of the Project would not significantly impact local or regional air quality in the Project area. Given the reduction in emissions at the related Black Dog Generating Station, there would be long-term benefits on air quality in the Project area.

7.2 Noise

The noise environment 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 day-night sound level (L_{dn}). The L_{eq} is the level of steady sound with the same 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.

7.2.1 Noise Regulations

Federal Noise Regulations

In 1974, the EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* This document provides the information for state and local governments to use in developing their own ambient noise standards. The EPA has established that an L_{dn} of 55 dBA protects the public from indoor and outdoor activity interference. We have adopted this criterion and use it to evaluate the potential noise impacts from the Project at noise sensitive areas (NSA). Due to the 10 dBA nighttime penalty added prior to the calculation of the L_{dn}, for a construction activity to meet the 55 dBA L_{dn} limit, it must be performed such that actual constant noise levels on a 24-hour basis does not exceed 48.6 dBA L_{eq} at any NSA. An NSA is an area that, because of its use by humans and the importance of reduced noise levels to such use, is designated for management which limits the noise levels from long-term and/or continuous noise-producing sources. Examples of NSAs include residences, churches, and hospitals.

State Noise Regulations

Minnesota Administrative Rule Chapter 7030 sets forth local noise regulations established for the preservation of public health and welfare. These standards are consistent with speech, sleep, annoyance, and hearing conservation requirements for receivers within areas grouped according to land activities by the Minnesota noise area classification (NAC) system established in Part 7030.0050. These standards are shown in table B-12.

Table B-12: Minnesota Noise Regulations				
Noise Area Classification	**Daytime[1] (dBA)**		**Nighttime[1] (dBA)**	
	L_{10}	**L_{50}**	**L_{10}**	**L_{50}**
1	65	60	55	50
2	70	65	70	65
3	80	75	80	75

Source = Minnesota Administrative Rule Part 7030.0050

[1]L_{10} = noise level exceeded 10 percent of the time; L_{50} = noise level exceed 50 percent of the time

Minnesota's noise pollution rules are based on statistical calculations that quantify noise levels over a 1-hour monitoring period. The L_{10} calculation is the noise level that is exceeded for 10 percent, or 6 minutes, of the hour. The L_{50} calculation is the noise level that is exceeded for 50 percent, or 30 minutes, of the hour. The daytime time period is defined as 7 a.m. to 10 p.m. The nighttime time period is defined as 10 p.m. to 7 a.m.

NACs are based on the land use at the location of the person who hears the noise, which does not always correspond with the zoning of an area. Therefore, noise from an industrial facility near a residential area would be held to NAC 1 standards if it can be heard from a residential property. Some common land uses associated with the NACs include (MPCA, 2015):

- NAC 1: Residential housing, religious activities, camping and picnicking areas, health services, hotels, educational services;
- NAC 2: Retail, business and government services, recreational activities, transit passenger terminals;
- NAC 3: Manufacturing, fairgrounds and amusement parks, agricultural and forestry activities; and
- NAC 4: Undeveloped and unused land

Note that while there is a NAC 4 category, there are no noise standards for these areas. The full list of NAC land uses is presented in Minnesota Administrative Rule Part 7030.0050. During construction activities, Northern would meet the Minnesota noise requirements or obtain proper exemptions.

7.2.2 Construction Noise Impacts

Noise impacts from construction of the Project would be temporary. Sources of noise during general pipeline open-cut construction would include heavy equipment operation. In order to limit noise impacts associated with the Project, construction activities generally would be conducted during the daytime, except in cases where nighttime construction may be necessary (e.g., HDD crossings, described below).

7.2.2.1 HDD Construction

In order to reduce impacts on environmental resources and local traffic flow, Northern is proposing the use of HDD in numerous locations along the route, summarized in table A-2. During HDD operations, construction work hours are expected to extend beyond the construction work hours allowed by Eagan's and Rosemount's noise ordinances and into nighttime construction. Northern applied for and received a Conditional Use Permit for the City of Rosemount; the City of Eagan does not require a Conditional Use Permit.

Typical HDD operations generate a noise level of approximately 85 dBA at a distance of 50 feet. The sound level at any specific NSA would be a function of that location's distance from the HDD entry site and any intervening topography, infrastructure, and/or foliage. Northern conducted ambient noise level surveys at nearby NSAs in April 2016. Northern predicted the anticipated sound pressure levels that would occur during HDD crossings at each entry and exit point. Anticipated drilling durations are greater than 24 hours for every HDD; therefore, each location has been modeled for 24-hour construction to represent a worst-case scenario. Table B-13 provides the change in predicted sound levels resulting from each HDD over the ambient noise level for the closest NSAs; appendix F shows a more extensive list for the closest NSAs in each cardinal direction, including maps and the maximum predicted sound levels at these NSAs of both mitigated and unmitigated HDD operations.

Northern states that it would endeavor to design and apply noise abating measures during HDD operations in order to meet specific noise levels or coordinate with affected residents to obtain their approval for alternative options. General mitigation measures that could be implemented at each site may consist of one or a combination of multiple efforts listed below.

- temporary noise abatement structures such as a noise curtain or sound wall;
- silencers of all engines;
- enclosures or wraps enclosing all equipment;
- relocation of equipment;
- use of low-noise equipment; and
- providing temporary housing and/or monetary compensation for affected residents; for drill durations lasting less than one week.

In the event the noise levels could not be reasonably mitigated, Northern would work directly with the affected residents to provide reimbursement for temporary accommodations outside the construction area. To ensure that the noise would not have a significant impact on local residents, we further recommend that:

Prior to construction of any HDD, Northern should file with the Secretary, for the review and written approval by the Director of OEP, an HDD noise mitigation plan to reduce the projected noise level attributable to the proposed drilling operations at nearby NSAs. During drilling operations, Northern should implement the approved plan, monitor noise levels, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than an L_{dn} of 55 dBA at the NSAs.

Table B-13: Closest NSAs to the HDD Entry and Exit Locations					
HDD Number	**Entry or Exit Point**	**Estimated HDD Drilling Duration (Hours)**	**Approximate Distance and Direction of Closest NSA from HDD Entry or Exit**	**Potential Noise Increase from HDD Without Mitigation (dBA)**	**Potential Noise Increase from HDD With Mitigation (dBA)**
HDD #1	Exit	154	489 feet SW	14.6	5.5
	Entry		85 feet NE	32.2	3.8
HDD #2	Entry	54	85 feet NE	32.2	3.8
	Exit		262 feet W	17.2	3.8
HDD #3	Entry	72	151 feet SW	24.8	10.0
	Exit		371 feet SE	12.6	10.0
HDD #4	Exit	222	354 feet N	21.2	8.6
	Entry		1,115 feet SW	0.8	NA
HDD #5	Entry	50	1,047 feet SW	1.5	NA
	Exit		133 feet NW	21.1	10.0
HDD #6	Exit	157	350 feet NW	21.1	8.2
	Entry		85 feet E	19.1	10.0
HDD #7	Entry	41	36 feet SE	33.8	10.0
	Exit		87 feet E	25.1	10.0
HDD #8	Exit	63	240 feet NE	25.2	9.2
	Entry		220 feet S	18.4	10.0
HDD #9	Entry	72	213 feet SE	11.8	10.0
	Exit		280 feet W	5.6	NA
HDD #10	Entry	45	220 feet S	11.8	10.0
	Exit		50 feet NE	28.7	10.0
HDD #11	Exit	45	105 feet NW	20.8	10.0
	Entry		125 feet S	17.9	10.0
HDD #12	Entry	49	489 feet SE	11.9	10.0
	Exit		413 feet S	11.5	10.0
HDD #13	Entry	45	375 feet E	5.2	NA
	Exit		215 feet E	8.7	NA
HDD #14	Exit	50	184 feet E	8.1	NA
	Entry		338 feet S	9.6	NA

Because of the temporary nature of construction activities, and our HDD noise recommendation, we conclude that no significant noise impacts would result from construction of the Project.

7.2.3 Operational Noise Impacts

No new or additional compression is proposed as part of the Project. No new meter or regulating stations are proposed. No measureable increase in noise levels or vibrations are expected from operation of the pipeline.

8. Reliability and Safety

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

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death. Methane has an auto-ignition temperature of 1,000 °F and is flammable at concentrations between 5.0 percent and 15.0 percent in air. An unconfined mixture of methane and air is not explosive; however, it may ignite and burn if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. Methane is buoyant at atmospheric temperatures and disperses rapidly in air.

8.1 Safety Standards

The DOT is mandated to prescribe minimum safety standards to protect against risks posed by pipeline facilities under Title 49, U.S.C. Chapter 601. The DOT's 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 the required safety standard. PHMSA's safety mission is 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.

Title 49, U.S.C. Chapter 601 provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards. A state may also act as DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement actions.

The DOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses the minimum federal safety standards for transportation of natural gas by pipeline. Under a *Memorandum of Understanding on Natural Gas Transportation Facilities* dated January 15, 1993, between the DOT and the FERC, the DOT 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 will 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. Alternatively, an applicant must certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. The FERC accepts this certification and does not impose additional safety standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the DOT. The Memorandum 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 pipeline and aboveground facilities associated with the Project must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion. Northern has stated that the Project facilities would be designed, constructed, operated, and maintained in accordance with 49 CFR 192.

8.2 DOT Class Locations

DOT regulations at 49 CFR 192.111 define area classifications based on population density near the pipeline. Areas of higher population face more stringent requirements. A “class location unit” is defined as an area that extends 220 yards (660 feet) on either side of the centerline of any continuous 1-mile-length of pipeline. The four area classifications are defined as follows:

- Class 1: Location with 10 or fewer buildings intended for human occupancy.
- Class 2: Location with between 11 and 45 buildings intended for human occupancy.
- Class 3: Location with 46 or more buildings intended for human occupancy or where the pipeline is within 100 yards (300 feet) of any building, or small, well-defined outside area such as a playground or other recreational area occupied by 20 or more people at least 5 days per 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 within a Class 1 location 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 of separation of pipe from mainline block valves (i.e., 10.0 miles in Class 1 locations, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4). The Project is entirely within defined Class 3 areas; therefore, the facilities for the Project would be designed to meet or exceed Class 3 standards.

As it is currently designed, approximately 48 percent of the route would be installed at a much greater depth than minimally required by the DOT regulations, reducing the potential for third-party damage.

Pipe design regulations for steel pipe are contained in 49 CFR 192, Subpart C. Section 192.105 specifies a formula for the pipeline’s design pressure. Sections 192.107 through 192.115 describe the required components of the design formula, including yield strength, wall thickness, design factor, longitudinal joint factor, and temperature derating factor. These

components are adjusted according to Project conditions. Northern's design would comply with all of these requirements.

If a subsequent increase in population density adjacent to the right-of-way results in a change in class location for the pipeline, Northern would reduce the maximum allowable operating pressure or replace the segment with pipe of sufficient grade and wall thickness, if required to comply with DOT requirements for the new class location.

8.3 High Consequence Areas and Integrity Management Planning

PHMSA promulgated a rule for pipeline integrity management in high-consequence areas (HCA) for natural gas transmission pipelines that has been incorporated into 49 CFR 192, Subpart O. This rule requires that an integrity management plan be developed to document procedures under which pipeline integrity would be monitored and maintained for those areas where the pipeline traverses lands or facilities that are considered HCAs.

DOT regulations in 49 CFR 192.903 identify a formula that is utilized to estimate the distance from a potential explosion at which death, injury, or significant property damage may occur adjacent to natural gas transmission pipelines and associated facilities. This distance is known as the potential impact radius and is defined as the radius of a circle within which potential failure of a pipeline could have significant impact on people or property.

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 radius[9] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[10]; 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, an HCA includes any area within a potential impact circle that contains:

[9] 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.

[10] The potential impact circle is a circle of radius equal to the potential impact radius.

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

Based on preliminary designs and available aerial imagery, Northern has identified two potential HCAs along the Project route, between approximate MPs 3.2 and 6.9 and between approximate MPs 7.3 to 7.86. Should the proposed route be granted a Certificate and analysis confirms these HCAs, they would be added to Northern's Integrity Management Plan. The pipeline integrity management rule for HCAs requires inspection of the pipeline HCAs every 7 years.

8.4 Operations, Maintenance, and Emergency Planning

The DOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the 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 of 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 and then property, and making them safe from actual or potential hazards.

The DOT 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.

The DOT also requires pipeline operators to place pipeline markers identifying the owner of the pipe and a 24-hour telephone number, as close as practical over each buried pipeline at each crossing of a public road and railroad, and wherever necessary to identify the location of the pipeline to reduce the possibility of damage or interference. Pipeline right-of-way markers can help prevent encroachment and excavation-related damage to pipelines. Because the right-of-way is much wider than the pipeline itself and a pipeline can be anywhere within the right-of-way, state laws require excavators to call their state One Call center well in advance of digging to locate underground utilities and ensure it is safe for the contractor to dig in that location.

8.5 Pipeline Accident Data

Pipeline operators are required to report incidents that involve fatalities, property damage of more than $50,000, injury requiring in-patient hospitalization, release of gas in excess of 3 million cubic feet or incidents considered significant by the operator. A total of 1,312 significant incidents on natural gas transmission pipelines were reported between 1996 and 2015 (DOT PHMSA, 2016a). The primary factors that caused significant natural gas transmission pipeline incidents during this time period are shown in table B-14 (DOT PHMSA, 2016a).

Table B-14: Natural Gas Transmission –Reported Signficant Incidents Summary (1996 – 2015)

Cause	Number of Incidents	Percentage of Total
Corrosion	311	23.7
Excavation damage	210	16
Incorrect operation	41	12.4
Material/weld/ equipment failure	357	27.2
Natural force damage	146	11.1
Other outside force damage	84	6.4
All other causes	163	12.4
Total	**1,312**	**100**

DOT PHMSA, 2016a

The most common pipeline incidents are caused by material/weld/equipment failure, excavation damage, and corrosion. The pipelines included in this data set vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

Historically, excavation damage was the most common incident resulting in pipeline 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 movement. Since April 1982, operators and contractors have been required to participate in One Call public utility locate programs. These locate programs have reduced unauthorized excavation activities near pipelines and subsequently reduced pipeline incidents caused by excavation damage.

Corrosion remains a major concern for gas transmission pipelines. However, the use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the rate of failure compared to unprotected or partially protected pipe.

8.6 Impacts on Public Safety

The service incident data summarized in table B-14 include pipeline failures of all magnitudes with widely varying consequences. Table B-15 presents the average annual fatalities

that occurred on natural gas transmission pipelines between 2011 and 2015. The data have been separated into employees and nonemployees to better identify a fatality rate experienced by the general public. Fatalities among the public averaged two per year over the 20-year period from 1996 to 2015.

Table B-15: Injuries and Fatalities – Natural Gas Transmission Pipelines

Year	Injuries		Fatalities	
	Employees	Public	Employees	Public
2011	1	0	0	0
2012	1	6	0	0
2013	0	2	0	0
2014	1	0	0	0
2015	1	13	1	2

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

Although incidents have occurred on natural gas transmission systems, the available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1996 to 2015, there were an average of 63 significant incidents and 2 fatalities per year. The number of significant incidents distributed over the more than 300,000 miles of natural gas transmission pipelines indicates the risk is low for an incident at any given location. The rate of total fatalities for the nationwide natural gas transmission lines in service is approximately 0.01 per year per 1,000 miles of pipeline. Operation of the Project would represent only a slight increase in risk to the nearby public and we are confident that with the options available in the detailed design of Northern's facilities, that they would be constructed and operated safely..

9. Cumulative Impacts

The Project is situated in north central Dakota County in towns of Rosemount and Eagan, Minnesota. Rosemount was first settled and began to grow as a village in the mid- to late-1800s after the Minnesota Railroad came through. However, Rosemount's city government was not established until approximately 1975 (Rosemount, Minnesota Website, 2016). Rosemount is 15 miles south of Minneapolis/St. Paul and has a population of approximately 23,000 and growing. Eagan, also approximately 15 miles south of Minneapolis/St. Paul, is nearly the same size as Rosemount but has a population much greater at approximately 67,000. In 1860, the township of Eagan was established, but it did not become a city until 1874. For both Eagan and Rosemount, population and development grew at a fairly slow pace until the introduction of the interstate highway system in the 1950s followed by the growth of metropolitan Minneapolis/St. Paul. What was once predominantly agricultural land is now mostly suburban areas. The natural environment in this region has undergone development and urbanization over the past 65 years.

The majority of the route would be routed along existing pipeline, transmission line, and public roadway rights-of-way. These areas are confined by residential developments throughout much of the route. However, from approximate MPs 2.25 to 3.25, the route would traverse parkland that is widely undeveloped and comprised of mature hardwood forests, open areas, ponds, and lakes.

In accordance with NEPA and FERC policy, we evaluated the cumulative impacts of the Project and other projects in the area. The CEQ regulations define cumulative impact as "the impact on the environment which results from the incremental impact of the action [being studied] when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time."[11] This cumulative impacts analysis includes actions meeting the following three criteria:

- the action impacts a resource area also potentially impacted by the proposed Project;
- the action causes the impacts within all or part of the Project area; and
- the action causes this impact within all or part of the time span for the potential impacts from the Project.

As described in section B of this EA, constructing and operating the Project would temporarily and permanently impact the environment. However, throughout section B of this EA, we determined that the Project would have only minimal, generally localized, and temporary impacts on environmental resources, with the exception of the long-term impacts on small amounts of forested land. Based on the collocation of the Project with existing rights-of-way, Northern's implementation of HDD for more than 70 percent of the route, and other minimization and mitigation measures as described in its Construction Procedures, and adherence to our recommendations, we have concluded that most of the project impacts would be largely limited to the 7.86-mile-long Project right-of-way and temporary workspaces or in adjacent areas. For example, erosion control measures included in the Plan and Procedures would keep disturbed soils within the work areas. For other resources, the contribution of regional cumulative impacts is lessened by the expected recovery of ecosystem function. For example, vegetation communities would be cleared, but restoration would proceed immediately following construction. Additionally, we determined that air quality and noise impacts would be temporary during construction and there would be no air quality or noise impacts during operation of the Project. All cultural resources that were identified along the proposed route would be avoided through routing, HDD, or other protection measures, such as our recommendation for two depressions identified during a TCP survey. The Project would have no adverse impact on cultural resources, thereby preventing any cumulative impact.

Table B-16 summarizes the resource-specific geographic boundaries that were considered in this analysis and justification for each. Actions outside of these boundaries are generally not evaluated because their potential to contribute to a cumulative impact diminishes with increasing distance from the Project. Table B-17 identifies past, present, and reasonably foreseeable

[11] 40 CFR § 1508.7 (2015).

projects or actions that occur within the geographic scope of each resource area. These projects were identified through conversations with local planning and zoning officials, publicly available information, and aerial and satellite imagery.

Table B-16: Resource-Specific Geographic Regions for Determining Cumulative Impacts of the Project

Resource(s)	Cumulative Impact Geographic Scope	Justification for Geographic Scope
Geology and Soils	Area of disturbance of the Project and other projects that would be overlapping or abutting each other	Project impacts on geology and soils would be highly localized and limited to the Project footprint during active construction. Cumulative impacts on geology and soils would only occur if other construction of other projects were geographically overlapping or abutting the Project.
Surface Water	Hydrologic Unit Code (HUC)-12 watershed boundary	Impacts on surface waters can result in downstream contamination or turbidity; therefore, the geographic scope we used to assess cumulative impacts on waterbodies is the HUC-12 subwatershed crossed by the Project. We believe this scope would be the reasonable scope in which cumulative impacts could occur on surface waterbodies based on the Project area. However, the Project would not directly affect any streams.
Wetlands and Groundwater	Hydrologic Unit Code (HUC)-12 watershed boundary	For similar reasons as above, contributions towards cumulative impact on wetlands and groundwater were assessed within the HUC-12 subwatershed.
Vegetation and Wildlife	2 miles from the Project	Due to the transient nature of wildlife and the mostly suburban/developed setting that exists for the majority of the Project, including the existing network of roads and residential areas, we considered cumulative impacts on vegetation and wildlife within a 2-mile buffer of the Project route. We believe this buffer would adequately account for the habitat/vegetation impacts and the availability of other habitat and how the species present would adapt.
Land Use and Recreation	0.5 mile from the Project	Project impacts on general land uses would be restricted to the construction workspaces. The project would also not result in any new permanent land conversion for aboveground facilities. Land use in the project area is mainly mixed residential and commercial land, along with existing rights-of-way. Therefore, we considered a 0.5-mile distance from the Project for the geographic scope because this would cover any land use/recreational impacts which could be incremental to the Project.
Visual Impacts	Approximately 0.5 mile	The geographic scope for assessing cumulative impacts on viewshed includes the surrounding area where a new facility would be visible. There are no new aboveground facilities proposed for the Project, except for appurtenant facilities within

Table B-16: Resource-Specific Geographic Regions for Determining Cumulative Impacts of the Project

Resource(s)	Cumulative Impact Geographic Scope	Justification for Geographic Scope
		Northern's existing Cedar and Rosemount stations. Therefore, the geographic scope would be limited to areas where clearing of mature trees would occur. Because the area is generally flat to gentle rolling hills, we considered a distance of approximately 0.5 mile appropriate.
Socioeconomics and traffic	Affected county and cities	Due to the Project's limited scope and the short construction duration, the geographic scope for assessing contributions to cumulative impacts on socioeconomics and traffic were evaluated on a county-wide basis.
Air Quality – Construction	0.25 mile from the Project (Operational impacts do not apply to the Project, other than the overall benefit on regional air quality from the conversion of the Black Dog Generating Station, as discussed in section 7.1.5, above.)	Due to the Project's limited scope, the short construction duration and the minimal amount of emissions generated by construction equipment, the geographic scope used to assess potential cumulative impacts on air from construction activities was set at 0.25 mile from the Project area.
Noise – Construction	Overlapping noise sensitive areas during construction and operation (Operational impacts do not apply to the Project.)	There would be no increase in noise from operation of the Project; therefore, the geographic scope for assessing potential cumulative impacts on noise was determined to be areas within direct proximity to the construction activities.

The actions considered in our cumulative impact analysis may vary from the proposed Project in nature, magnitude, and duration. These actions are included based on the likelihood of their impacts coinciding with the Project impacts, meaning the other actions have current or ongoing impacts or are "reasonably foreseeable." The actions we considered are those that could affect similar resources during the same timeframe as the Project. The anticipated cumulative impacts of the Project and these other actions are discussed below, as well as any pertinent mitigation actions.

Table B-17: Details of other Actions with Potential Cumulative Impacts on Resources within the Geographic Scope Considered						
City	**Project**	**Distance and Direction from Proposed Project Centerline**	**Description & Resources Impacted**	**Approximately Size of Project Footprint**	**Land use and approximate acreages affected by project**	**Anticipated Date of Construction / Project Status**
PAST PROJECTS						
Eagan	Dakota Path 1st – 4th Additions	Abutting the Project at approximate MP 3.5	First four phases of a new six-phase residential development. Approximately 126 lots for new homes. Phases 3 and 4 abut Northern's existing pipeline easement on each side. The Project required removal of ornamental trees within the golf course.	Phase 1&2: 31 acres Phase 3: 7.4 acres Phase 4: 17.6 acres Total: 56 acres	Prior to construction, this entire area was a 56-acre golf course. Northern's existing easement through this area is 90 feet wide. Once operational, the Project would not involve expansion of Northern's current easement beyond its existing dimensions in this area.	Completed between 2013 - 2015
Rosemount	Bella Vista Subdivision – Phases I and II	Approximately 400 feet NE of MP 0.0 on the east side of Bacardi Avenue	Residential neighborhood development providing lots for approximately 150 new homes. 56 lots were developed beginning in 2014 (Phases I and II). Predominantly pastureland with two small forested areas.	35.3 acres	Prior to grading, the aerial imagery shows pastureland, a single 1-acre isolated PFO area, and a 3-acre upland forested area	Clearing and grading began in 2014 and was completed in 2015.
Rosemount	Wilde Lake Estates	Approximately 700 feet NE of MP 1.4	14-lot subdivision – previous land use was agriculture.	14 acres	Prior to grading, aerial imagery shows agricultural field with no wetlands or waterbodies.	Grading was completed in 2015.
PRESENT PROJECTS						
Eagan	Dakota Path 5th Addition	Abutting the Project at approximate MP 3.5	Fifth phase of new residential development. Approximately 20 lots for new homes.	Phase 5 = 6.1 acres, major grading already completed prior to 2015.	Prior to construction, this entire area was a golf course.	Currently under construction (2016)

Table B-17: Details of other Actions with Potential Cumulative Impacts on Resources within the Geographic Scope Considered						
City	**Project**	**Distance and Direction from Proposed Project Centerline**	**Description & Resources Impacted**	**Approximately Size of Project Footprint**	**Land use and approximate acreages affected by project**	**Anticipated Date of Construction / Project Status**
Rosemount	Bella Vista Subdivision – Phase III	Approximately 400 feet NE of MP 0.0 on the east side of Bacardi Avenue	Addition of approximately 100 lots as part of Phase III. Developed beginning in 2014 (Phases I and II).	0.0 acre because grading and stabilization already occurred in 2014.	Prior to grading, the aerial imagery shows pastureland, a single 1-acre isolated PFO area, and a 3-acre upland forested area.	Beginning at the end of 2016
FUTURE						
Eagan	Dakota Path 6th Addition	Abutting the Project at approximate MP 3.5	Sixth phase of new residential development. Approximately 15 lots for new homes. Area was cleared and graded in 2014.	Phase 6 = 6.1 acres, major grading already completed prior to 2015.	Prior to construction, this entire area was a golf course.	Expected to begin construction in late 2016 or early 2017
Eagan	Xcel Black Dog Gas Pipeline	Begins at MP 7.86	New 1.8-mile-long, 16-inch-diameter pipeline from Northern's existing Cedar Station to the Black Dog Generating Station in Burnsville, Minnesota. Mostly open land along existing transmission line corridor – possibly mixed with emergent wetlands.	Approximately 10 acres of temporary impacts on existing transmission line corridor and transportation corridor.	The pipeline would be collocated with Hwy 13 and the existing Xcel transmission corridor. The majority of the route would be drilled and would result in only temporary impacts. Little to no tree clearing would be required.	Construction expected to begin in 2017.
Burnsville	Xcel Energy - Black Dog Unit Six Project	Approximately 1.4 miles west of Cedar Station (MP 7.86)	Modifications and/or new appurtenances to support the Black Dog Pipeline would be contained within the existing station.	Any impacts would be contained within the existing fence line of the generating station.	Land use before and after would be remain industrial.	Construction expected to begin in 2018.

Table B-17: Details of other Actions with Potential Cumulative Impacts on Resources within the Geographic Scope Considered						
City	**Project**	**Distance and Direction from Proposed Project Centerline**	**Description & Resources Impacted**	**Approximately Size of Project Footprint**	**Land use and approximate acreages affected by project**	**Anticipated Date of Construction / Project Status**
Rosemount	LHRP Prairie Restoration Program	Overlaps Project area within park	Prairie restoration project within and abutting the construction work area for the Project inside the LHRP.	Approximately 4.7 acres.	Area is currently on and abutting existing A-line easement. Currently open space to be converted to prairie after completion of Cedar Station Upgrade Project construction.	Expected in 2018 (after the proposed Project is complete).

The following is a discussion of the defined area resources and the nature of potential cumulative impacts, as well as the measures that Northern would employ to minimize cumulative impacts.

9.1 Geology and Soils

As Project impacts on geology and soils would be highly localized and limited primarily to the Project footprint during the period of active construction, cumulative impacts on geology and soils would only occur if other geographically overlapping or abutting projects were constructed at the same time (and place) as the Project (and the exposure of soils to erosion and sedimentation) occurs.

Neither the Project, nor the other projects/actions occurring within the geographic and/or temporal scopes of the Project, would result in impacts on mineral resources or geologic hazards. The Bella Vista Subdivision and Wilde Lake Estates developments within the city of Rosemount, identified in the chart above, are not within the geographic scope of cumulative impacts for soils, as neither development is within or abutting the footprint of the Project. The Dakota Path subdivision is within the same footprint as the Project; however, soil stabilization would have been completed prior to commencement of construction activities for the Cedar Station Upgrade Project and Northern's Project would implement the Plan and Procedures to minimize any soil impacts and contain them within the right-of-way. In the event ground disturbing activities within Cedar Station occur at the same time as the Black Dog Pipeline, there would be a minor cumulative increase in the potential for soil erosion from stormwater or high winds or other soil impacts. However, both projects would implement BMPs to limit erosion and sedimentation. The LHRP Prairie Restoration Program would occur abutting and within the construction work spaces in the LHRP. The soils in this area could be subject to additional impact as the area is restored to native prairie; however, we anticipate the restoration project would result in a net beneficial impact, even though soils might be disturbed more than once. Northern would implement FERC's Plan to minimize impacts on soils. We believe that limited footprint and the measures Northern would adopt to minimize impacts on soils would prevent any significant cumulative impacts on geology and soils from the Project in consideration with other projects.

9.2 Surface Water

The Project would not cross any streams. The Project does cross ponds, which are classified by NWI maps and Minnesota PWI maps as wetlands and public waters wetlands, respectively. These ponds, although considered waterbodies by FERC's definition, would be crossed using the HDD method. The only other project described above that could also have direct or indirect impacts on waterbodies is the Black Dog Pipeline, which would cross Black Dog Lake also using HDD. We are not aware of any other projects that would directly or indirectly affect the ponds. As discussed in section B.2.2, a possibility of an inadvertent return exists which could impact these ponds during construction; however, because the ponds are not anticipated to be impacted by any other Project, and Northern would implement the Procedures as well as its *Plan for Inadvertent Release of Drilling Mud* we do not believe that even if an inadvertent release were to occur, it would result in a significant cumulative impact. Therefore, because the Project's direct impacts on these waterbodies would be avoided by use of HDD and

indirect impacts would be adequately minimized by the use of the Plan and Procedures and Northern's *Plan for Inadvertent Release of Drilling Mud*, we conclude that any cumulative impact on waterbodies from the Project would be negligible.

9.3 Wetlands and Groundwater

The Project would result in short-term temporary impacts on 0.52 acre of emergent wetlands. There would be no temporary, long-term, or permanent impacts on scrub-shrub or forested wetlands. The Black Dog Pipeline also would likely contribute to minor temporary impacts on emergent wetlands as the route follows an existing transmission line corridor where NWI and PWI emergent wetlands are present. Based on pre-development aerial imagery, it appears there may have been permanent impacts on a forested wetland during the development of the Bella Vista subdivision. The other developments do not appear to have contributed to wetland or waterbody impacts. Since there are no permanent wetland impacts associated with the Project, it would not contribute to long-term cumulative impacts on scrub-shrub, forested wetlands, or ponds. However, construction of the Project in addition to the Black Dog Pipeline would result in temporary and minor cumulative impact on emergent wetlands within the geographic scope.

Northern would implement the Procedures to minimize the temporary impact to emergent wetlands within the active construction right-of-way. Additionally, we anticipate erosion control measures in accordance with local or state permitting authorities would be implemented in the development and construction of the Black Dog Pipeline, resulting in quick restoration (generally between one and three growing seasons) of the emergent wetland to pre-construction conditions following construction. Therefore, we conclude that the temporary impact on wetlands from the Project would be cumulatively minor when considered in the context of the other projects' wetland impacts.

As indicated in section B.2.1, the depth to groundwater is deeper than the trench excavations for open trench construction. Consequently, cumulative impact on groundwater would likely be limited only to HDD activities. There is a chance that HDD construction associated from the Project in combination with HDD construction associated with the Black Dog Pipeline could result in temporary cumulative impacts within the aquifers if the HDD activities occur concurrently or within several days of one another. If temporary impacts occur, it would likely be limited to short-term turbidity visible in groundwater. It is unlikely that the development of subdivisions within the geographic scope of the Project resulted in any permanent or ongoing impacts on groundwater, as grading generally would not have extended below the groundwater levels, or if any disturbance were to occur due to infiltration of precipitation, we would expect it to subside once soils have settled. Additionally, all major ground-disturbing activities associated with the development of these subdivisions were outside the temporal scope of the Project in term of groundwater impacts. We also anticipate that Northern's SPCC Plan would prevent or minimize the opportunity for and necessitate immediate control and clean-up of spills of fuels, lubricants, or other hazardous material, and would therefore minimize the opportunity for cumulative impacts that could result if other projects were to also result in spills. For these reasons, we conclude that any cumulative impact on groundwater from the Project would be negligible.

9.4 Vegetation and Wildlife

The construction activities associated with clearing, grading, removal of vegetation, and the potential for the establishment of invasive plant species occurring during the same timeframe and area can result in cumulative impacts. In addition, changes of these environments can also cause alteration of wildlife habitat, displacement of wildlife, and other secondary effects such as forest fragmentation. To account for both direct and indirect effects of the Project, the geographic scope includes a 2-mile buffer around the Project centerline which we found appropriate based on the relative suburban nature of the area.

All of the projects listed in the table above are within the geographic and temporal scope of the Project due to the potential for long- and short-term impacts on mature trees and wildlife habitats. By utilizing HDD and existing rights-of-way, Northern designed the Project so it would minimize impacts on mature forested areas. There would be some clearing of mature trees, which would be spread out along the route. Of the 5.4 acres of forest impacted, about 5 acres would be allowed to revegetate to pre-construction conditions, although this would still represent a long-term impact on these forested areas. Similarly, the Black Dog Pipeline route has been sited to minimize tree clearing and impacts on wildlife habitats by following existing rights-of-way and using HDD. However, the development of new subdivisions appears to have resulted in long-term and permanent impacts on trees and wildlife habitat, and any future development might also have additional impacts. The impact on vegetation and wildlife from all of the actions would have a cumulative impact when considered with the Cedar Station Project.

From our research, it appears that the pre-existing habitat for the three new subdivisions were not significantly diverse in terms of vegetation or wildlife habitat prior to development. The Dakota Path subdivision was a golf course with immature and ornamental trees scattered throughout the area. Both the Bella Vista subdivision and Wilde Lake Estates were predominantly open areas used for agricultural purposes with small clusters of mature trees. We anticipate that there would be minor temporary cumulative impact on herbaceous vegetation and wildlife species that utilize open space, pastureland, and existing energy corridors where construction occurs in the same footprint, such as with the Black Dog Pipeline. However, this land would be allowed to revert to pre-construction conditions following construction of the pipeline and therefore would minimize the potential for any significant cumulative impacts on wildlife or vegetation from the Project.

The prairie restoration project within the LHRP would result in the conversion of 4.7 acres of existing pipeline right-of-way and open space to open prairie which would result in net benefit to vegetation impacted by the Project. Northern would restore the construction area back within the LHRP to pre-existing conditions (or new open prairie) and would not perform routine maintenance on the new pipeline easement. Therefore, because of the existing developed nature of the Project area; the use of HDDs for more than 70 percent of the route; the transient nature of wildlife and the ability to adapt to already disturbed/developed areas, most areas would be allowed to revegetate immediately following construction; and the minimal amount of permanent tree clearing (although forested areas could take over 10 years to reforest), we do not anticipate any significant cumulative impact on vegetation and wildlife in the Project area.

9.5 Socioeconomics and Traffic

We anticipate that that the majority of socioeconomic impacts from the Project would occur during construction. Although the major earth-moving work is complete for the three new subdivisions, there are still empty lots that will eventually have homes built on them. This development could take place within the timeframe of the Project. Additionally, the construction of the Black Dog Pipeline would take place during the same timeframe as the Cedar Station Upgrade Project. The Project and the all the projects listed in the above tables have or would generate temporary construction jobs, increased local spending, and tax revenues. The local supply of construction workers needed for these projects may be derived from workers employed in the area, which would provide a direct economic benefit to those communities in which they reside. Non-local laborers could represent a temporary increase in the percent of the total population in the Project area; however, the proximity to the St. Paul/Minneapolis area brings with it ample housing options such as motels, hotels, campgrounds, apartments, and rental homes and other services. In addition, this region has the necessary infrastructure to provide public services and utilities to support the projects, and should not place any burden on the existing services. For the projects that have already been constructed, most impacts would have occurred and no longer be additive to the Cedar Station Project, with the exception of tax revenues.

It does not appear that any of the projects would result in new full-time permanent jobs. If the county taxes each development or project, there could be a positive cumulative impact on tax revenues collected by the county in consideration with the Cedar Station Project. We do not believe this impact to be significant, however, as once constructed, Northern would continue to pay taxes with very minimal use of county services, while homeowners would pay taxes, but continue to use county services. Therefore, the Project, when considered with other projects, would result in a minor, yet long-term cumulative economic benefit.

If both the Cedar Station Upgrade Project and the Black Dog Pipeline are constructed at the same time, there could be minor cumulative impacts from increased traffic in the area of Cedar Station. If new homes are constructed within these developments at the same time, we anticipate that deliveries of building materials could coincide with the Project, also resulting in some minor cumulative impact on traffic. These impacts would be expected to be localized, minor, and short-term (only lasting for a few minutes to perhaps a day), and detours would be provided and/or local access maintained. Based on this information, we do not anticipate that the Project, when considered with the other projects in the area, would result in any significant cumulative impact on public services, traffic, or availability of housing.

9.6 Land Use, Visual Resources, and Recreation

Changes in land cover, including forest fragmentation and the conversion of farmland to residential, began in the mid-1800s and continue today in the geographic scope considered for the cumulative impact analysis. The construction and operation of the Project and other reasonably foreseeable future projects would require the temporary and permanent use of land, which would result in temporary and permanent impact/conversion of land use. The majority of the Project impacts on general land uses would be restricted to the construction workspaces; therefore, the geographic scope for land use and recreation used was 0.5 mile from the edge of

the Project. The continued development of land would have a greater impact on the amount of forested land than any other land use and most of the above projects have or may contribute to future land use conversions. While many of the pipeline construction impacts would be temporary, construction of the Project would result in some permanent land use changes, including forest conversion to maintained rights-of-way. No permanent aboveground facilities would be placed on properties outside of existing aboveground facilities, preventing a cumulative impact of loss of commercial, agricultural, or residential land to permanent aboveground natural gas infrastructure. In addition, the Black Dog Pipeline may contribute to minor forest conversion impacts about 2,100 feet southwest of the Project, along Highway 13.

A cumulative visual impact could occur in the area surrounding Cedar Station where both the Project and the Black Dog Pipeline would be installed in proximity of one another. However, this area is industrial and there would not be any conversion of forested land to pipeline rights-of-way for either project near Cedar Station. The Dakota Path subdivision was developed along Northern's existing A-line corridor; and no changes to the corridor would occur within this area once the new pipeline is operational because Northern would not expand the width of its current easement in this area. Therefore, no changes in land use would occur within Dakota Path as a result of the Project. Additionally, the other two residential developments are not within the viewshed of the Project (which would be cited along the existing A-line in these areas as well). Therefore, we conclude any visual cumulative impacts would not be significant.

In addition, because the Project would be collocated with existing rights-of-way for approximately 96 percent of the route, forest conversion would be reduced and overall land use would generally be consistent with the current baseline condition of adjacent utility right-of-way. This collocation would also result in fewer visual impacts, although this could add minor amounts of land use conversion where forested areas would be converted to right-of-way, further extending visual impacts on what we would consider the baseline conditions of the area, as most of these rights-of-way have existing for some time. The existing A-line right-of-way was established in the 1930's; and, the transmission line right-of-way was first established in the 1950's. Although other projects listed above could result in changes to land use, such as from open areas/agricultural to residential, the Cedar Station Upgrade Project would generally allow most areas to revert to preconstruction conditions, preventing cumulative impact that would be caused if Cedar Station were resulting in permanent changes to land use along the entire line. For these reasons, we conclude cumulative impacts on land use or visual impacts would not be significant.

We received comments on the cumulative impact of activities occurring within the LHRP. The Dakota County Parks Commission, the Dakota County Office of Planning, along with a number of consulting companies, developed the Master Plan for the LHRP which lists park improvements to be completed over the next 10 years. Specific timelines for improvements are not known, although if they were to occur, we believe they would result in a net beneficial impact on the LHRP. Northern and Dakota County officials worked together to design a route that takes into account future initiatives within the park so that the Project would avoid hindering any future park plans. Because these timeframes are unknown, we do not consider them reasonably foreseeable.

One particular project within the LHRP, the prairie restoration project, would result in conversion of open space to open prairie and is discussed above in vegetation impacts, which would be a beneficial impact but could occur in the same temporal range as the Cedar Station Upgrade Project. By minimizing the size of the construction area and use of HDD within the park, Northern would reduce the amount of temporary and permanent impacts on the park, specifically any conversion in land use. Although both the prairie restoration project and the Northern's Project could occur at the same time, neither project would result in a detrimental cumulative change in land use. Northern would restore the construction area back within the park to pre-existing conditions (or new open prairie) and would not perform routine maintenance on the new pipeline easement. Therefore, we do not anticipate any significant cumulative impacts on land use within the LHRP.

The Project has the potential to result in temporary impacts on recreation where it traverses non-motorized-vehicle trails along the existing transmission line corridor (MP 4.8 – 5.7). Trail access would temporarily be restricted to the public during active construction through that area. However, none of the projects within the geographic scope of the Project would occur at the same time and place, specifically along the trails between MP 4.8 – 5.7 and within the LHRP. The portion of the prairie restoration project within the LHRP would not occur until after the Project has been commissioned. As noted above, there is a list of enhancement projects within the LHRP that are not yet scheduled. Northern has worked with the LHRP officials to design a route that would not impede these projects. If one or more of the park projects occurred at the same time as the Project within the LHRP, park users could see a temporary, short-term impact on access to certain portions of the park. However, as noted above, the enhancement projects, although possibly restricting access for a short amount of time, would ultimately lead to a benefit for park users in the future. Therefore, any cumulative impacts on recreation would be negligible.

9.8 Noise

Noise impacts from the Project as well as the other projects listed in the table above would only occur during construction activities. There would be no increase in noise from the operation of the Project; however, there could be cumulative noise impacts during construction.

Since major earth moving/grading activities for the residential developments have already been completed, only intermittent home building noise, like hammering and power tools would occur during the daytime. Therefore, there is a potential for temporary cumulative noise impacts on the same NSAs that are within 0.5 mile of MP 3.5 (the Dakota Path subdivision area). Cumulative impacts on noise could occur if homes are being actively constructed within Dakota Path at the same time as Project construction in this area. The period of simultaneous noise impacts from home building and pipeline construction would generally last approximately one month. Additionally, at MP 3.5, Northern would perform HDD construction that could result in increased noise levels at night. Since home building occurs during the daytime, there would not be a cumulative impact on noise during the nighttime hours near MP 3.5.

The other project that has potential to generate noise at the same time as the Project is the construction of the Black Dog Pipeline. Therefore, a potential exists for temporary cumulative

noise impacts on the same NSAs that are within 0.5 mile of the Cedar Station. Due to the assembly line-type construction methods of pipeline installation, if construction activities occur at the same time near Cedar Station for both the Project and the Black Dog Pipeline, the duration would likely be less than one month. The proposed HDD of Highway 77 could contribute to cumulative impacts on noise if the Black Dog Pipeline is constructed in this location at the same time. The area within and surrounding Northern's Cedar Station is bound by Highway 77 and Highway 13 to the north, east, and west. There is an apartment complex to the south. The ambient noise level in this area is higher than other areas along the Project due to the presence of multiple highways. Therefore, increases in noise above the ambient level from construction activities would be less significant. However, Northern would continue working with affected NSAs to mitigate noise impacts to the greatest extent. Noise mitigating measures would likely include temporary curtains or sound barriers around HDD entry sites or financial compensation for temporary lodging to certain NSAs.

Contributions to noise impacts from construction would be short-term; therefore, we conclude that cumulative impact on noise would not be significant.

9.9 Air Quality

Construction of the present and future projects in table B-17 is currently underway and/or may be at the same time as the Project (Dakota Path and Bella Vista subdivisions, and installation of the Xcel Black Dog Gas Pipeline). In the event that construction of the Project and the present and future projects coincide, cumulative air quality impacts could be additive but would be minimal due to the limited, short-term nature of the pipeline construction. As described in the cumulative noise section above, the Dakota Path and Bella Vista subdivisions and the Black Dog Pipeline could be constructed concurrently with the Project schedule (April – October 2017). Construction-related air quality impacts would subside once construction activities are complete; and, significant cumulative air quality impacts as a result of Project construction are not anticipated.

Additionally, there would be no change in emissions (e.g., permanent air quality impacts resulting from the Project). Section 7.1.5 of this EA explains that the proposed Project would supply gas to the Black Dog Unit 6 Project (a peaking facility) and identifies the net emissions when considered with other contemporaneous coal to nautral gas conversion projects at Black Dog Generating Station. The Black Dog Unit 6 Project, along with the decommissioning of coal-fired Unit 3 and coal-fired Unit 4, would result in a net emission decrease from the Black Dog Generating Station. Also, there would be no air quality impacts from operation of the buried pipelines.

9.10 Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer are not indications of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change.

The Intergovernmental Panel on Climate Change (IPCC) is the leading international, multi-governmental scientific body for the assessment of climate change. The United States is a member of the IPCC and participates in the IPCC working groups to develop reports. The leading U.S. scientific body on climate change is the U.S. Global Change Research Program (USGCRP). Thirteen federal departments and agencies[12] participate in the USGCRP, which began as a presidential initiative in 1989 and was mandated by Congress in the Global Change Research Act of 1990.

The IPCC and USGCRP have recognized that:

- globally, GHGs have 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 this accumulation of GHG;
- these 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, *Climate Change Impacts in the United States*, 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). The report includes a breakdown of overall impacts by resource and impacts described for various regions of the United States. Although climate change is a global concern, for this cumulative analysis, we will focus on the potential cumulative impacts of climate change in the Project area.

The USGCRP's report notes the following observations of environmental impacts with a high or very high level of confidence that may be attributed to climate change in the Midwest region:

- average temperatures have risen about 1.5 °F between 1900 and 2010 and are projected to increase another 4 to 5 °F over the next several decades;
- an increase in health risks are possible due to projected additional heat stress and poor air quality;
- the agricultural crop growing season has lengthened since 1950 and is projected to continue lengthening due to the earlier occurrence of the last spring freeze, potentially increasing crop production in the short-term;

[12] The following departments comprise the USGCRP: the U.S. Departments of Energy, Commerce, Defense, Agriculture, Interior, State, Health and Human Services, as well as the EPA, PHMSA, the National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, and the Agency for International Development.

- increased temperature stress, wetter springs, and the continued occurrence of springtime cold air outbreaks are projected and may reduce crop yields overall in the long-term (particularly corn and soybeans);
- a change in range and/or elevation is projected for many tree species with potential declines in paper birch, quaking aspen, balsam fir, and black spruce and increases in oaks and pines;
- tree species in flat terrain may not be able to repopulate an area if climate change results in prevention of germination;
- increased insect outbreaks, forest fire, and drought may result in increased tree mortality and the reduction in beneficial carbon sinks;
- annual precipitation has increased by about 20 percent over the past century, particularly from increased high intensity rainfall events, and this trend is projected to continue; and
- increased surface water temperatures, increased precipitation, and longer growing seasons are projected to result in an increase in blue-green and toxic algae in the Great Lakes, harming fish and reducing water quality.

Emissions of GHGs from the proposed Project and other regional projects would not have any direct impacts on the environment in the Project area. Currently, there is no scientifically-accepted methodology available to correlate specific amounts of GHG emissions or reductions to discrete changes in average temperature rise, annual precipitation fluctuations, surface water temperature changes, or other physical effects on the environment in the Midwest region. However, contributions or reductions to GHG emissions globally may affect the climate change impacts discussed above for the Midwest region.

Climate change impacts, such as increased precipitation, flooding, erosion, and scouring could potentially result in pipeline exposure. Pipelines are typically buried at least 3 feet below grade and are routinely inspected and maintained per regulations at 49 CFR 192, including discovery and handling of any exposed pipeline. To prevent corrosion, the Project would be constructed using pipe with an external coating capable of withstanding stress from a variety of environmental sources, including oxygen, water, and other chemicals. As such, the pipeline would not likely be significantly impacted by climate change.

The USGCRP report states that in the Midwest region "per capita GHG emissions are 22 percent higher than the national average due, in part, to the reliance on fossil fuels, particularly coal for electricity generation." Natural gas emits less CO_2 compared to other fuel sources (e.g., fuel oil or coal). Therefore, the USGCRP report also notes that increased use of natural gas in the Midwest may reduce emissions of GHGs. If approved, the Project would aid in the displacement of coal use at the Black Dog Generating facility, thereby regionally offsetting some GHG emissions. As emissions have been minimized, and the Project would be consistent with climate goals, we conclude that the Project would not significantly contribute to GHG cumulative impacts or climate change.

9.11 Conclusions on Cumulative Impacts

Impacts associated with the Project would be relatively minor. The impacts from other existing and proposed projects or general activities within the geographic scope of analysis are also expected to be minor. Our project-specific and resource specific (based on appropriate geographic scope) analysis leads us to conclude that the Project would contribute to a negligible cumulative impact when the effects of the Project are added to past, present, and reasonably foreseeable projects.

C. ALTERNATIVES

In preparing this EA, we evaluated several alternatives to the Project to determine whether they would be reasonable and environmentally preferable to construction of the Project as proposed. These alternatives include the no-action alternative, various route alternatives, and an alternative that would result in replacing the existing A-Line with a larger diameter pipe. Our evaluation criteria for selecting potentially preferable alternatives are:

- technical feasibility and practicability;
- conferring a significant environmental advantage over the proposed action; and
- meeting the objectives of the proposed action (i.e., providing the necessary additional natural gas delivery pressure to the Black Dog Generating Station in order to facilitiate that station's conversion from coal use to natural gas use).

Each alternative discussed below was considered to the point where it was clear that the alternative was not reasonable, would result in environmental impacts that would be greater than those of the Project, or that could not meet the Project objective.

The proposed routing reflects modifications to the originally proposed route that Northern incorporated during the pre-filing and application review based on discussions with landowners, land managing agencies, project engineers, and FERC staff to avoid or minimize impacts on sensitive resources, reduce or eliminate engineering and constructability concerns, and/or avoid or minimize conflicts with existing land uses. These route variations were incorporated into the Project route and are considered part of the Project and are discussed in section A. Their associated environmental consequences were included in our environmental analysis in section B.

There are no new major aboveground facilities proposed in association with the Project, and all the proposed new aboveground facilities would be installed within existing aboveground facilities. Therefore, we did not evaluate any siting alternatives to these minor facilities.

At times, evaluating alternative systems to a proposed project is warranted. System alternatives are those that would use other pipeline systems (or other parts of a project sponsor's system) to achieve the objectives of the proposed Project. The point of identifying and evaluating system alternatives is to determine if the potential environmental impact could be avoided or reduced by using another pipeline system or configuration. For the Cedar Station Upgrade Project, reasonable system alternatives are limited by the aerial extent of the proposed action, i.e., to increase the pressure of natural gas Northern currently delivers to the Black Dog Generating Station less than 8 miles from Northern's existing Rosemont Junction facility. There are no other pipeline systems in the area that could deliver natural gas to the generating station without constructing significantly more pipeline facilities (thereby incurring greater environmental impact) than those proposed by Northern. The nearest alternative systems other than Northern's existing pipeline, Northern Border Pipeline Company and Viking Pipeline Company, are between 80 and 140 miles from the Black Dog Generating Station. As a result, Black Dog Generating Station would have to design and construct an 80- to 140-mile-long

pipeline resulting in a much greater environmental impact than the Project. As such, we did not evaluate any system alternatives.

1. No-Action Alternative

Under the no-action alternative, Northern would not construct the Project and consequently would be unable to meet a contractual obligation with its customer, NSP-MN. However, NSP-MN would still require an increase in natural gas delivery pressure in order to decommission two existing coal-fired units and replace them with one natural gas-fired unit. Under the no-action alternative, NSP-MN would either need to seek additional natural gas supplies from an alternative source or would continue using coal as its energy source, both of which could result in an increase of impacts.

Therefore, the no-action alternative is not recommended because it would not accomplish the objective of the proposed action and would likely result in the construction of other facilities that would not offer a significant environmental advantage over the Project.

2. Pipeline Route Alternatives

As mentioned above, several route variations were incorporated into the proposed Project during pre-filing. Route variations generally are small segments of a route that are revised in order to avoid a particular resource or address a specific landowner concern. Route alternatives, which we evaluate below, deviate from a relatively large segment of a proposed pipeline alignment for a substantial length and distance in an effort to reduce overall environmental impacts, but ultimately serve the same delivery points as the proposed alignment. Northern's proposed route follows its existing corridor to the extent practicable. In areas where Northern does not follow its existing route, Northern did so in order to accommodate scoping comments (such as with the Thomas Lake Countryhomes) and constructability issues they identified (such as homes being built immediately adjacent to the existing right-of-way and the need for road closures). Because of these issues, we did not evaluate an alternative that follows the existing right-of-way the entire length, as any such alternative would increase impacts that scoping comments suggested Northern avoid.

2.1 Lebanon Hills Alternatives

We received a number of comments concerning impacts on the LHRP. Northern has proposed two HDDs to cross nearly all of the 5,391 feet of pipeline through the LHRP. By drilling under the LHRP, surface impacts would be greatly minimized. All but 743 feet of the proposed route would be collocated within Northern's existing easement through the LHRP. This section could not be collocated and completed by HDD because of the curvature of the existing pipeline. If Northern were to construct along its existing easement using upland construction techniques, it would require an open cut of a deep-water wetland.

Based on public comments received, we evaluated three alternative pipeline routes through the Park (Wilderness Run Road; Pilot Knob Route; and Johnny Cake Ridge Road) and two alternative pipeline routes (South Robert Trail and Highway 77 Alternatives) that avoid the

Park entirely. Figure C-1 contains mapping of these alternatives. Each of these routes are longer than the proposed route. Generally, an increase in length results in a corresponding increase of impacts, which often results in alternatives not being environmentally preferable over the proposed routing. However, at times, even a somewhat longer route can be preferable due to the nature of the resources avoided and the quality of the habitat crossed. In the following analysis, each alternative route is examined and compared to the proposed route to determine if it would result in a significant environmental advantage over the proposed route.

2.1.1 Wilderness Run Road Alternative

The Wilderness Run Road Alternative deviates from the proposed route in a northerly direction at approximate MP 1.8, where it follows an existing electric utility corridor for approximately 1.7 miles. The alternative then turns west and runs parallel to Wilderness Run Road and an existing transmission line corridor for an additional 2 miles until it rejoins the proposed route at Thomas Lake Road (MP 4.7).

The Wilderness Run Road Alternative would result in about one additional mile of construction, although it would have a 100 foot shorter crossing of the LHRP compared to the proposed route. The Wilderness Run alternative would result in an additional 137.1 acres of temporary impact and 29.6 acres of permanent impact compared to the proposed route. Of this, the alternative would create additional temporary and permanent impacts within the LHRP estimated at 9.3 and 5.8 acres, respectively. The alternative would also impact 0.5 acre more of wetland. Under the Wilderness Run Road Alternative, an additional 28 new landowners would be impacted compared to the proposed route, with impacts occurring mainly on residential properties. However, the Wilderness Run Road Alternative would impact 15 fewer buildings within 50 feet of the construction work areas and approximately 1.4 acres less forest clearing. Compared to the proposed route, only 27 percent of the Wilderness Run Alternative within the LHRP could be constructed by HDD and only 45 percent of the overall alternative route could be installed by HDD, resulting in greater environmental impact on the LHRP and overall.

Due to the added length of the route, increased temporary and permanent impacts inside and outside of the LHRP, the 28 new easements required from additional landowners, and increased construction in residential areas, we do not find the Wilderness Run Road Alternative presents a significant environmental advantage and is not environmentally preferable to the proposed route. We do not recommend this alternative.

Figure C-1: Lebanon Hills Alternatives

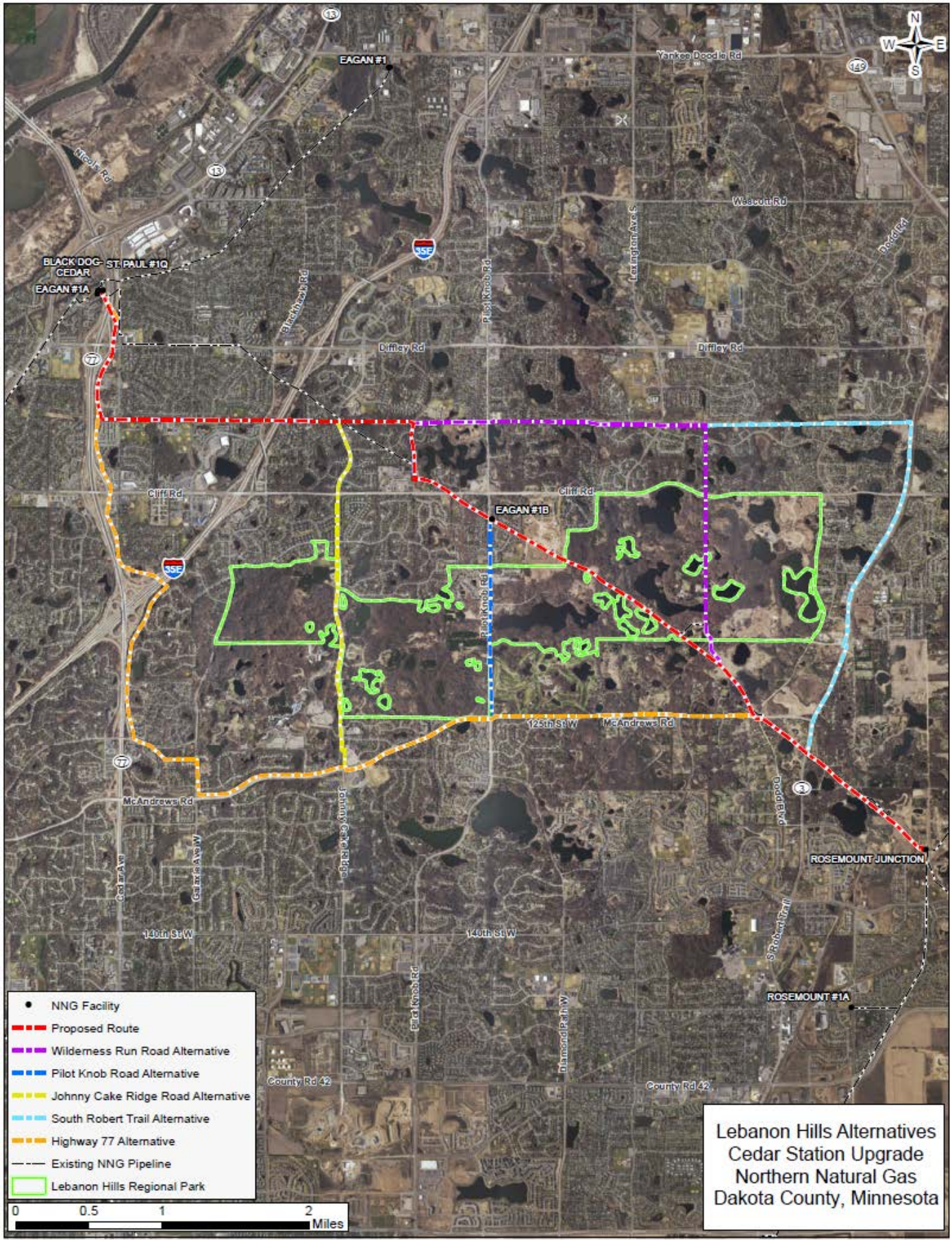


Table C-1: Lebanon Hills Regional Park Alternatives Comparison											
Routes	**Length (miles)**	**Temporary Impacts (acres)**	**Permanent Impacts (acres)**	**Temporary LHRP Impacts (acres)**	**Permanent LHRP Impacts (acres)**	**Forest Impact in LHRP (acres)**	**New Landowners**	**Buildings w/in 50 feet[1]**	**Tree Clearing (acres)**	**Wetland Impact (acres)**	**Percent HDD / Percent HDD of LHRP**
Proposed Route	7.86	149.01	9.80	4.42	0.13	0.00	15	113	5.4	0.65	78 / ~100
Wilderness Run Road Alternative	8.68	286.1	39.4	13.70	5.96	13.70	43	98	4	1.15	45 / 27
Pilot Knob Road Alternative	8.72	287.1	79.4	5.21	2.27	5.21	47	100	16	1.17	42 / 13
Johnny Cake Ridge Road Alternative	9.4	303.6	47.9	7.03	3.06	7.03	96	129	15	1.33	36 / 19
South Robert Trail Alternative	9.99	317.9	53.8	0	0	0	97	101	11	1.71	39 / NA
Highway 77 Alternative	9.64	309.4	49.5	0	0	0	88	295	20	2.11	35 / NA

[1]Single-unit, multi-unit residential, and commercial buildings

NA = not applicable

2.1.2 Pilot Knob Road Alternative

The Pilot Knob Road Alternative deviates from the proposed route in a westerly direction at approximately MP 1.5, where it follows McAndrews Road for approximately 1.8 miles. The route then turns north and runs parallel to Pilot Knob Road for an additional 1.5 miles until it rejoins the proposed route at MP 3.8.

The Pilot Knob Road Alternative would result in about one additional mile of pipeline but would cross approximately 2,400 feet less of the LHRP. The alternative would have an additional 138.1 acres of temporary impact and 69.6 acres of permanent impact compared to the proposed route. The alternative would create additional temporary and permanent impacts within the LHRP estimated at 0.8 and 2.14 acres, respectively. The alternative would also impact 0.5 acre more of wetland. An additional 32 landowners and 10.6 acres of forested lands would be impacted by the Pilot Knob Road Alternative. The alternative would impact 13 fewer buildings within 50 feet of the construction work areas, however. Compared to the proposed route, only 13 percent of the Pilot Knob Road Alternative within the LHRP could be constructed by HDD and only 42 percent of the overall alternative route could be installed by HDD, resulting in greater environmental impact on the LHRP and overall.

Due to the added length of the route, the reduced amount that could be installed by HDD, the increased temporary and permanent impacts, the incremental landowner impact and tree clearing required, we do not find the Pilot Knob Road Alternative environmentally preferable to the proposed route and do not recommend it.

2.1.3 Johnny Cake Ridge Road Alternative

The Johnny Cake Ridge Road Alternative deviates from the proposed route in a westerly direction at approximately MP 1.5, where it follows McAndrews Road for approximately 2.9 miles. The route then turns north and runs parallel to Johnny Cake Ridge Road for 2.5 miles until it rejoins the proposed route at MP 5.3.

The Johnny Cake Ridge Road Alternative would result in an additional 1.5 miles of pipeline and would cross approximately 2,000 feet less of the LHRP. The Johnny Cake Ridge Road Alternative would have an additional 154.6 acres of temporary impact and 38.1 acres of permanent impact compared to the proposed route. Of this, the alternative would create additional temporary and permanent impacts within the LHRP estimated at 2.6 and 2.9 acres, respectively. The alternative would also impact about 0.7 acre more of wetland. An additional 81 landowners (16 of which have structures within 50 feet of the right-of-way) and an additional 9.6 acres of tree clearing would be impacted by the Johnny Cake Ridge Road Alternative. Compared to the proposed route, only 19 percent of the Johnny Cake Ridge Road Alternative within the LHRP could be constructed by HDD and only 36 percent of the overall alternative route could be installed by HDD, resulting in greater environmental impact on the LHRP and overall.

The Johnny Cake Ridge Road Alternative also has areas of steep grade immediately adjacent to the road, which could limit the use of HDD and cause the need for more workspace using open-cut construction methods. This would require the pipeline to be sited adjacent or

offset to the road at some distance to address constructability concerns. This would result in newly impacted landowners having their property bisected by a new right-of-way.

Due to the added length of the route, increased temporary and permanent impacts, incremental landowner impact and tree clearing required, as well as the constructability challenges potentially requiring greater workspaces, we do not find that the Johnny Cake Ridge Road Alternative presents a significant environmental advantage over the proposed route. We do not recommend this alternative.

2.1.4 South Robert Trail Alternative

The South Robert Trail Alternative deviates from the proposed route in a northerly direction at approximately MP 1.0, where it follows South Robert Trail road for approximately 2.5 miles. The route then turns west and parallels an existing utility corridor until it rejoins the proposed route at MP 4.7.

The South Robert Trail Alternative would be approximately 2.1 miles longer than the proposed route, although it would completely avoid the LHRP. This would create additional temporary and permanent impacts estimated at 168.9 and 44.0 acres, respectively. An additional 82 landowners and 5.6 acres of forested land would be impacted by the South Robert Trail Alternative. There would be 12 fewer buildings within 50 feet of the construction work areas; however, only 39 percent of the South Robert Trail Alternative could be completed by HDD, resulting in a greater environmental impact compared to the proposed route, of which 78 percent could be installed by HDD. The alternative would also result in about 1.1 acres of additional wetland impact compared to the proposed route.

Although this route would completely avoid impacts on the LHRP, we did not find the South Robert Trail Alternative to result in a significant environmental advantage over the proposed route because of the added length of the route, increased temporary and permanent environmental impacts, incremental landowner impact, and a considerable increase in tree clearing required. We do not recommend this alternative.

2.1.5 Highway 77 Alternative

The Highway 77 Alternative deviates from the proposed route in a westerly direction at approximately MP 1.5, where it follows McAndrews Road for approximately 3.9 miles. The route then turns north and parallels Galaxie Avenue and 127th Street before paralleling Highway 77 for 2.6 miles until it rejoins the proposed Route at MP 7.0.

The Highway 77 Alternative would be 1.8 miles longer than the proposed route and would completely avoid the LHRP. This would create additional temporary and permanent impacts outside the LHRP estimated at 160.4 and 39.7 acres, respectively. An additional 73 landowners (some of these are associated with multiple unit buildings) and 14.6 acres of forested land would be impacted by the Highway 77 Alternative. An additional 182 buildings within 50 feet of the right-of-way would be impacted during construction. Only 35 percent of the Highway 77 Alternative could be completed by HDD, resulting in a greater environmental impact

compared to the proposed route, of which 78 percent could be installed by HDD. The alternative would also result in about 1.5 acres of additional wetland impact compared to the proposed route.

This route would place the pipeline in a constrained construction corridor along Highway 77 between residences and businesses. This would result in disturbances to these residences and businesses, which could include temporary blockage of driveways and streets. This increase in impacts on landowners would result in considerable disturbance during construction for a period of a few weeks up to a few months.

Due to the added length of the route, increased temporary and permanent impacts, incremental landowner impacts and tree clearing required, as well as constructability concerns, we do not find the Highway 77 Alternative environmentally preferable environmentally preferable to the proposed route. Although this route does avoid the LHRP, we do not find that it presents any significant environmental advantage over the proposed route. Therefore, we do not recommend this alternative.

2.1.6 Lebanon Hills Regional Park Alternatives Summary

Although some alternatives would avoid the LHRP, all of the alternatives would result in a greater environmental impact and a greater number of impacted landowners outside of the LHRP. Some of the alternatives would reduce impacts on certain resources; however, none of these reduced impacts on resources resulted in a significant environmental advantage over the proposed route. Additionally, most of the alternatives would result in greater impacts overall to the resources examined based on the increased length and reduced amount that could be installed by HDD. Dakota County, the entity that manages the LHRP, filed comments stating, "The county has requested various provisions to minimize the environmental impact of the utility line construction and maintenance within the LHRP, and [Northern] has indicated that it will agree to the provisions." We believe that the proposed route through the LHRP, based on the HDD method and Northern's proposed construction and restoration measures to reduce surface impacts with the LHRP and restore areas disturbed by construction, effectively minimizes the impact on the LHRP and therefore, we find no alternative that results in a significant environmental advantage over Northern's proposed route.

3. A-Line Replacement Alternative

During the public scoping process, a comment was submitted requesting that we consider an alternative that would involve removal of the A-line and replacing it with a larger diameter pipeline that would support the requested capacity increase. In considering this alternative, we concluded that taking the A-line out of service, removing it, and installing a new pipeline in its place would result in significant service interruptions. This would not allow Northern to meet its existing delivery requirements and would also result in the Project crossing some the areas that commentors specifically requested be avoided. Therefore, this alternative was not considered further.

D. STAFF'S CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis in this EA, we conclude that if Northern constructs and operates the facilities in accordance with its application and supplements, along with our recommended mitigation measures listed below, approval of this proposal would not constitute a major federal action significantly affecting the quality of the human environment. We recommend that the Commission Order contain a finding of no significant impact and include the following mitigation measures as conditions to any Certificate the Commission may issue.

1. Northern 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. Northern 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 OEP **before using that modification**.

2. The Director of OEP has delegated authority to 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; and

    b. the design and implementation of any additional measures deemed necessary (including stop-work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from Project construction and operation.

3. **Prior to any construction**, Northern shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel would be informed of the EI's authority and have been or would 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**, Northern 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.

    Northern'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. Northern's right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas pipeline to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. Northern 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 Commission's 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**, Northern shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. Northern must file revisions to the plan as schedules change. The plan shall identify:

   a. how Northern 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 Northern 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 onsite construction and inspection personnel;

   c. how Northern 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 Northern will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change);

f. the company personnel (if known) and specific portion of Northern's organization having responsibility for compliance;

g. the procedures (including use of contract penalties) Northern will follow if noncompliance occurs; and

h. for each discrete facility, a Gantt or PERT chart (or similar Project scheduling diagram), and dates for

(1) the completion of all required surveys and reports;

(2) the environmental compliance training of onsite personnel;

(3) the start of construction; and

(4) the start and completion of restoration.

7. Northern shall employ at least one EI 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, Northern shall file updated status reports with the Secretary on a **weekly 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 Northern's efforts to obtain the necessary federal authorizations;

b. the construction status of the Project, 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, and their cost;

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 Northern from other federal, state, or local permitting agencies concerning instances of noncompliance, and Northern's response.

9. **Prior to receiving written authorization from the Director of OEP to commence construction of any Project facilities**, Northern shall file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

10. Northern 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.

11. **Within 30 days of placing the authorized facilities in service**, Northern shall file an affirmative statement with the Secretary, certified by a senior company official:

a. that the facilities have been constructed 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 Northern has complied with or would 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.

12. Northern **shall not begin construction until** Northern files with the Secretary:

a. the SHPO's comments on the additional information regarding the two depressions, and on Northern's proposed protective measures for the two depressions;

b. the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties would be adversely affected; and

c. the FERC staff reviews and the Director of OEP notifies Northern in writing that construction may proceed.

All material 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: "CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE."

13. **Prior to construction of any HDD**, Northern shall file with the Secretary, for the review and written approval by the Director of OEP, an HDD noise mitigation plan to reduce the projected noise level attributable to the proposed drilling operations at nearby NSAs. During drilling operations, Northern shall implement the approved plan, monitor noise levels, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than an Ldn of 55 dBA at the NSAs.

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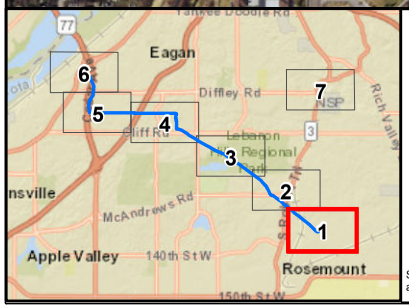
Appendix A

Cedar Station Upgrade Project

Project Mapping



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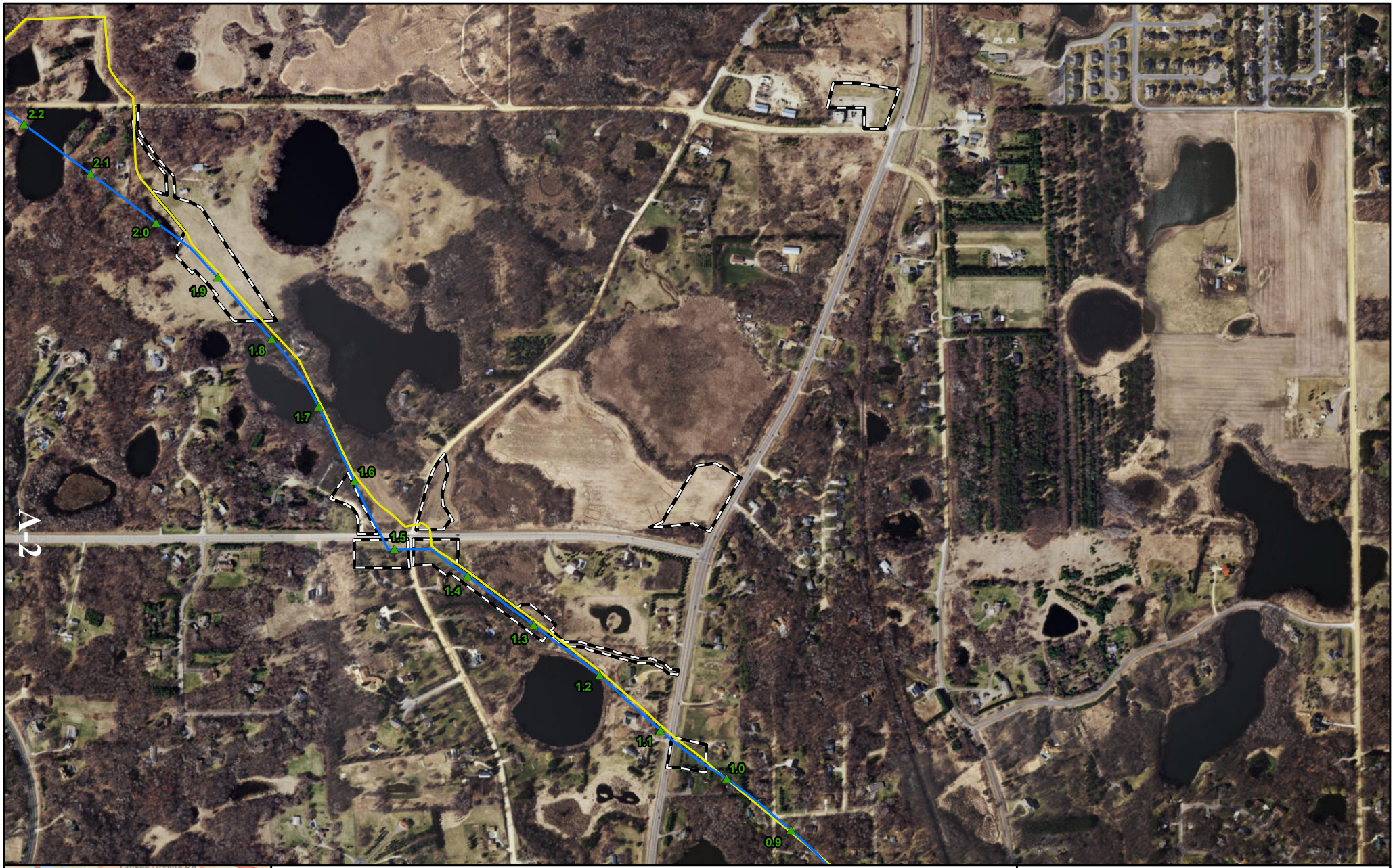
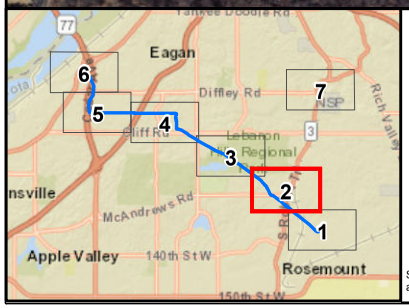
Source: USGS NAIP 2015, Burns and McDonnell Engineering Company, and Northern Natural Gas

- Mile Post
- Proposed Pipeline
- Existing 16-inch A-Line
- Project Area

Cedar Station Upgrade
Northern Natural Gas
Dakota County, Minnesota





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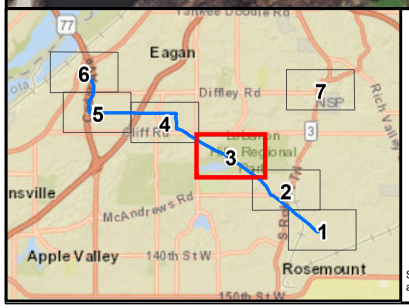
Proposed Pipeline

Existing 16-inch A-Line

Project Area

Cedar Station Upgrade
Northern Natural Gas
Dakota County, Minnesota



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Source: USGS NAIP 2015, Burns and McDonnell Engineering Company, and Northern Natural Gas

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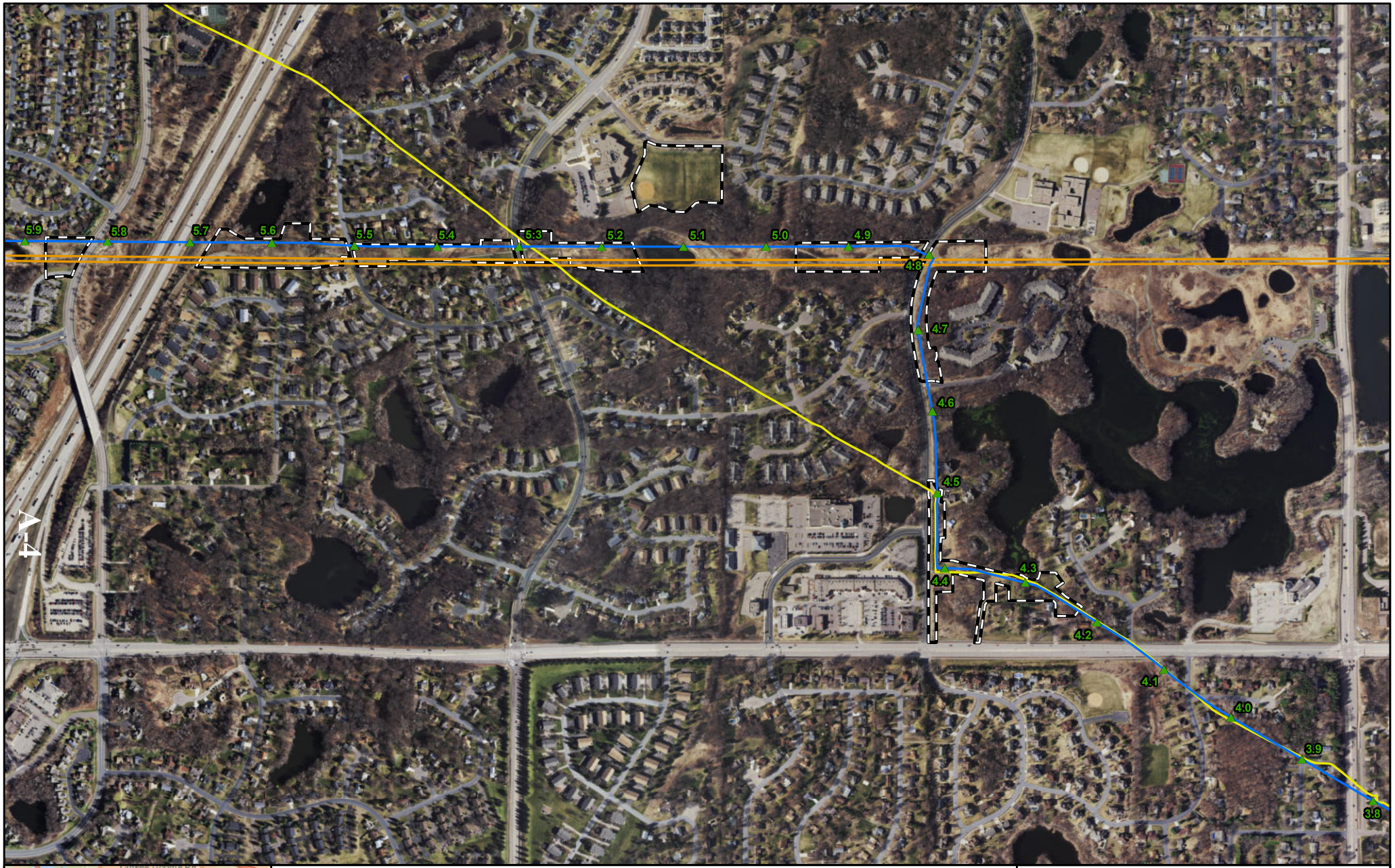
- Existing 16-inch A-Line
- Project Area

Cedar Station Upgrade
Northern Natural Gas
Dakota County, Minnesota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Source: USGS NAIP 2015, Burns and McDonnell Engineering Company, and Northern Natural Gas
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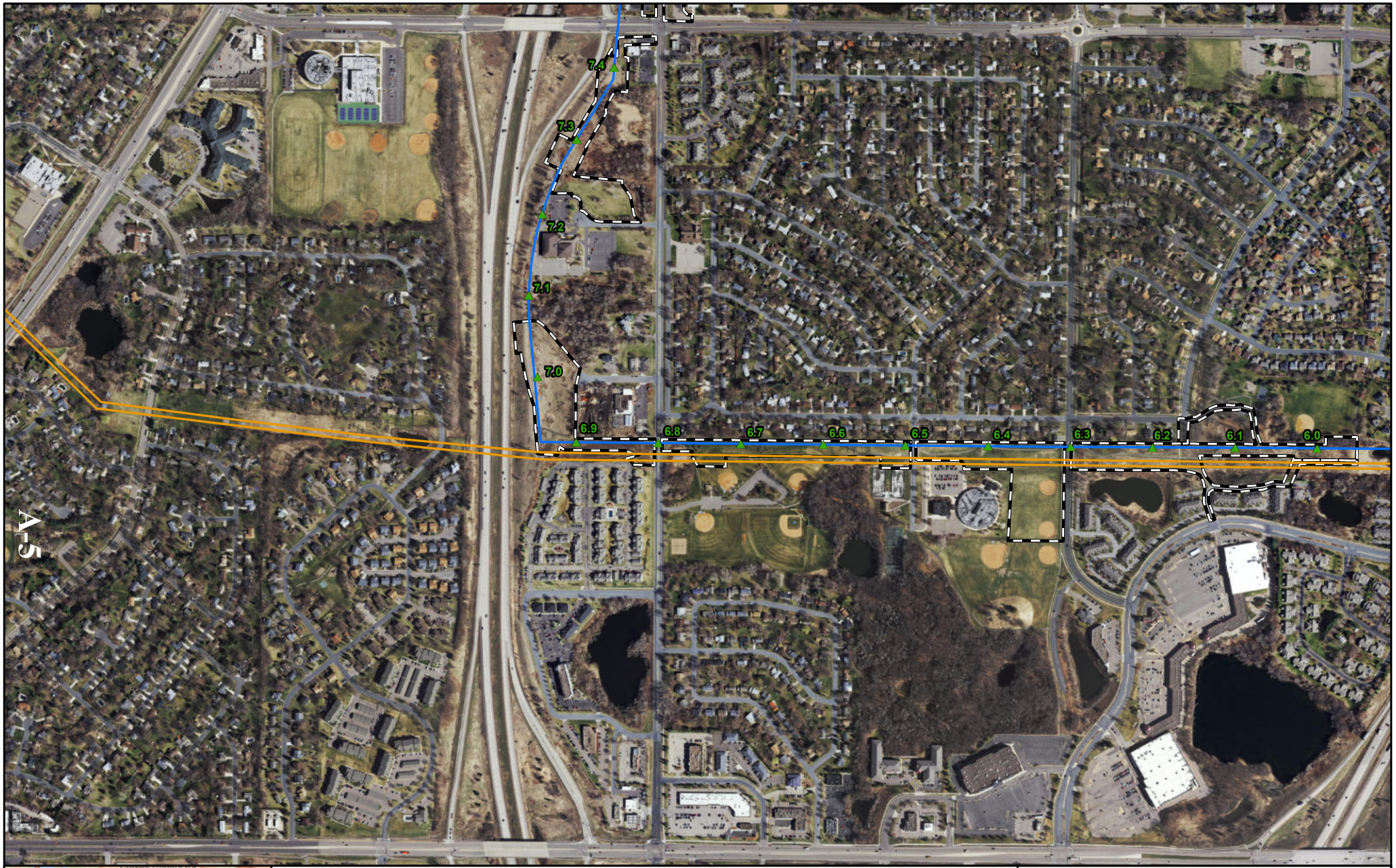
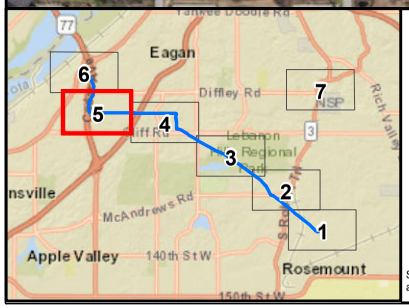
Proposed Pipeline
Existing 16-inch A-Line
Existing 345-kV Transmission Line
Project Area
Cedar Station Upgrade
Northern Natural Gas
Dakota County, Minnesota





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Source: USGS NAIP 2015, Burns and McDonnell Engineering Company, and Northern Natural Gas

▲ Mile Post

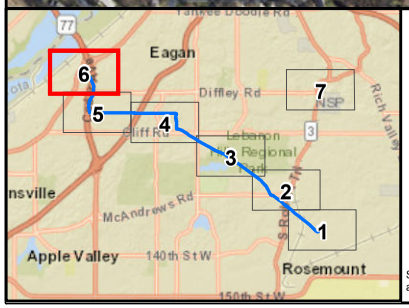
Proposed Pipeline

Existing 345-kv Transmission Line

Project Area

Cedar Station Upgrade
Northern Natural Gas
Dakota County, Minnesota

A-6



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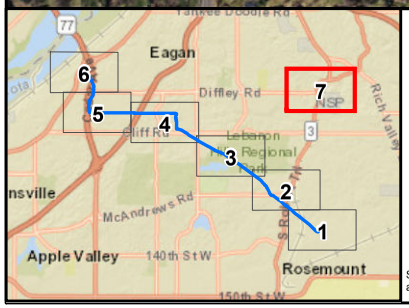
Source: USGS NAIP 2015, Burns and McDonnell Engineering Company, and Northern Natural Gas

- Mile Post
- Proposed Pipeline
- Existing 16-inch A-Line
- Project Area

Cedar Station Upgrade
Northern Natural Gas
Dakota County, Minnesota



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Source: USGS NAIP 2015, Burns and McDonnell Engineering Company, and Northern Natural Gas

Existing 345-kV Transmission Line

Project Area

Cedar Station Upgrade
Northern Natural Gas
Dakota County, Minnesota

Appendix B

Cedar Station Upgrade Project

Northern's Plan for the Inadvertent Release of Drilling Mud

Northern Natural Gas
Plan for Inadvertent Release of Drilling Mud

The purpose of this plan is to outline the Northern Natural Gas Company (Northern), contractor and third-party inspector responsibilities pertaining to preparation, monitoring management and clean-up of inadvertent releases of drilling mud (frac-outs) resulting from horizontal directional drill (HDD) activities. The plan will be provided to Northern, contractor and inspection personnel prior to the commencement of HDD activities.

Contractors are required to conduct HDD activities in compliance with the applicable environmental guidelines set forth in the Federal Energy Regulatory Commission's Upland Erosion Control, Revegetation, and Maintenance Plan (FERC Plan) and Wetland and Waterbody Construction and Mitigation Procedures (FERC Procedures) and any applicable local, state and federal regulations concerning HDD activities.

1.0 Requirements Prior to On-site HDD Activities

1.1 Through the environmental permitting process and/or consultation with the applicable state agency, Northern will determine agency-specific requirements prior to beginning of HDD activities.

1.2 The environmental inspector (EI) will conduct an on-site tailgate meeting with the contractor HDD crew and inspection personnel to review the following: spill prevention; frac-out monitoring responsibilities, containment and clean-up procedures; and required notifications.

1.3 The contractor will have sufficient spill containment material and supplies as required to contain any frac-out. These may include, but are not limited to, pumps and hoses, sand bags, straw bales, silt fence and turbidity curtain.

1.4 The contractor will have a vacuum truck on-site or on-call within a reasonable distance to assist with any required frac-out mud removal.

1.5 The contractor will provide Northern with material safety data sheets MSDS for drilling mud and additives. These sheets will be kept on site.

1.6 The contractor will submit all proposed HDD mud additives to Northern for approval prior to using them.

1.7 The contractor will provide Northern with documentation of the proposed approved disposal site for drilling mud.

2.0 Monitoring Requirements

2.1 The contractor will assign personnel to continuously monitor the HDD activities. This will include walking the HDD path between entry and exit points (where practical) and visually inspecting for frac-outs. At road crossings, the contractor will ensure monitoring is conducted in accordance with all applicable safety requirements. In areas of open water, at a minimum visual inspections will be conducted from the waterbody banks. The contractor is responsible for determining a safe monitoring method.

2.2 The environmental inspector will document frac-out incidents including initial containment and final clean-up and the information will be included using environmental procedure 380.203a, Appendix A: Environmental Inspection Daily Report.

2.3 Northern inspection personnel will monitor all initial frac-out containment and final clean-up activities to ensure that they are completed safely, promptly and in compliance with all project permits.

3.0 Initial Frac-Out Management

3.1 Upon discovery of a frac-out, the drilling operation will be immediately stopped. Any frac-out will be immediately enclosed by an appropriate containment. The structure will be constructed from the on-site material and supplies in a manner which minimizes impact to the surrounding environment. The structure type and size will be determined by the location and severity of the release.

3.2 The contractor will immediately notify the EI to ensure that any required agency notifications are promptly made. The EI will report any releases along stream banks or within live water to appropriate agency as required. In cases where frac-outs occur along stream banks, turbidity curtains will be used in an effort to contain the mud within the bank area.

3.3 Following completion of containment, the drilling mud will be cleaned up and removed for proper disposal in compliance with the applicable state and federal regulations. After corrective measures are implemented, the drilling operation will be allowed to resume. The containment structure will remain in place until the HDD operation is complete.

3.4 Upon resuming drilling operations, the contractor will reduce the gallons-per-minute of drilling mud to minimize the release of drilling mud to the surface. If frac-out flows can not be sufficiently decreased, and environmental conditions permit, a viscosifier (additive) may be added to the drilling mud to promote bore hole-stability. In cases where the release can not be entirely stopped, the operation may proceed provided the mud is continuously removed from within the containment structure, the containment structure is not breeched or mud does not reach the structure; and the initially contained frac-out area does not increase in size.

3.5 If the operation is deemed unsuccessful, the existing bore hole will be plugged and/or abandoned, dependent on the size and location, and another attempt at boring will be made. The subsequent attempt will occur within the previously environmentally cleared and approved right of way (ROW), or if outside the cleared ROW, after proper agency clearance is received. Any plugging and/or abandonment of a HDD hole will be in compliance with all applicable state and federal permits, laws, and regulations and is subject to Northern approval.

4.0 Requirements Following HDD Completion

4.1 Upon completion of drilling activities, all containment structures and drilling mud remaining within the structures will be removed. The frac-out site will be returned to the original grade and, where applicable, the disturbed area will be

reseeded and mulched. The EI will monitor these activities to ensure proper clean-up and restoration.

4.2 All drilling mud captured as a result of frac-out clean-up, including that captured within the HDD entry and exit pits, will be removed from the site for proper disposal.

5.0 Specific Special Considerations For Lebanon Hills Regional Park

5.1 All drilling mud captured as a result of frac-out clean-up will be left in place and remain undisturbed, provided that the release does not contact any culturally significant resources, waterbodies, wetlands or archeological sites within Lebanon Hills Regional Park.

5.2 Due to the drilling mud being a naturally occurring substance (Bentonite), the Dakota County Parks Department has requested that all mud releases be left alone or cleaned up by hand to minimize soil disturbance within the park.

CHANGE MANAGEMENT:

Responsibility for Procedure:

Address all questions on this procedure to the director of environmental affairs.

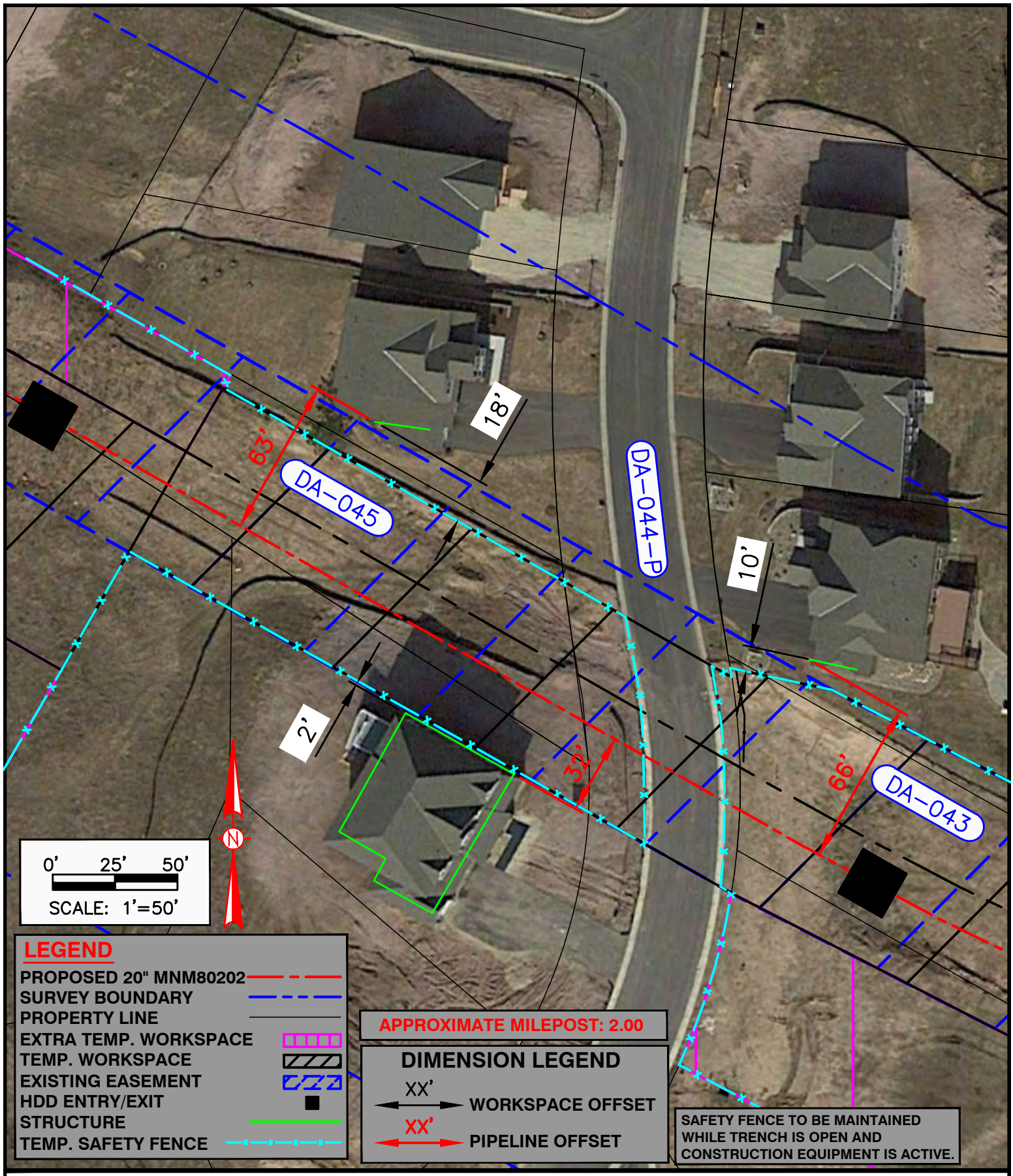
Revision History:

Rev. 0 12/14/12 Publish Only: Original procedure released.

Appendix C

Cedar Station Upgrade Project

Site-specific Construction Plans for Residences within 25 feet of the Project



Northern Natural Gas
A Berkshire Hathaway Energy company

Cedar Station Upgrade 20" MNM80202
Residence Site Specific Plan of
Tract DA-043, DA-044-P, DA-045
Sec. 34, T27N. R23W
Dakota County, Minnesota

RSSP-004
Issued to FERC
Date: 10/16/16
Scale: 1'=50'

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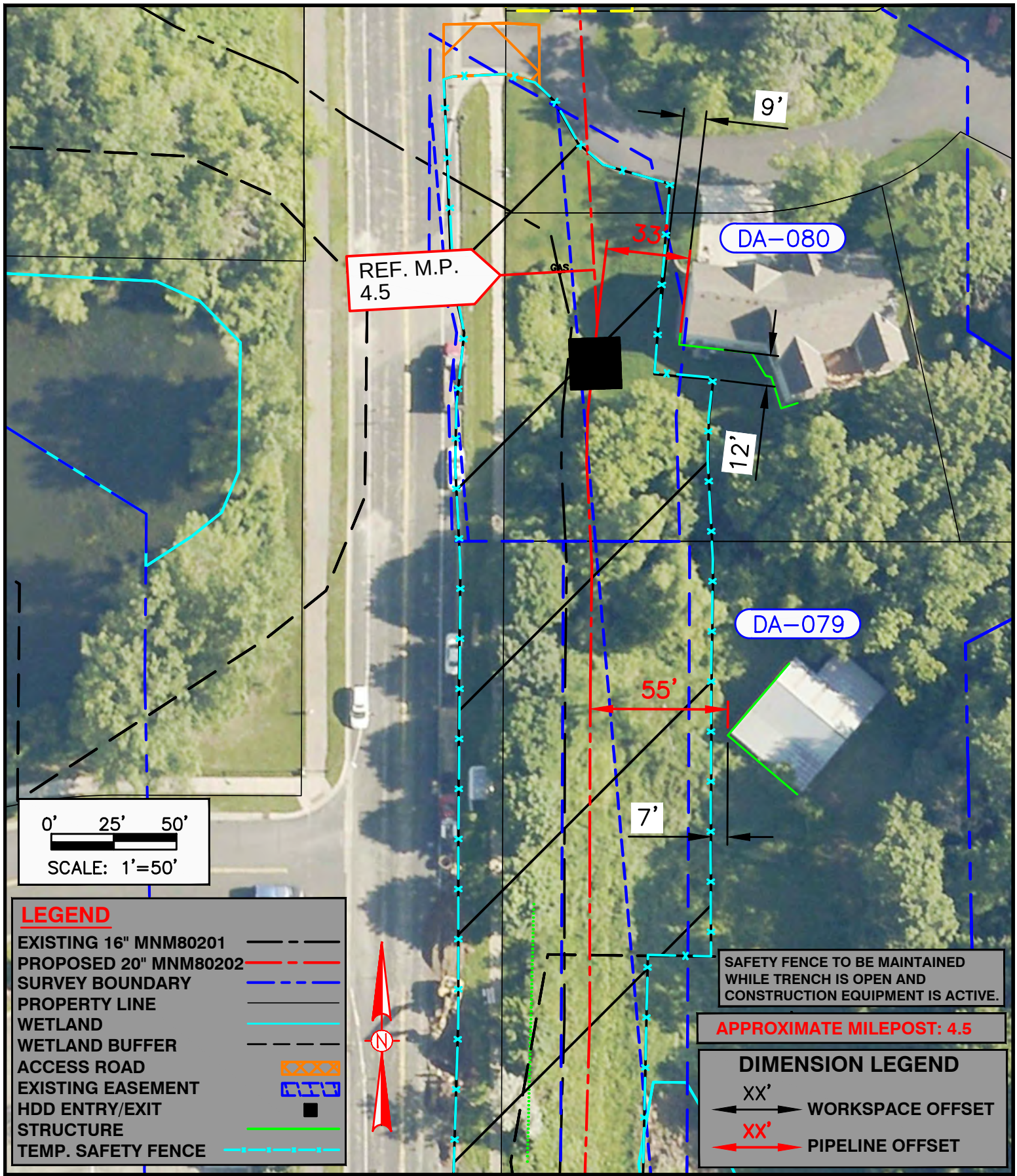

Northern Natural Gas
A Berkshire Hathaway Energy company

Cedar Station Upgrade 20" MNM80202
Residence Site Specific Plan of
Tract DA-060, DA-059, DA-058, DA-057
Sec. 34, T27N. R23W
Dakota County, Minnesota

RSSP-008
Issued to FERC
Date: 10/16/16
Scale: 1'=50'

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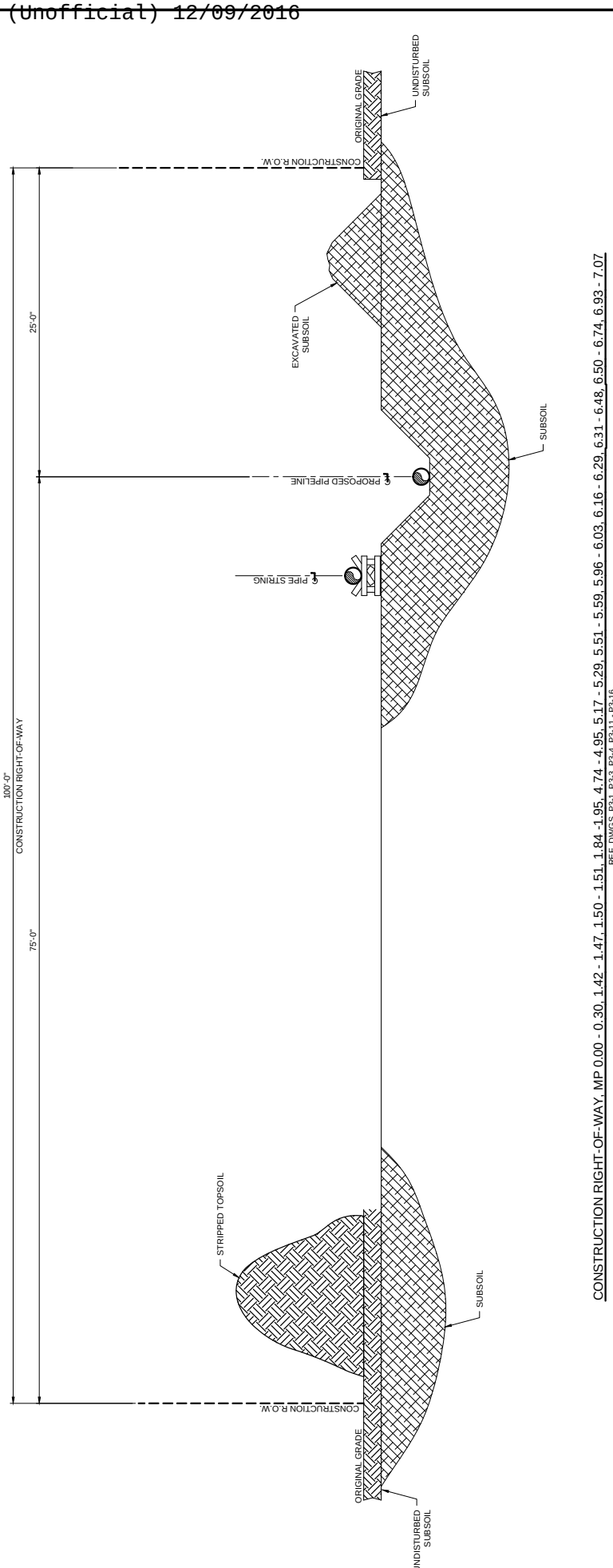
Appendix D

Cedar Station Upgrade Project

Right-of-way Cross Sectional Diagrams

Figure 1.2-1: Cross Sectional Drawings



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REF. DWGS. P3-1, P3-3, P3-4, P3-11 - P3-16

SCALED DISCLAIMER
NOTICE: SCALE APPLIES TO 22"x34" PAPER SIZE ONLY

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A	ISSUED TO FERC	SPS	3/5/16		

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SCALE: 1/4" = 1'-0"
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CONST.-YR: 2016

M453B 20" MNM80202
CEDAR STATION UPGRADE
CEDAR STATION UPGRADE 20" MNM80202
SEC. 21, 17, 28, 29, & 30, T115N & T27N, R19W & R23W
DAKOTA COUNTY, MINNESOTA

Northern Natural Gas

PROJECT NO. 01116826
DWG NO. **ROW-1**

Skocz, Steve
5/23/2016 5:44 PM
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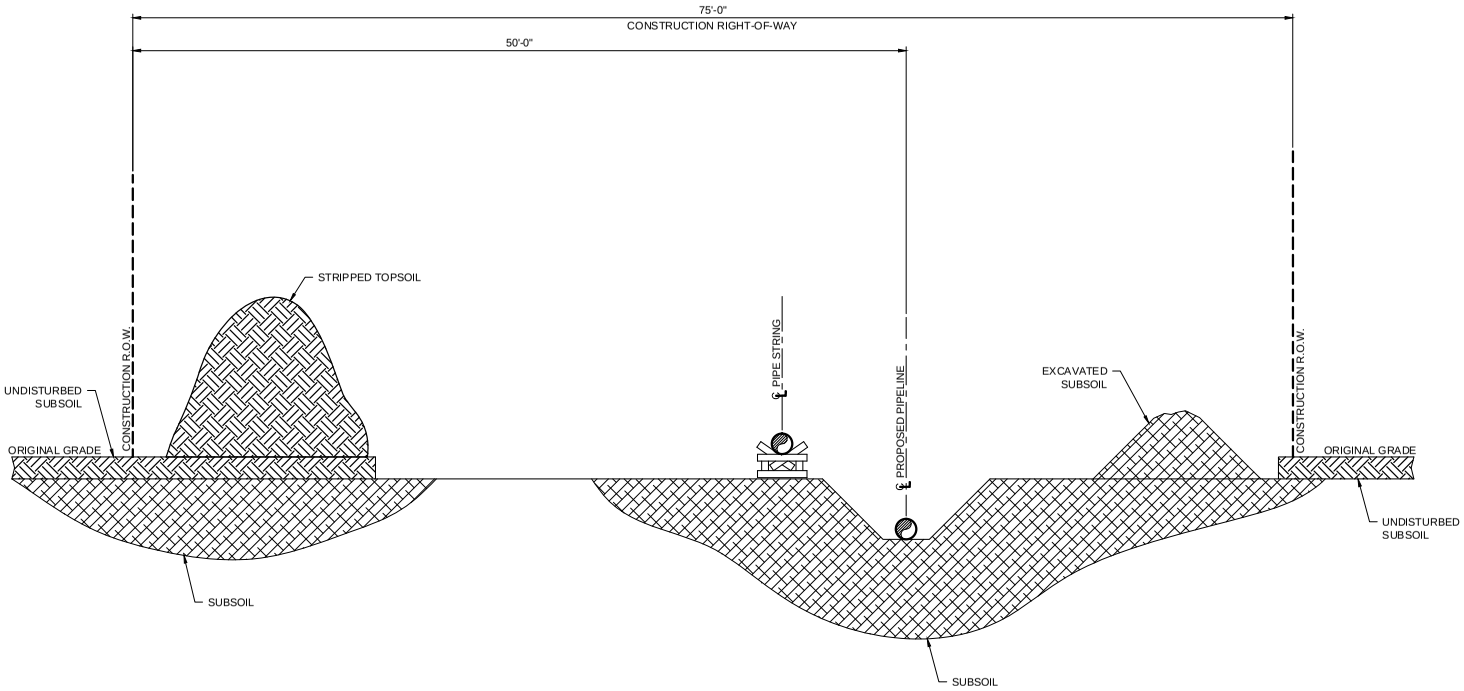
Figure 1.2-1: Cross Sectional Drawings



CONSTRUCTION RIGHT-OF-WAY, MP 1.29 - 1.42, 3.05 - 3.05, 5.59 - 5.66, 6.03 - 6.16

REF. DWGS. P3-3, P3-7,P3-12 - P3-14

LEGEND

TOPSOIL

SUBSOIL

48" 24" 0 4'-0" 8'-0"

SCALE: 1/4" = 1'-0"

SCALE DISCLAIMER:
NOTED SCALE APPLIES TO 22"x34" PAPER SIZE ONLY

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ASBUILT			
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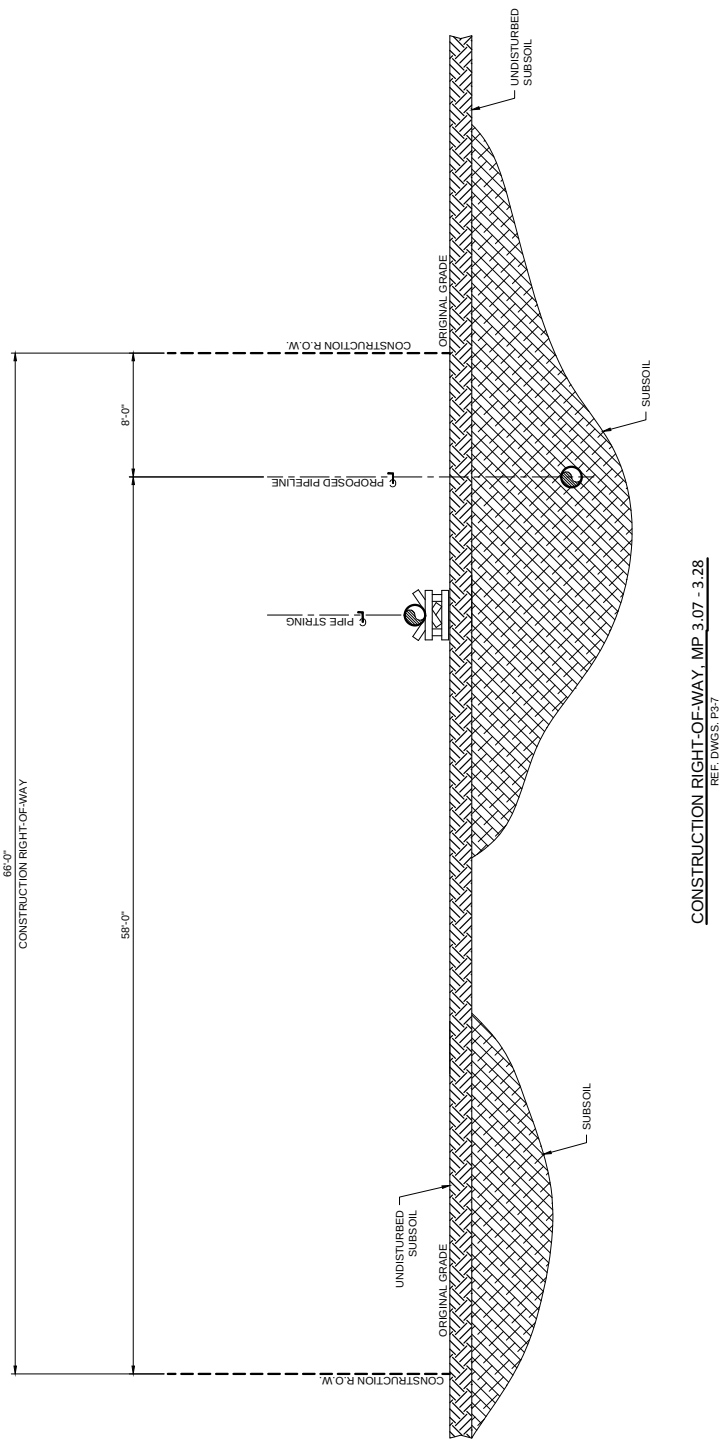
M453B 20" MNM80202
CEDAR STATION UPGRADE
CEDAR STATION UPGRADE 20" MNM80202
SEC. 17, 28, 29, & 30, T115N & T27N, R19W & R23W
DAKOTA COUNTY, MINNESOTA

Northern Natural Gas

PROJECT NO. 01116826

DWG. NO. **ROW-2** A

Figure 1.2-1: Cross Sectional Drawings



NO.	REVISION - DESCRIPTION	BY	DATE	CHKD	APPD
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ANY CHANGES FROM WHAT IS SHOWN MUST BE IDENTIFIED AND REVIEWED BY REGULATORY BEFORE **IMPLEMENTATION**

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REL. NO.: N/A
CONST.-YR: 2016

M453B 20" MNM80202
CEDAR STATION UPGRADE
CEDAR STATION UPGRADE 20" MNM80202
SEC. 34, T27N, R23W
DAKOTA COUNTY, MINNESOTA

Northern Natural Gas

PROJECT NO. **01116826**
DWG. NO. **ROW-3**

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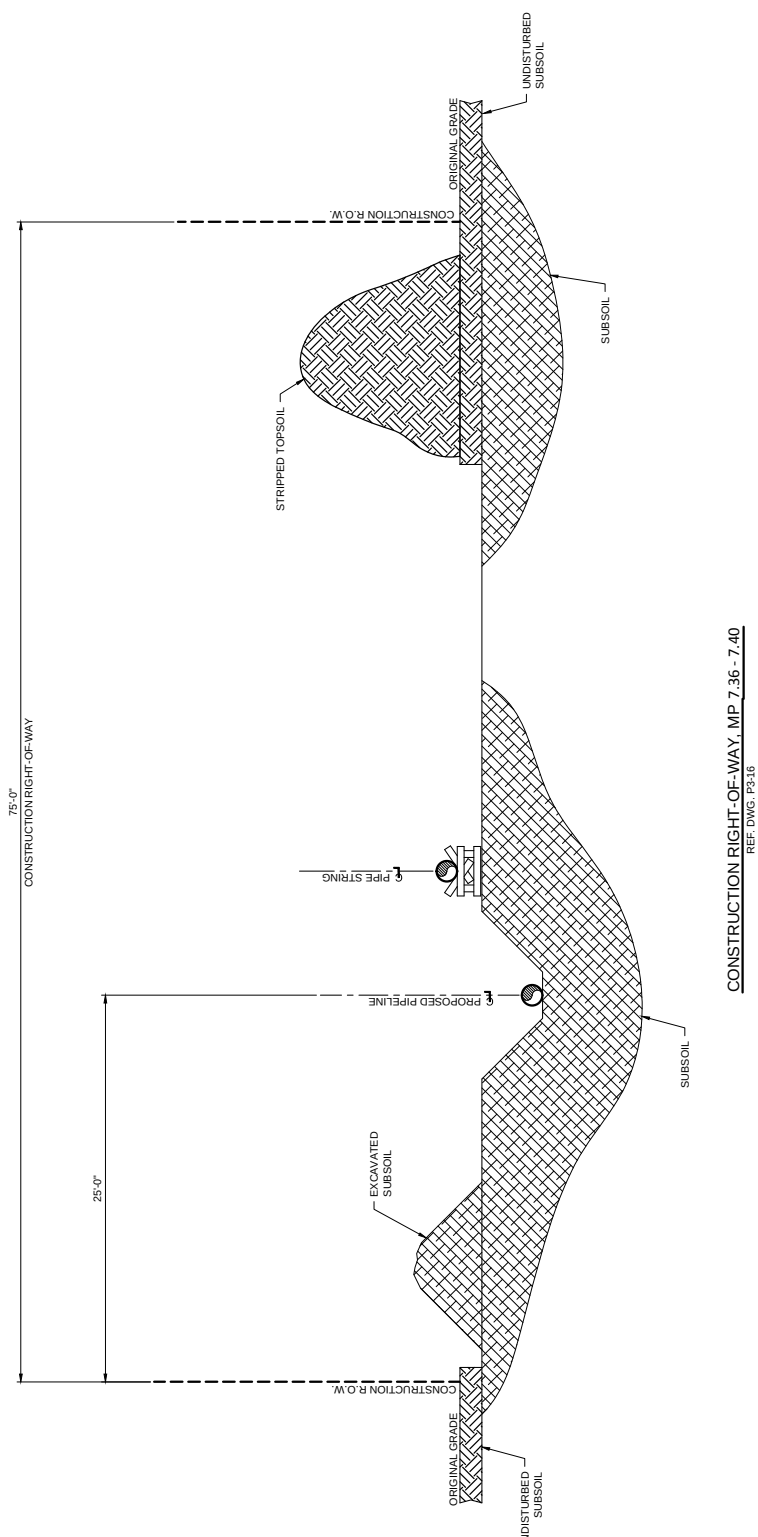
Figure 1.2-1: Cross Sectional Drawings



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REL. NO.: N/A
CONST. YR: 2016

M453B 20" MNM80202
CEDAR STATION UPGRADE
CEDAR STATION UPGRADE 20" MNM80202
SEC. 30, T27N, R23W
DAKOTA COUNTY, MINNESOTA

Northern Natural Gas

PROJECT NO. 01116826
DWG. NO. ROW-4

NO.	REVISION - DESCRIPTION	BY	DATE	CHKD	APPD
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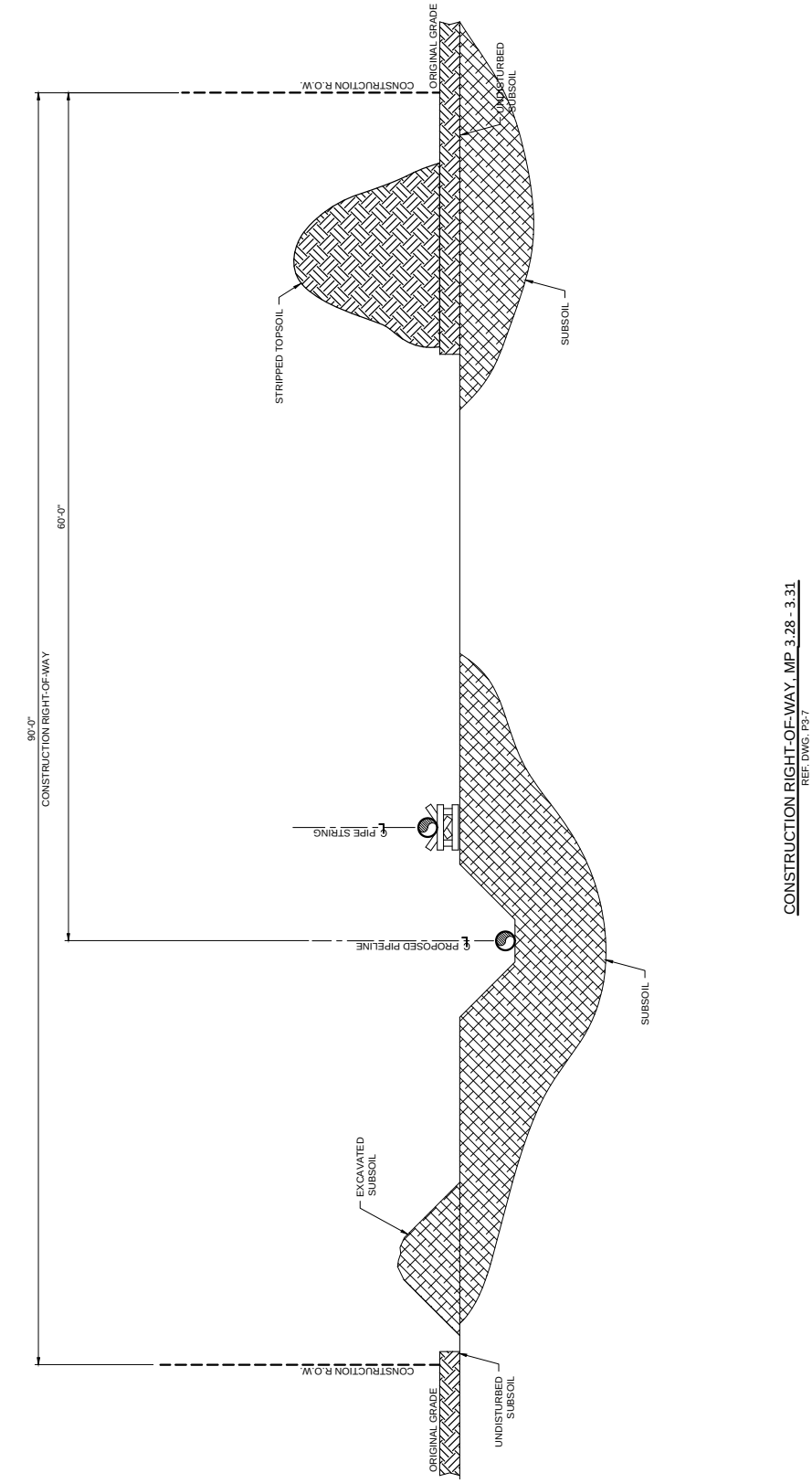
Figure 1.2-1: Cross Sectional Drawings



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REF. DWG. P3-7

LEGEND
TOPSOIL
SUBSOIL

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SCALE DISCLAIMER
NOTICE: SCALE APPLIES TO 22"x34" PAPER SIZE ONLY

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ANY CHANGES FROM WHAT IS SHOWN MUST BE IDENTIFIED AND REVIEWED BY REGULATORY BEFORE **IMPLEMENTATION**

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CONST. YR 2016

M453B 20" MNM80202
CEDAR STATION UPGRADE
CEDAR STATION UPGRADE 20" MNM80202
SEC. 21, T115N, R19W
DAKOTA COUNTY, MINNESOTA

Northern Natural Gas

PROJECT NO. **01116826**
DWG. NO. **ROW-5**

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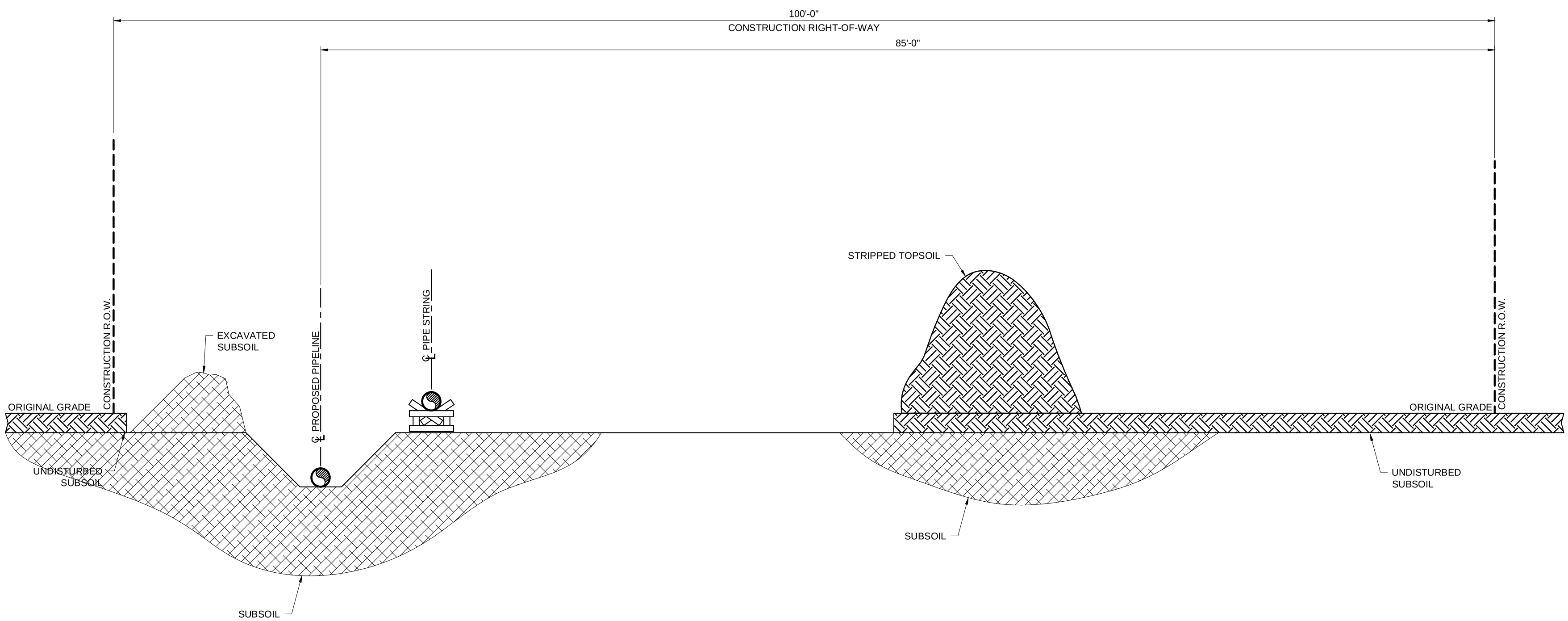
Skocz, Steve

Figure 1.2-1: Cross Sectional Drawings



CONSTRUCTION RIGHT-OF-WAY, MP 3.31 - 3.46
REF. DWG. P3-8

LEGEND

TOPSOIL
SUBSOIL

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SCALE: 1/4" = 1'-0"

SCALE DISCLAIMER:
NOTED SCALE APPLIES TO 22"x34" PAPER SIZE ONLY

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APP'D
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ANY CHANGES FROM WHAT IS SHOWN MUST BE IDENTIFIED AND REVIEWED BY REGULATORY BEFORE **IMPLEMENTATION**

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CEDAR STATION UPGRADE
CEDAR STATION UPGRADE 20" MNM80202
SEC. 21, T115N, R19W
DAKOTA COUNTY, MINNESOTA

Northern Natural Gas

PROJECT NO. **01116826**

DWG. NO. **ROW-6** A

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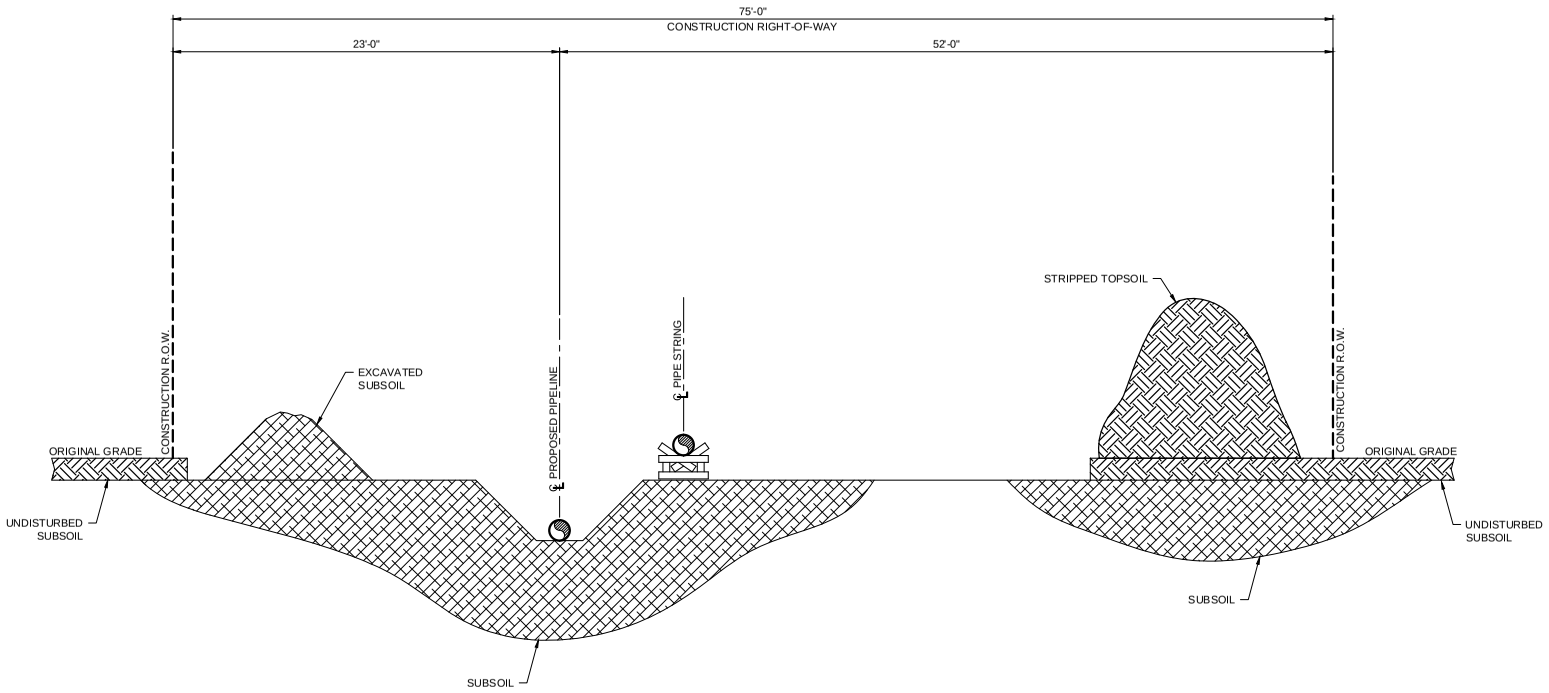
Figure 1.2-1: Cross Sectional Drawings



CONSTRUCTION RIGHT-OF-WAY, MP 4.27 - 4.49

REF. DWG. P3-10

LEGEND

TOPSOIL

SUBSOIL

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SCALE: 1/4" = 1'-0"

SCALE DISCLAIMER:
NOTED SCALE APPLIES TO 22"x34" PAPER SIZE ONLY

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED TO FERC	SPS	3/5/16		

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ANY CHANGES FROM WHAT IS SHOWN MUST BE IDENTIFIED AND REVIEWED BY REGULATORY BEFORE **IMPLEMENTATION**

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M453B 20" MNM80202
CEDAR STATION UPGRADE
CEDAR STATION UPGRADE 20" MNM80202
SEC. 8, T27N, R23W
DAKOTA COUNTY, MINNESOTA

Northern Natural Gas

PROJECT NO. 01116826

DWG. NO. **ROW-7** A

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Figure 1.2-1: Cross Sectional Drawings

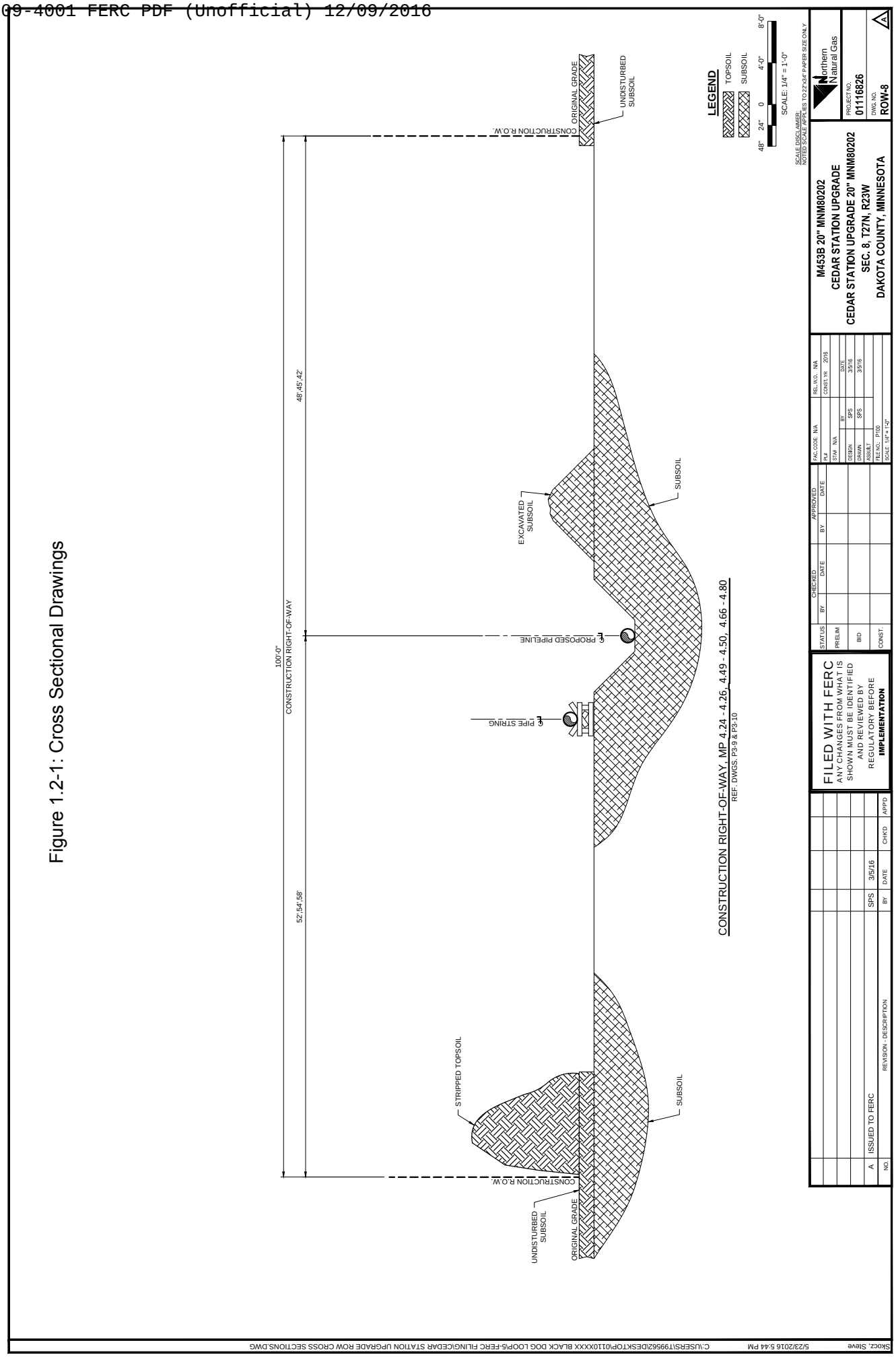
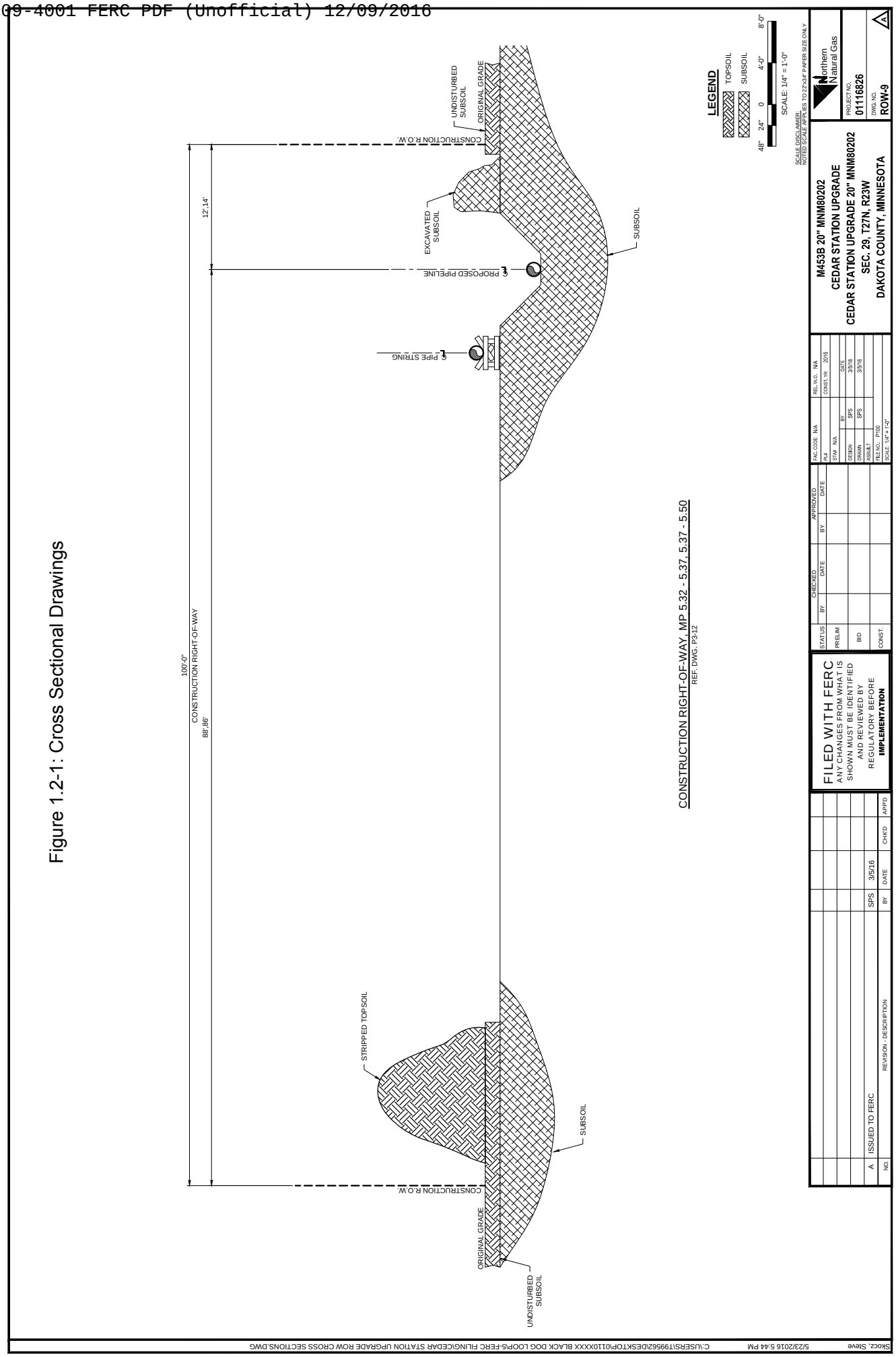


Figure 1.2-1: Cross Sectional Drawings



Appendix E

Cedar Station Upgrade Project

Extra Temporary Workspaces

Extra Temporary Workspace for the Cedar Station Upgrade Project							
Beginning MP	**Ending MP**	**Side of Construction Work Area**	**Justification for ETWS**	**Length max (ft)**	**Width max (ft)**	**Dominant Land Use[a]**	**Approximate Acreage**
0	0.1	Both sides of pipeline	Rosemount Junction Pig Launcher workspace	360	375	Open Land	2.36
0.14	0.31	North side of pipeline	HDD entry/exit ETWS	855	167	Agricultural	2.21
0.26	0.31	South side of pipeline	HDD entry/exit ETWS	200	23	Agricultural	0.06
1.03	1.08	Both sides of pipeline	HDD entry/exit ETWS	200	250	Residential	0.99
1.28	1.33	North side of pipeline	HDD entry/exit ETWS	262	71	Open Land	0.37
1.42	1.48	North side of pipeline	Road Crossing – Dodd Blvd	285	155	Residential	0.48
1.43	1.48	South side of pipeline	Road Crossing – Dodd Blvd & McAndrews Rd.	152	26	Residential	0.07
1.49	1.52	South side of pipeline	Road Crossing - McAndrews Rd	353	179	Residential	0.79
1.49	1.52	North side of pipeline	Road Crossing - McAndrews Rd	130	39	Residential	0.11
1.53	1.61	South side of pipeline	Road Crossing - McAndrews Rd	432	175	Open Land	0.90
1.83	2.03	North side of pipeline	HDD entry/exit ETWS	1096	208	Open Land	3.34
1.84	1.88	South side of pipeline	HDD entry/exit ETWS	221	25	Open Land	0.12
1.92	1.96	South side of pipeline	HDD entry/exit ETWS	166	25	Open Land	0.09
2.99	3.08	North side of pipeline	HDD entry/exit ETWS	489	200	Open Land	1.45
3.09	3.11	South side of pipeline	Access Road	150	160	Open Land	0.13
3.08	3.11	South side of pipeline	Access Road	76	187	Open Land	0.13
3.10	3.23	Both sides of pipeline	HDD entry/exit ETWS	722	66	Open Land	1.06
3.24	3.29	North side of pipeline	HDD entry/exit ETWS	216	99	Open Land	0.39
3.24	3.31	South side of pipeline	HDD entry/exit ETWS	401	108	Residential	0.77
3.36	3.4	South side of pipeline	HDD entry/exit ETWS	200	61	Residential	0.27
3.36	3.4	North side of pipeline	HDD entry/exit ETWS	201	35	Residential	0.16
3.45	3.49	South side of pipeline	HDD entry/exit ETWS	209	17	Residential	0.07
3.45	3.54	North side of pipeline	HDD entry/exit ETWS	429	85	Residential	0.62
4.23	4.31	North side of pipeline	HDD entry/exit ETWS on Cliff Rd.	474	110	Residential	0.38

Extra Temporary Workspace for the Cedar Station Upgrade Project							
Beginning MP	**Ending MP**	**Side of Construction Work Area**	**Justification for ETWS**	**Length max (ft)**	**Width max (ft)**	**Dominant Land Use[a]**	**Approximate Acreage**
4.24	4.26	South side of pipeline	HDD entry/exit ETWS	68	31	Residential	0.02
4.26	4.32	South side of pipeline	HDD entry/exit ETWS	262	90	Residential	0.31
4.34	4.35	South side of pipeline	HDD entry/exit ETWS	79	136	Residential	0.23
4.39	4.43	South side of pipeline	HDD entry/exit ETWS	157	574	Open Land	0.83
4.63	4.68	East side of pipeline	HDD entry/exit ETWS	214	41	Forested	0.2
4.77	4.8	East side of pipeline	HDD entry/exit ETWS	198	315	Open Land	1.16
4.86	4.96	South side of pipeline	HDD entry/exit ETWS pull back	535	89	Open Land	1.06
5.15	5.24	South side of pipeline	HDD entry/exit ETWS pull back	471	87	Open Land	0.78
5.26	5.29	South side of pipeline	Road Crossing – Johnny Cake Ridge Road	179	25	Open Land	0.10
5.26	5.30	North side of pipeline	Road Crossing – Johnny Cake Ridge Road	216	75	Forested	0.36
5.3	5.35	South side of pipeline	Road Crossing – Johnny Cake Ridge Road	280	19	Open Land	0.11
5.31	5.35	North side of pipeline	Road Crossing – Johnny Cake Ridge Road	203	30	Open Land	0.14
5.46	5.5	South side of pipeline	Road Crossing – Woodgate Road	207	42	Open Land	0.19
5.51	5.55	North side of pipeline	Road Crossing – Woodgate Road	213	14	Residential	0.04
5.52	5.69	South side of pipeline	HDD entry/exit pull back	920	111	Open Land	1.99
5.55	5.59	North side of pipeline	HDD entry/exit	191	100	Forested	0.4
5.63	5.67	North side of pipeline	HDD entry/exit	203	60	Open Land	0.16
5.95	5.99	North side of pipeline	HDD entry/exit	200	50	Open Land	0.23
5.95	6.03	South side of pipeline	HDD entry/exit	408	25	Open Land	0.23
6.03	6.16	Both sides of pipeline	HDD entry/exit	692	75	Open Land	1.14
6.14	6.3	South side of pipeline	HDD at residential area – offset to avoid houses	849	77	Open Land	1.39
6.16	6.17	North side of pipeline	Wetland Crossing	64	163	Paved Area	0.23

Extra Temporary Workspace for the Cedar Station Upgrade Project							
Beginning MP	**Ending MP**	**Side of Construction Work Area**	**Justification for ETWS**	**Length max (ft)**	**Width max (ft)**	**Dominant Land Use[a]**	**Approximate Acreage**
6.45	6.49	South side of pipeline	Road Crossing – Sandstone Dr.	211	16	Commercial	0.08
6.49	6.53	South side of pipeline	Road Crossing – Sandstone Dr.	192	71	Open Land	0.31
6.72	6.76	South side of pipeline	Road Crossing – Nicols Rd.	214	72	Open Land	0.33
6.8	6.84	South side of pipeline	Road Crossing – Nicols Rd.	180	67	Open Land	0.22
6.93	6.98	Both sides of pipeline	90 degree point of inflection	329	136	Open Land	0.38
7.05	7.09	West side of pipeline	HDD entry/exit ETWS	200	30	Open Land	0.12
7.28	7.31	East side of pipeline	HDD entry/exit ETWS	200	25	Open Land	0.09
7.28	7.31	West side of pipeline	HDD entry/exit ETWS	200	90	Open Land	0.37
7.37	7.44	West side of pipeline	HDD entry/exit ETWS	351	81	Open Land	0.32
7.37	7.41	East side of pipeline	HDD entry/exit ETWS	220	74	Open Land	0.23
7.48	7.56	East side of pipeline	HDD entry/exit ETWS	431	181	Paved Area	1.33
7.49	7.68	East side of pipeline	Road Crossing – Diffley Rd.	2,044	163	Commercial	3.48
7.59	7.63	Both sides of pipeline	HDD entry/exit ETWS	202	104	Commercial	0.43
7.59	7.63	West side of pipeline	HDD entry/exit ETWS	161	87	Commercial	0.29
7.84	7.87	Both sides of pipeline	Cedar Station	802	336	Open Land	4.77
						Total	**41.37**

[a] Dominant land use represents the main land use type impacted by a particular ETWS. There may be multiple land use types within one ETWS.

Access Roads for the Cedar Station Upgrade Project							
Road ID	**MP[a]**	**Existing Road Type**	**Length (feet)**	**Acreage Impacted**	**Permanent or Temporary**	**Dominant Land Use[b] Type Abutting Access Road**	**Proposed Modifications[c]**
AR-1	1.3	Paved/dirt path/two-track	895	0.61	Temporary	Residential	The dirt path would be widened and improved (likely by use of gravel or mats) to support construction traffic; minor tree trimming or clearing may be required
AR-2	2.0	Gravel/dirt path	670	0.51	Temporary	Residential	The existing path would be widened and improved (likely by use of gravel or mats) to support construction traffic; minor tree trimming or clearing may be required to obtain design width
AR-3	2.43	Paved/gravel	2,652	0.61	Temporary	Paved	None
AR-4[d]	3.1	Gravel/dirt	1,090	0.79	Temporary	Forested Upland	The existing access road would be graded and improved (likely by use of gravel and mats) to support construction traffic
AR-5	4.4	Gravel/dirt	290	0.19	Temporary	Residential	The existing access road would be widened and improved (likely by use of gravel or mats) to support construction traffic
AR-6	4.5	Paved	40	0.02	Temporary	Residential	None
AR-7	5.9	Paved	180	0.12	Temporary	Residential	None
AR-8	6.0	Paved/greenfield	880	0.77	Temporary	Paved (Commercial)	Greenfield portions of the access road would be graded and likely covered with gravel or mats to support construction traffic; minor tree clearing is required. The greenfield portion will be returned to pre-construction conditions following completion of

Access Roads for the Cedar Station Upgrade Project							
Road ID	**MP[a]**	**Existing Road Type**	**Length (feet)**	**Acreage Impacted**	**Permanent or Temporary**	**Dominant Land Use[b] Type Abutting Access Road**	**Proposed Modifications[c]**
							construction.
AR-9	6.1	Paved	680	0.45	Temporary	Paved (Residential)	Portions of the public path would be widened and improved (likely by use of gravel or mats) to support construction traffic; minor tree trimming or clearing may be required
AR-10	7.4	Paved/gravel/dirt	360	0.37	Temporary	Paved (Commercial)	Gravel and dirt portions would be improved (likely by use of gravel or mats) to support construction traffic; no modifications will be required on the paved segments of the access road
Total			**7,737**	**4.44**	**(0.75 acre of this is already paved and no impacts are anticipated)**		

[a] Approximate milepost where the proposed access road would intercept the construction corridor or pipeline alignment.
[b] The existing surrounding land use is the current dominant land use type that abuts the access road. There may be multiple land use types present along the entire length of an access road.
[c] Access roads would be returned to pre-construction conditions unless otherwise requested by the landowner.
[d] Access road impact calculations start at the end of Carriage Hill Drive.

Appendix F

Cedar Station Upgrade Project

Estimated Sound Levels at NSAs Based on 24-hour HDD Operations

APPENDIX F

Estimated Sound Levels at NSAs Based on 24-hour HDD Operations

NSA ID	Entry or Exit Point	Approximate Distance and Direction of Closest NSA from HDD Workspace [a]	Ambient Ldn dBA	Estimated HDD Noise without Mitigation			Estimated HDD Noise with Mitigation [b]		
				Attributed to HDD Ldn dBA	Unmitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA	Attributed to HDD Ldn dBA [b]	Mitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA
HDD #1, expected drilling duration of 154 hours (6.4 days)									
NSA01 (Residences)	Exit	489 feet SW	51	65.4	65.6	14.6	55	56.5	5.5
NSA01a (Residences)		775 feet E	51	61.1	61.5	10.5	55	56.5	5.5
NSA01b (Residences)		985 feet NE	51	53.7	55.6	4.6	55	56.5	5.5
NSA01c (Residences)		1,270 feet N	51	56.8	57.8	6.8	55	56.5	5.5
NSA02 (Residences)	Entry	85 feet NE	53.6	85.8	85.8	32.2	55	57.4	3.8
NSA02a (Residences)		460 feet NW	53.6	65.6	65.9	12.3	55	57.4	3.8
NSA02b (Residences)		385 feet W	53.6	71.6	71.7	18.1	55	57.4	3.8
NSA02c (Residences)		155 feet SW	53.6	80.3	80.3	26.7	55	57.4	3.8
HDD #2, expected drilling duration of 54 hours									
NSA02 (Residences)	Entry	85 feet NE	53.6	85.8	85.8	32.2	55	57.4	3.8
NSA02a (Residences)		460 feet NW	53.6	66.5	66.7	13.1	55	57.4	3.8
NSA02b (Residences)		385 feet W	53.6	71.8	71.9	18.3	55	57.4	3.8
NSA02c (Residences)		155 feet SW	53.6	80.3	80.3	26.7	55	57.4	3.8
NSA03 (Residences)	Exit	262 feet W	53.6	70.7	70.8	17.2	55	57.4	3.8
NSA03a (Residences)		540 feet SE	53.6	65.8	66.1	12.5	55	57.4	3.8
NSA03b (Residences)		620 feet E	53.6	60.9	61.6	8	55	57.4	3.8
NSA03c (Residences)		350 feet NE	53.6	68.5	68.6	15	55	57.4	3.8
HDD #3, expected drilling duration of 72 hours									
NSA04 (Residences)	Entry	151 feet SW	55	79.8	79.8	24.8	64.5	65.0	10.0
NSA04a (Residences)		205 feet SE	55	77	77	22	64.5	65.0	10.0
NSA04b (Residences)		375 feet NE	55	71.2	71.3	16.3	64.5	65.0	10.0

NSA ID	Entry or Exit Point	Approximate Distance and Direction of Closest NSA from HDD Workspace [a]	Ambient Ldn dBA	Estimated HDD Noise without Mitigation			Estimated HDD Noise with Mitigation [b]		
				Attributed to HDD Ldn dBA	Unmitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA	Attributed to HDD Ldn dBA [b]	Mitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA
NSA04c (Residences)		610 feet NW	55	61.5	62.4	7.4	64.5	65.0	10.0
NSA05 (Residences)	Exit	371 feet SE	55.6	68	68.2	12.6	65.1	65.6	10.0
NSA05a (Residences)		835 feet NW	55.6	55.4	58.5	2.9	-	-	-
NSA05b (Residences)		550 feet W	55.6	64.5	65	9.4	-	-	-
NSA05c (Residences)		360 feet SW	55.6	68.2	68.4	12.8	65.1	65.6	10.0
HDD #4, expected drilling duration of 222 hours (9.25 days)									
NSA06 (Residences)	Entry	354 feet NE	47	68.2	68.2	21.2	55	55.6	8.6
NSA06a (Residences)		630 feet SW	47	57.6	58	11	55	55.6	8.6
NSA06b (Residences)		750 feet S	47	56	56.5	9.5	55	55.6	8.6
NSA06c (Residences)		935 feet SE	47	53.8	54.6	7.6	-	-	-
NSA07 (Residences)	Exit	1,115 feet SW	56.6	49.5	57.4	0.8	-	-	-
NSA07a (Residences)		2,260 feet SE	56.6	50	57.5	0.9	-	-	-
NSA07b (Residences)		3,070 feet SE	56.6	47.4	57.1	0.5	-	-	-
NSA07c (Residences)		1,655 feet N	56.6	48.6	57.2	0.6	-	-	-
HDD #5, expected drilling duration of 50 hours									
NSA08 (Residences)	Entry	1,047 feet SW	53.5	49.7	55	1.5	-	-	-
NSA08a (Residences)		2,450 feet SE	53.5	48.1	54.6	1.1	-	-	-
NSA08b (Residences)		3,280 feet SE	53.5	44.8	54	0.5	-	-	-
NSA08c (Residences)		1,580 feet N	53.5	59.7	60.6	7.1	55	57.3	3.8
NSA09 (Residences)	Exit	133 feet NW	56.1	77.2	77.2	21.1	65.6	66.1	10.0
NSA09a (Residences)		311 feet S	56.1	69.4	69.6	13.5	65.6	66.1	10.0
NSA09b (Residences)		1,440 feet SW	56.1	49.8	57	0.9	-	-	-
NSA09c (Residences)		1,020 feet N	56.1	54.3	58.3	2.2	-	-	-
HDD #6, expected drilling duration of 157 (6.5 days)									
NSA10 (Residences)	Entry	350 feet NW	47.5	68.6	68.6	21.1	55	55.7	8.2

NSA ID	Entry or Exit Point	Approximate Distance and Direction of Closest NSA from HDD Workspace [a]	Ambient Ldn dBA	Estimated HDD Noise without Mitigation			Estimated HDD Noise with Mitigation [b]		
				Attributed to HDD Ldn dBA	Unmitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA	Attributed to HDD Ldn dBA [b]	Mitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA
NSA10a (Park)		660 feet W	47.5	57.4	57.8	10.3	55	55.7	8.2
NSA10b (Residences)		950 feet SW	47.5	54	54.9	7.4	-	-	-
NSA10c (Residences)		900 feet NE	47.5	55.1	55.8	8.3	55	55.7	8.2
NSA11 (Residences)	Exit	85 feet E	67.4	86.4	86.5	19.1	76.9	77.4	10.0
NSA11a (Residences)		90 feet NE	67.4	85.7	85.8	18.4	76.9	77.4	10.0
NSA11b (Residences)		350 feet NW	67.4	72.4	73.6	6.2	-	-	-
NSA11c (Residences)		130 feet SW	67.4	82.1	82.2	14.8	76.9	77.4	10.0
HDD #7, expected drilling duration of 41 hours									
NSA12 (Residences)	Entry	36 feet SE	60.1	93.9	93.9	33.8	69.6	70.1	10.0
NSA12a (Residences)		125 feet NE	60.1	80.4	80.4	20.3	69.6	70.1	10.0
NSA12b (Residences)		585 feet NW	60.1	62.9	64.7	3.6	-	-	-
NSA13 (Residences)	Exit	87 feet E	56.1	81.2	81.2	25.1	65.6	66.1	10.0
NSA13a (Residences)		416 feet NW	56.1	66.9	67.2	11.1	65.6	66.1	10.0
NSA13b (Residences)		257 feet W	56.1	71	71.1	15	65.6	66.1	10.0
NSA13c (Residences)		233 feet SW	56.1	72	72.1	16	65.6	66.1	10.0
HDD #8, expected drilling duration of 63 hours									
NSA14 (Residences)	Entry	240 feet NE	46.4	71.6	71.6	25.2	55	55.6	9.2
NSA14a (Residences)		400 feet NW	46.4	67.4	67.4	21	55	55.6	9.2
NSA14b (Residences)		285 feet SW	46.4	58.7	58.9	12.5	55	55.6	9.2
NSA14c (Residences)		260 feet SE	46.4	56.5	56.9	10.5	55	55.6	9.2
NSA15 (Residences)	Exit	220 feet S	57.6	75.9	76	18.4	67.1	67.6	10.0
NSA15a (Residences)		262 feet SW	57.6	74.4	74.5	16.9	67.1	67.6	10.0
NSA15b (School)		260 feet NE	57.6	73.7	73.8	16.2	67.1	67.6	10.0
NSA15c (Residences)		425 feet W	57.6	70.2	70.4	12.8	67.1	67.6	10.0
HDD # 9, expected drilling duration of 72 hours									

NSA ID	Entry or Exit Point	Approximate Distance and Direction of Closest NSA from HDD Workspace [a]	Ambient Ldn dBA	Estimated HDD Noise without Mitigation			Estimated HDD Noise with Mitigation [b]		
				Attributed to HDD Ldn dBA	Unmitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA	Attributed to HDD Ldn dBA [b]	Mitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA
NSA16 (Residences)	Entry	213 feet SE	64.9	76.4	76.7	11.8	74.4	74.9	10.0
NSA16a (Residences)		685 feet E	64.9	60.8	66.3	1.4	-	-	-
NSA16b (Residences)		900 feet NE	64.9	63	67.1	2.2	-	-	-
NSA16c (Residences)		295 feet SW	64.9	68.5	70.1	5.2	-	-	-
NSA17 (Park)	Exit	280 feet W	66.1	70.3	71.7	5.6	-	-	-
NSA17a (Residences)		470 feet N	66.1	60.8	67.2	1.1	-	-	-
NSA17b (Residences)		315 feet E	66.1	64.4	68.3	2.2	-	-	-
NSA17c (Residences)		275 feet S	66.1	63.6	68	1.9	-	-	-
HDD #10, expected drilling duration of 45 hours									
NSA18 (Residences)	Entry	220 feet S	59.9	71.4	71.7	11.8	-	-	-
NSA18a (Residences)		430 feet E	59.9	60.5	63.2	3.3	-	-	-
NSA18b (Residences)		510 feet NE	59.9	63.9	65.4	5.5	-	-	-
NSA18c (Park)		230 feet NW	59.9	75.9	76	16.1	69.4	69.9	10.0
NSA19 (Residences)	Exit	50 feet NE	56.9	85.6	85.6	28.7	66.4	66.9	10.0
NSA19a (Residences)		384 feet SE	56.9	69.9	70.1	13.2	66.4	66.9	10.0
NSA19b (Residences)		260 feet NW	56.9	69.8	70	13.1	66.4	66.9	10.0
NSA19c (Park)		351 feet NE	56.9	68	68.3	11.4	66.4	66.9	10.0
HDD #11, expected drilling duration of 45 hours									
NSA20 (Residences)	Exit	105 feet NW	58	78.8	78.8	20.8	67.5	68.0	10.0
NSA20a (Park)		305 feet S	58	69	69.3	11.3	67.5	68.0	10.0
NSA20b (Residences)		295 feet E	58	69.9	70.2	12.2	67.5	68.0	10.0
NSA20c (Residences)		165 feet NE	58	75.2	75.3	17.3	67.5	68.0	10.0
NSA21 (Residences)	Entry	125 feet S	62.3	80.1	80.2	17.9	71.8	72.3	10.0
NSA21a (Business)		310 feet NE	62.3	68.7	69.6	7.3	-	-	-
NSA21b (Residences)		730 feet E	62.3	71.7	72.2	9.9	-	-	-

NSA ID	Entry or Exit Point	Approximate Distance and Direction of Closest NSA from HDD Workspace [a]	Ambient Ldn dBA	Estimated HDD Noise without Mitigation			Estimated HDD Noise with Mitigation [b]		
				Attributed to HDD Ldn dBA	Unmitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA	Attributed to HDD Ldn dBA [b]	Mitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA
NSA21c (Residences)		755 feet NE	62.3	69.1	69.9	7.6	-	-	-
HDD #12, expected drilling duration of 49 hours									
NSA22 (Business)	Entry	489 feet SE	57.5	69.1	69.4	11.9	67	67.5	10.0
NSA22a (Church)		470 feet N	57.5	69.7	70	12.5	67	67.5	10.0
NSA22b (Residences)		490 feet W	57.5	62.8	63.9	6.4	-	-	-
NSA22c (Residences)		840 feet S	57.5	59.4	61.6	4.1	67	67.5	10.0
NSA23 (Church)	Exit	413 feet S	58.2	69.4	69.7	11.5	67.7	68.2	10.0
NSA23a (Residences)		585 feet E	58.2	64.2	65.2	7	-	-	-
NSA23b (Business)		425 feet NE	58.2	62.4	63.8	5.6	-	-	-
NSA23c (Residences)		900 feet SW	58.2	59.2	61.7	3.5	-	-	-
HDD #13, expected drilling duration of 45 hours									
NSA24 (Residences)	Entry	375 feet E	64.3	68	69.5	5.2	-	-	-
NSA24a (School)		1,450 feet W	64.3	53.9	64.7	0.4	-	-	-
NSA24b (Residences)		1,265 feet NW	64.3	55.5	64.8	0.5	-	-	-
NSA24c (Residences)		560 feet SE	64.3	65.4	67.9	3.6	-	-	-
NSA25 (Residences)	Exit	215 feet E	64.2	72.3	72.9	8.7	-	-	-
NSA25a (School)		400 feet SE	64.2	62.8	66.6	2.4	-	-	-
NSA25b (Residences)		720 feet NW	64.2	57.8	65.1	0.9	-	-	-
NSA25c (Residences)		870 feet W	64.2	58.1	65.2	1	-	-	-
HDD #14, expected drilling duration of 50 hours									
NSA26 (Residences)	Entry	184 feet E	66.8	74.2	74.9	8.1	-	-	-
NSA26a (Residences)		280 feet NE	66.8	70.5	72	5.2	-	-	-
NSA26b (Residences)		680 feet NW	66.8	66.3	69.6	2.8	-	-	-
NSA26c (Residences)		745 feet W	66.8	62.6	68.2	1.4	-	-	-
NSA27 (Residences)	Exit	338 feet S	63.2	72.3	72.8	9.6	-	-	-

NSA ID	Entry or Exit Point	Approximate Distance and Direction of Closest NSA from HDD Workspace [a]	Ambient Ldn dBA	Estimated HDD Noise without Mitigation			Estimated HDD Noise with Mitigation [b]		
				Attributed to HDD Ldn dBA	Unmitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA	Attributed to HDD Ldn dBA [b]	Mitigated HDD plus Ambient Noise Ldn dBA	Potential Increase dBA
NSA27a (Residences)		760 feet E	63.2	60.5	65.1	1.9	-	-	-
NSA27b (Business)		370 feet NW	63.2	55.9	63.9	0.7	-	-	-
NSA27c (Residences)		405 feet SW	63.2	70.7	71.4	8.2	-	-	-

[a] Direction from HDD entry or exit point

[b] Northern has indicated it would attempt to implement noise abatement to reduce noise impacts at the NSAs to below 55dBA Ldn or 10 dBA over background noise where ambient levels are above 55 dBA Ldn. The specific measures should be filed and reviewed by FERC before Northern preceeds with construction.

HDD = Horizontal Directional Drilling; NSA = noise sensitive area; dBA = A-weighted decibels

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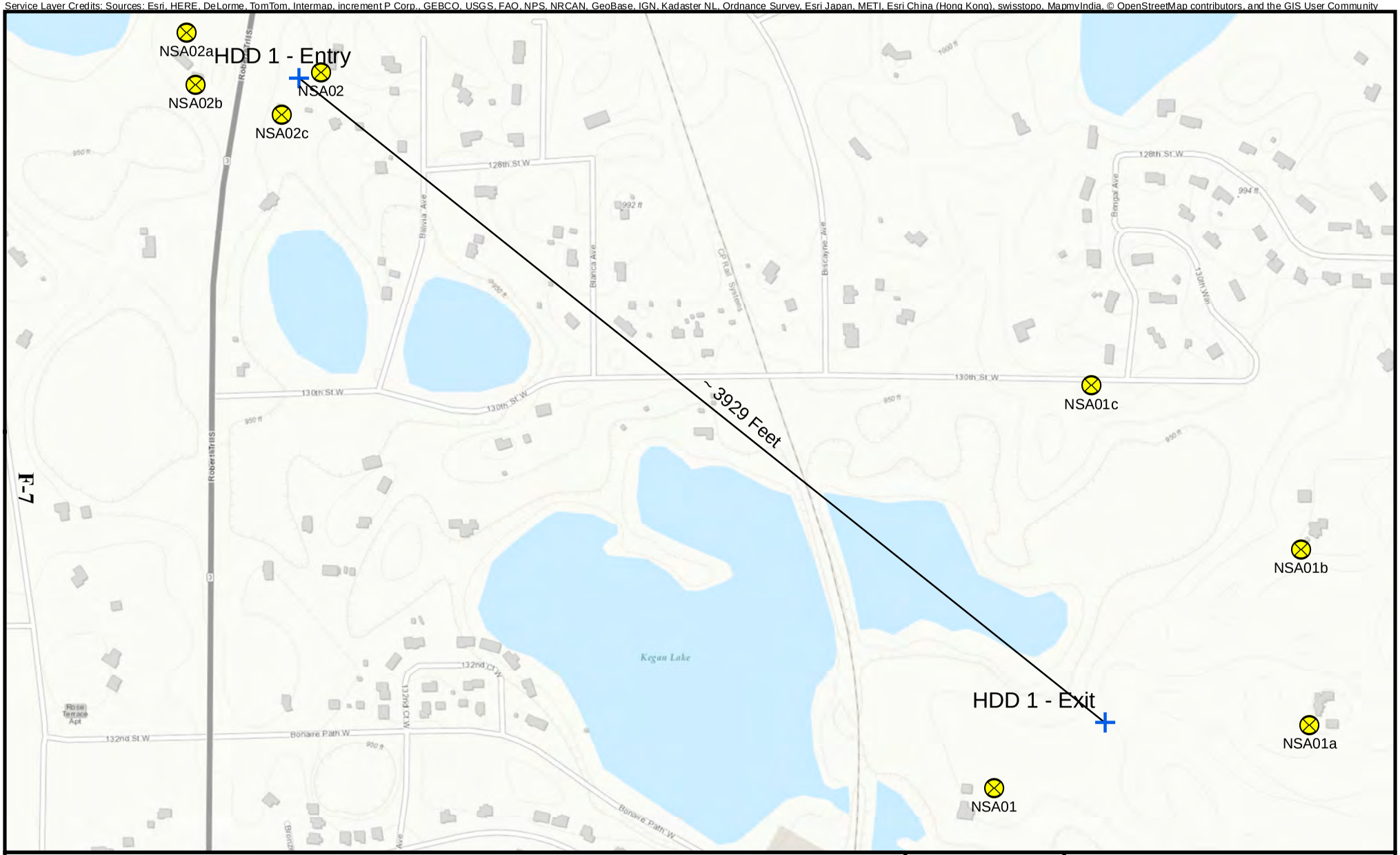

HDD Entry/Exit Locations

NSAs

NORTH

500 250 0 500

Scale in Feet

BURNS McDONNELL

Figure A-1
Northern Natural Gas
Cedar Station Upgrade
HDD #1 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016

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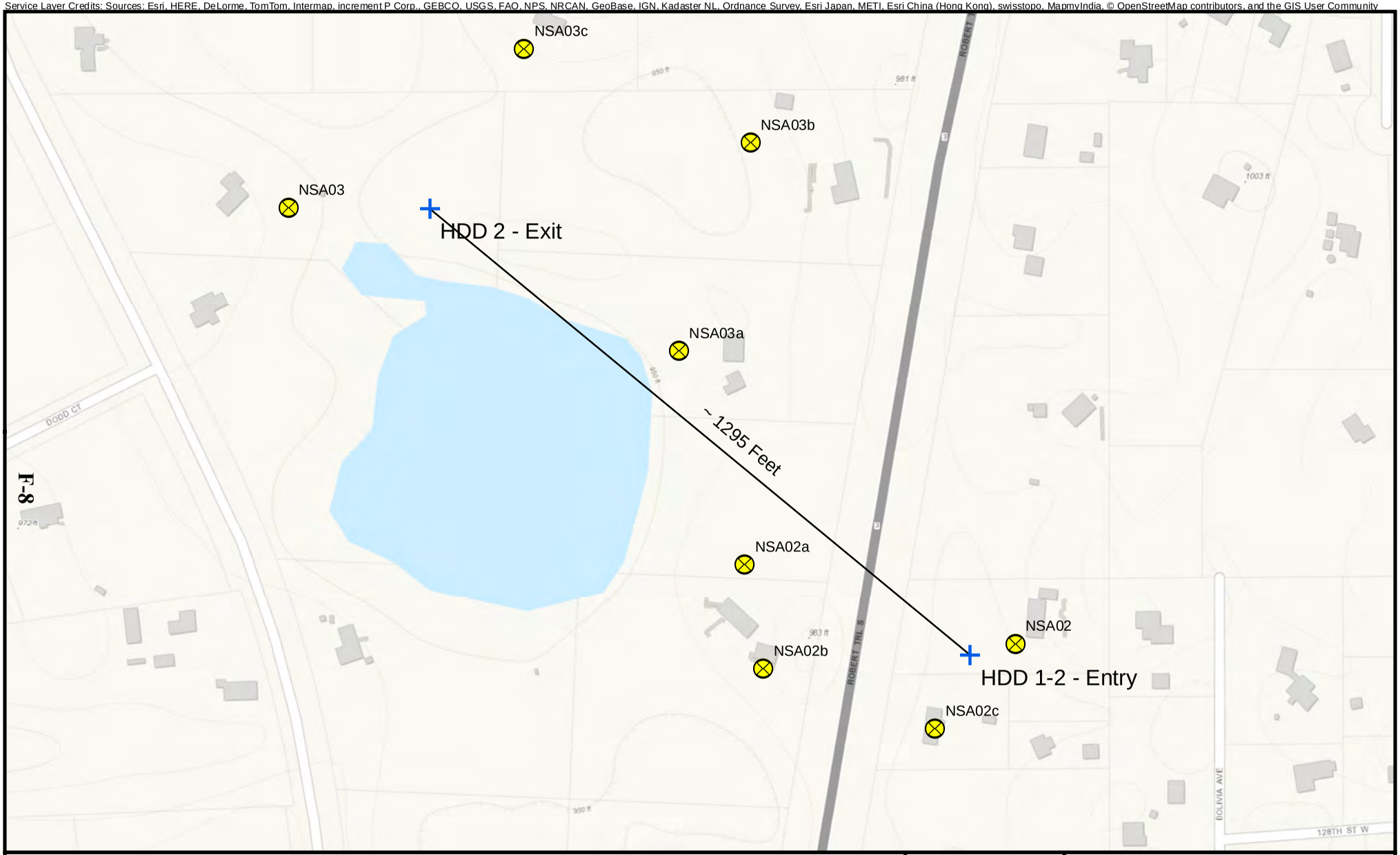

HDD Entry/Exit Locations

NSAs

NORTH

250 125 0 250

Scale in Feet

BURNS McDONNELL

Figure A-2
Northern Natural Gas
Cedar Station Upgrade
HDD #2 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016

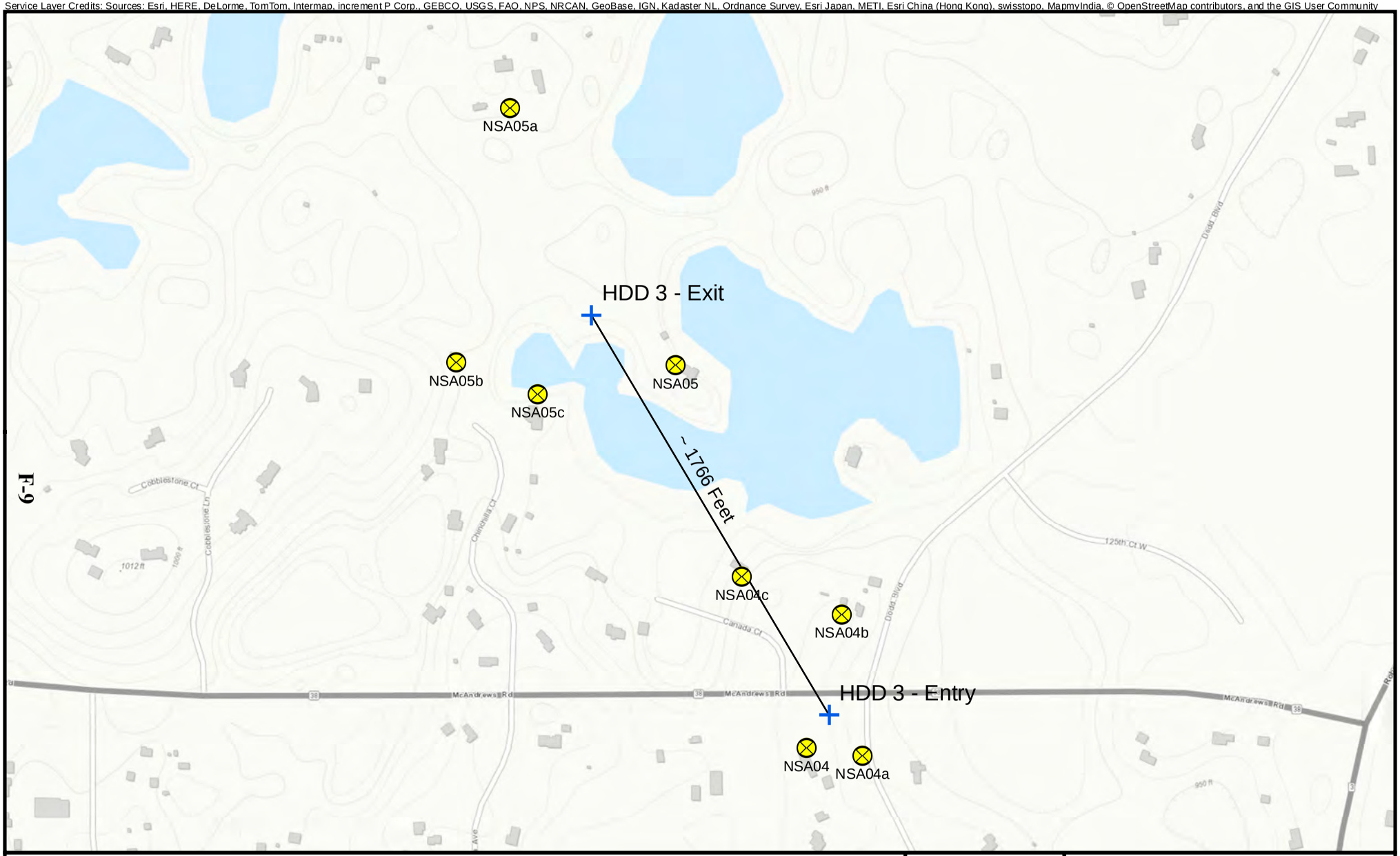

Figure A-3
Northern Natural Gas
Cedar Station Upgrade
HDD #3 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016

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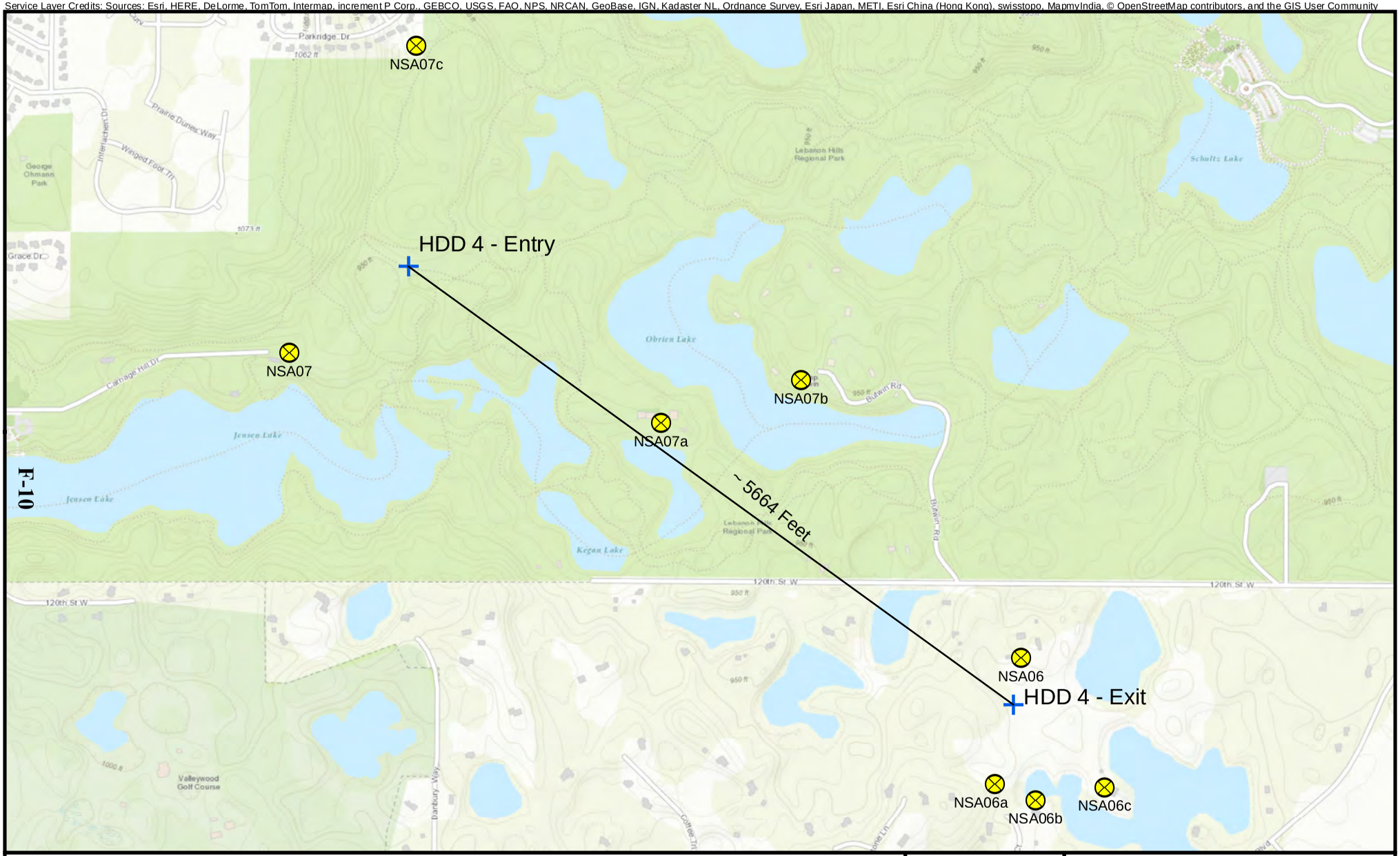


+ HDD Entry/Exit Locations

⊗ NSAs

NORTH

1,000 500 0 1,000

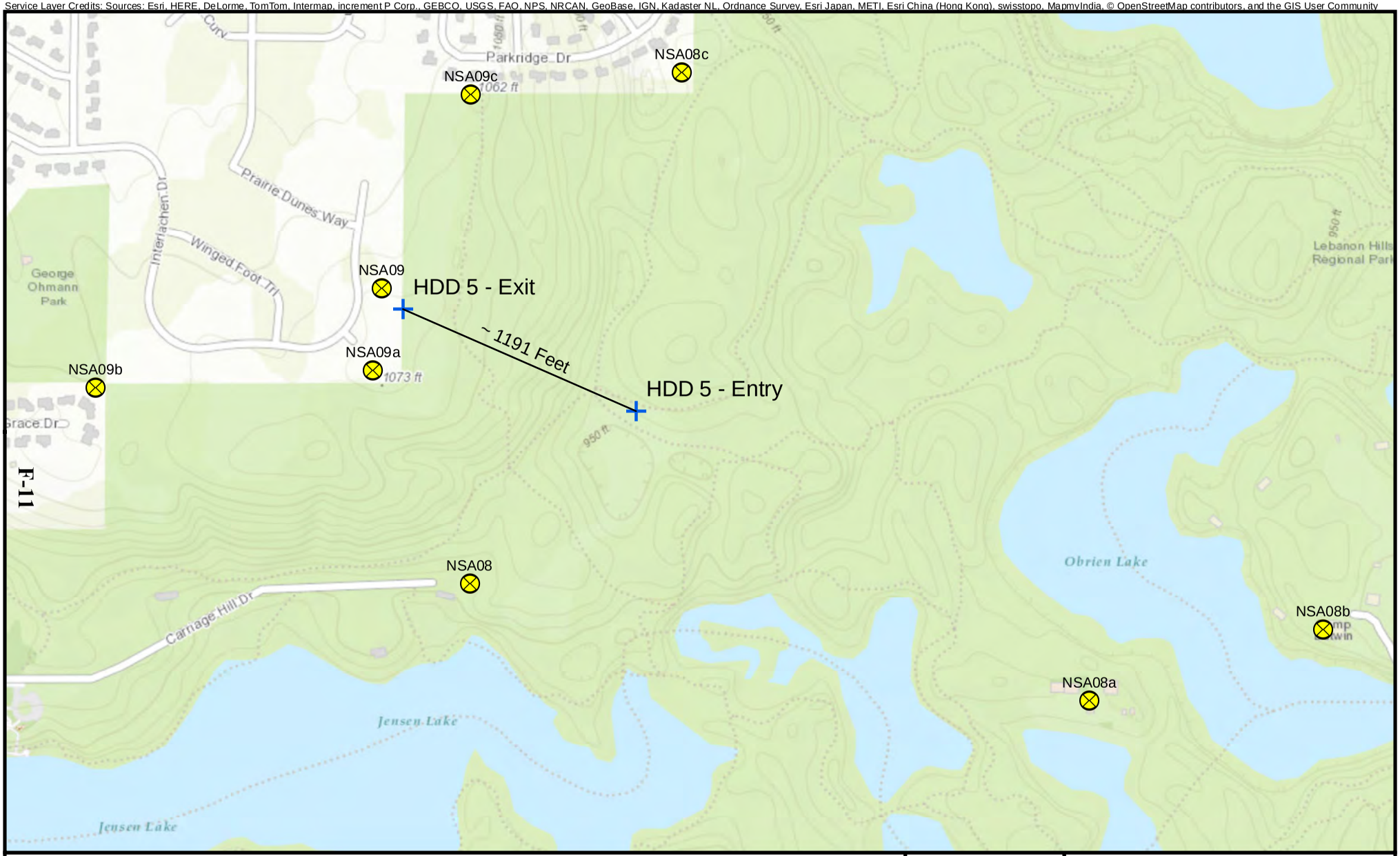
Scale in Feet

BURNS McDONNELL

Figure A-4
Northern Natural Gas
Cedar Station Upgrade
HDD #4 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016



HDD Entry/Exit Locations

NSAs

NORTH

600 300 0 600

Scale in Feet

BURNS McDONNELL

Figure A-5
Northern Natural Gas
Cedar Station Upgrade
HDD #5 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016

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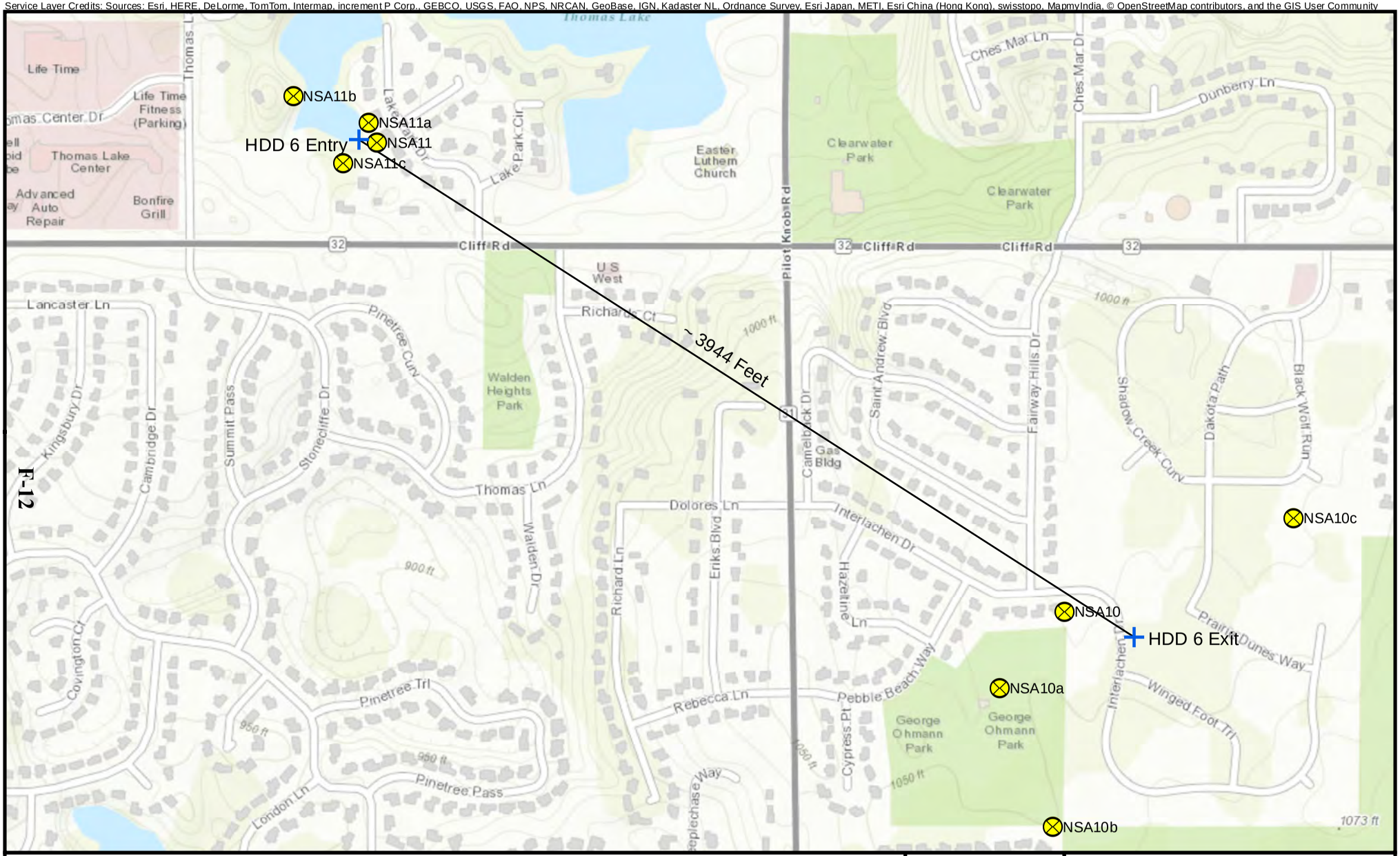

Source: Burns & McDonnell Engineering Company, Inc.
Issued: 7/15/2016

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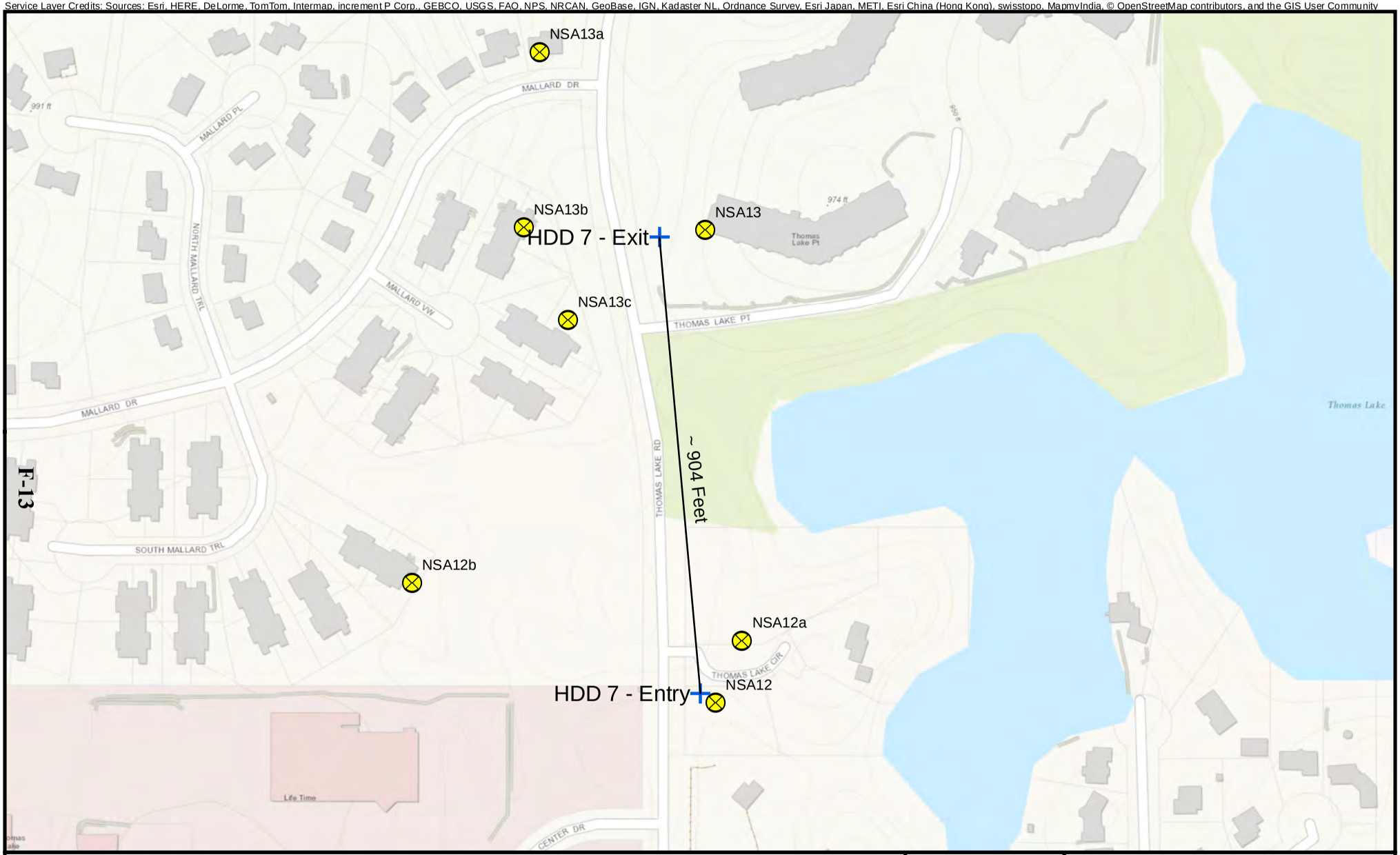


HDD Entry/Exit Locations

NSAs

NORTH

250 125 0 250

Scale in Feet

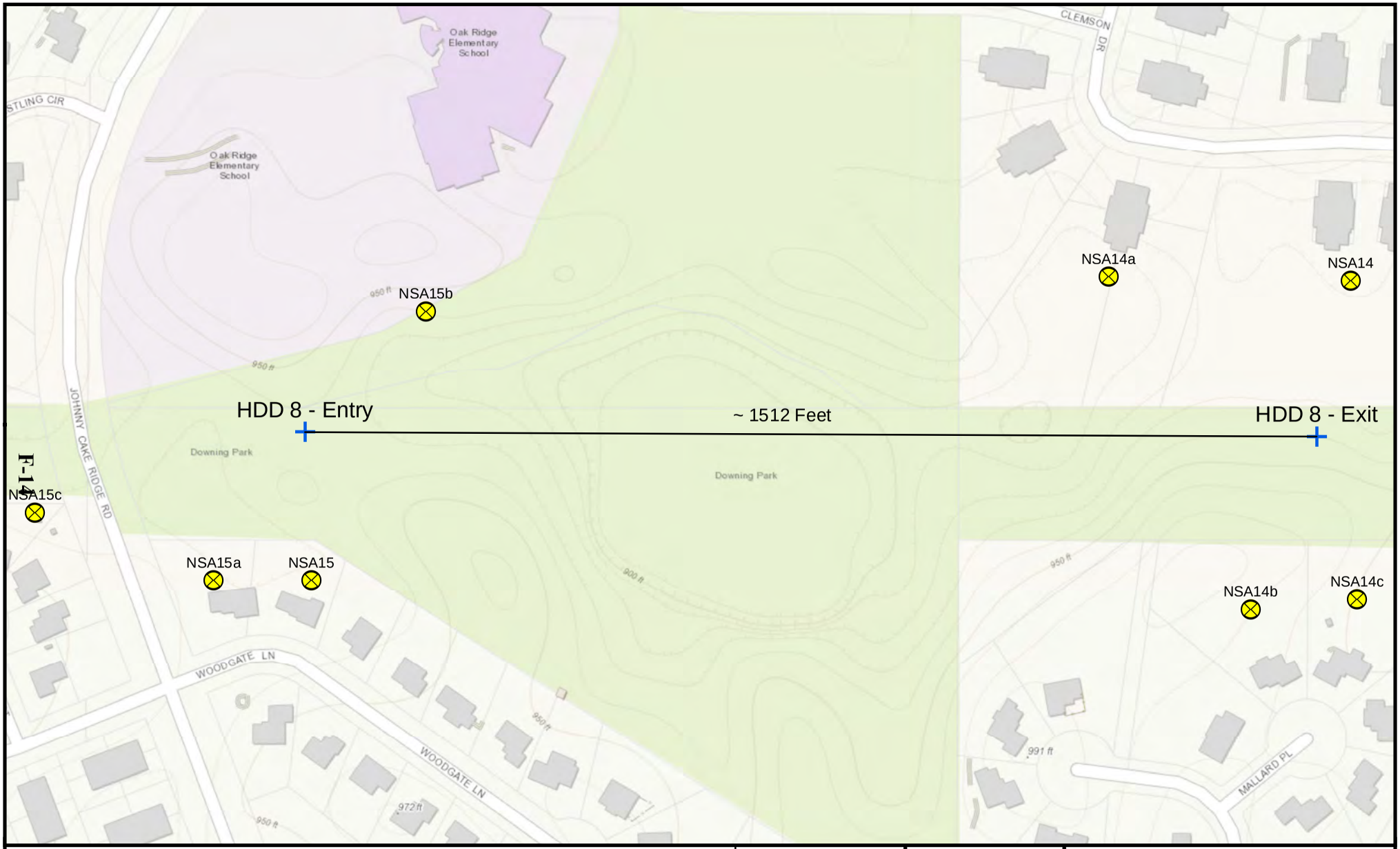
BURNS McDONNELL

Figure A-7
Northern Natural Gas
Cedar Station Upgrade
HDD #7 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016

Path: G:\Projects\Air-Noise Dept\Project Files\Northern Natural Gas\Cedar Station Noise Study\GIS\ArcDocs\Figure A-8.mxd irbrewe 7/15/2016



HDD Entry/Exit Locations

NSAs

NORTH

200 100 0 200

Scale in Feet

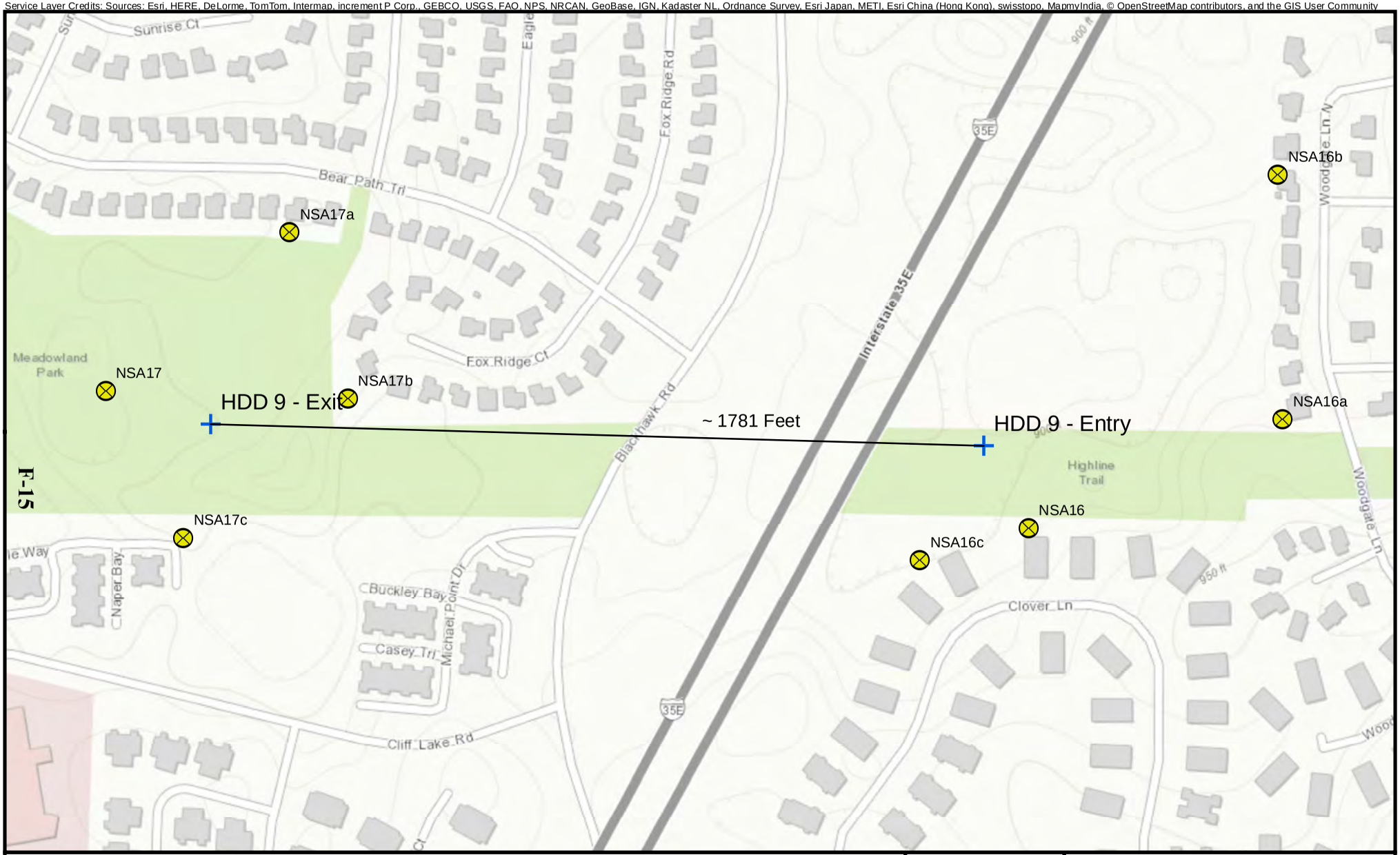
BURNS McDONNELL

Figure A-8
Northern Natural Gas
Cedar Station Upgrade
HDD #8 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016

Path: G:\Projects\Air-Noise Dept\Project Files\Northern Natural Gas\Cedar Station Noise Study\GIS\ArcDocs\Figure A-9.mxd irbrewe 7/15/2016



HDD Entry/Exit Locations

NSAs

NORTH

300 150 0 300

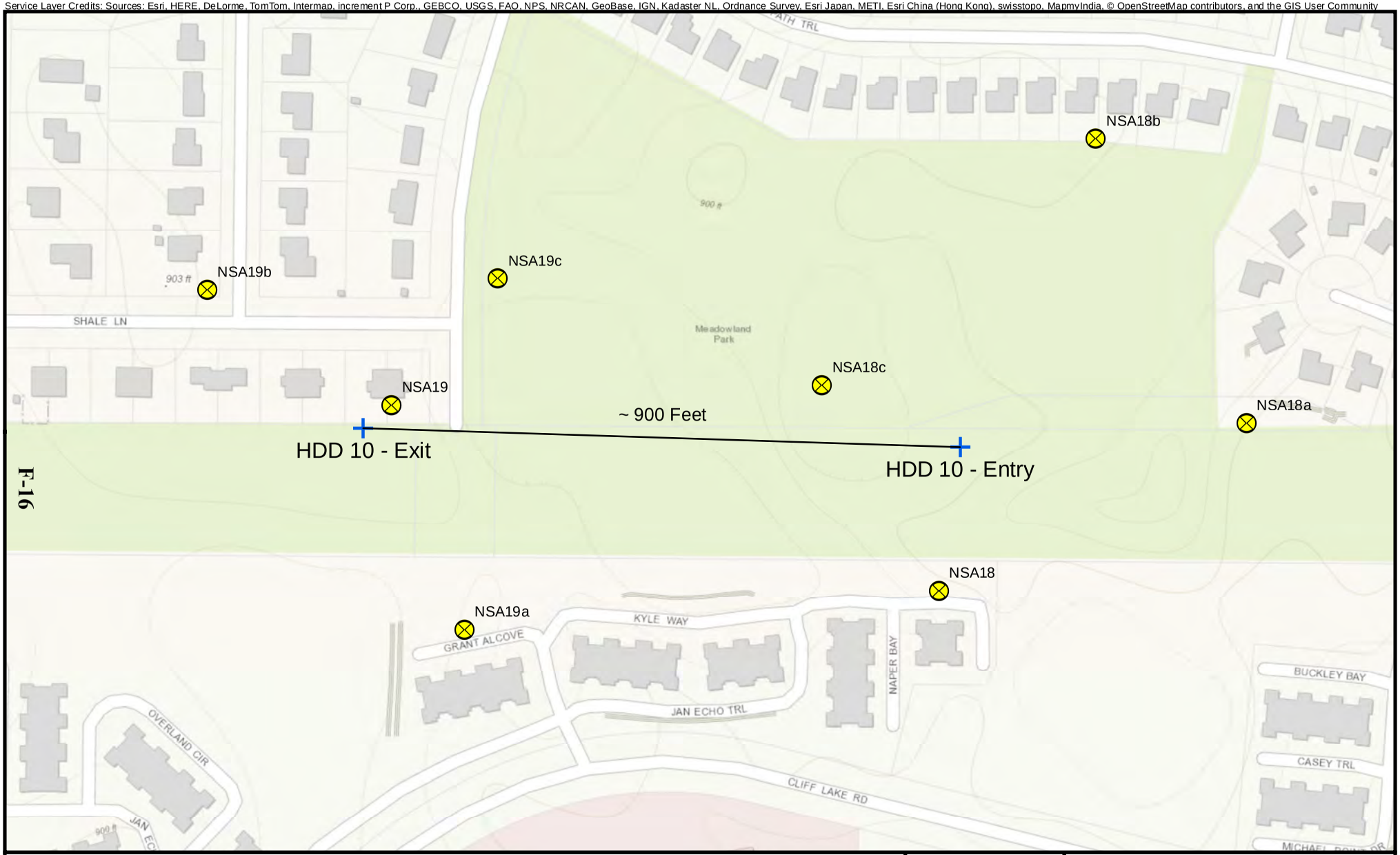
Scale in Feet

BURNS McDONNELL

Figure A-9
Northern Natural Gas
Cedar Station Upgrade
HDD #9 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016



HDD Entry/Exit Locations

NSAs

NORTH

200 100 0 200

Scale in Feet

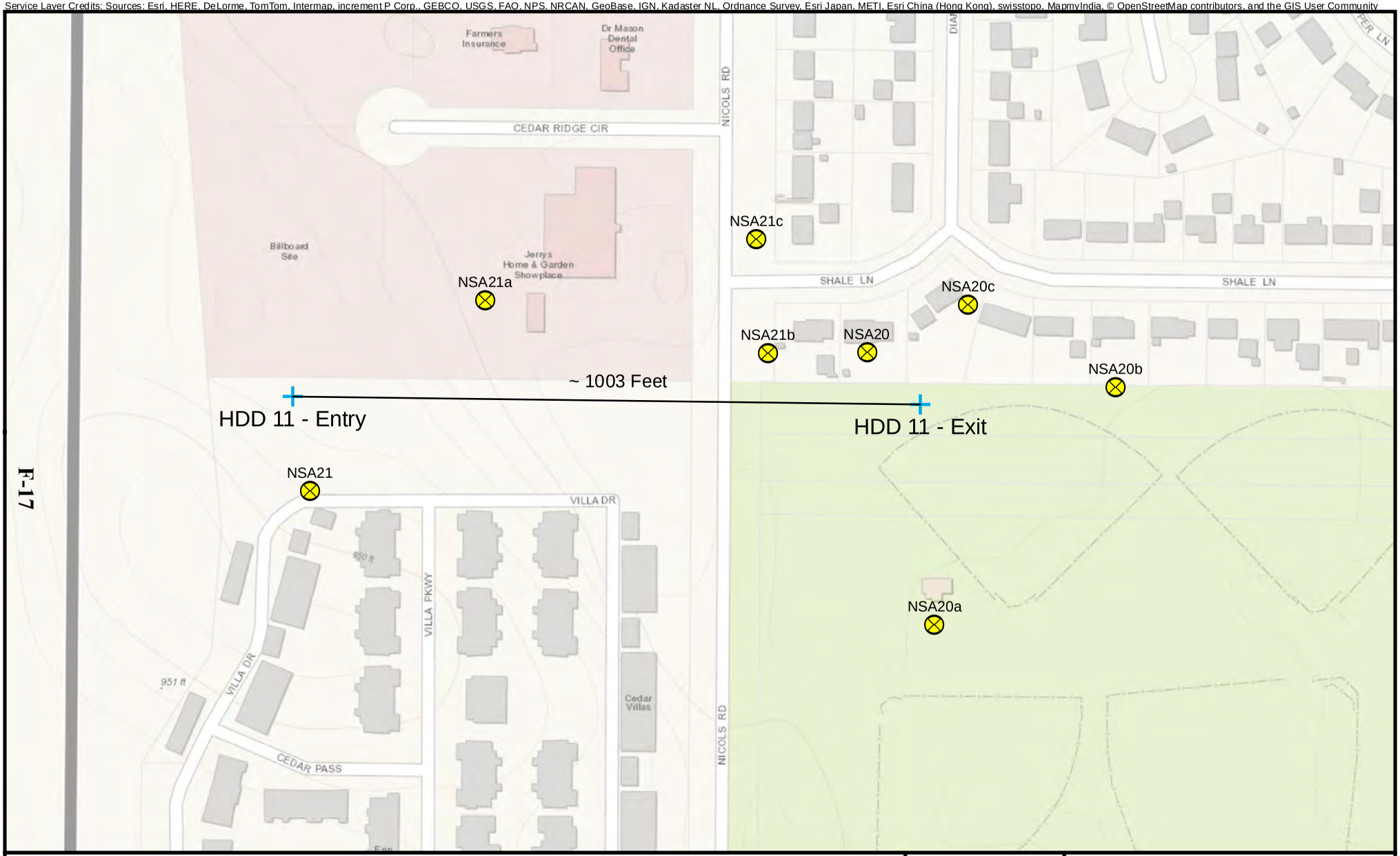
BURNS McDONNELL

Figure A-10
Northern Natural Gas
Cedar Station Upgrade
HDD #10 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/21/2016

Path: G:\Projects\Air-Noise Dept\Project Files\Northern Natural Gas\Cedar Station Noise Study\GIS\ArcDocs\Figure A-11.mxd irbrewe 7/21/2016



HDD Entry/Exit Locations

NSAs

NORTH

200 100 0 200

Scale in Feet

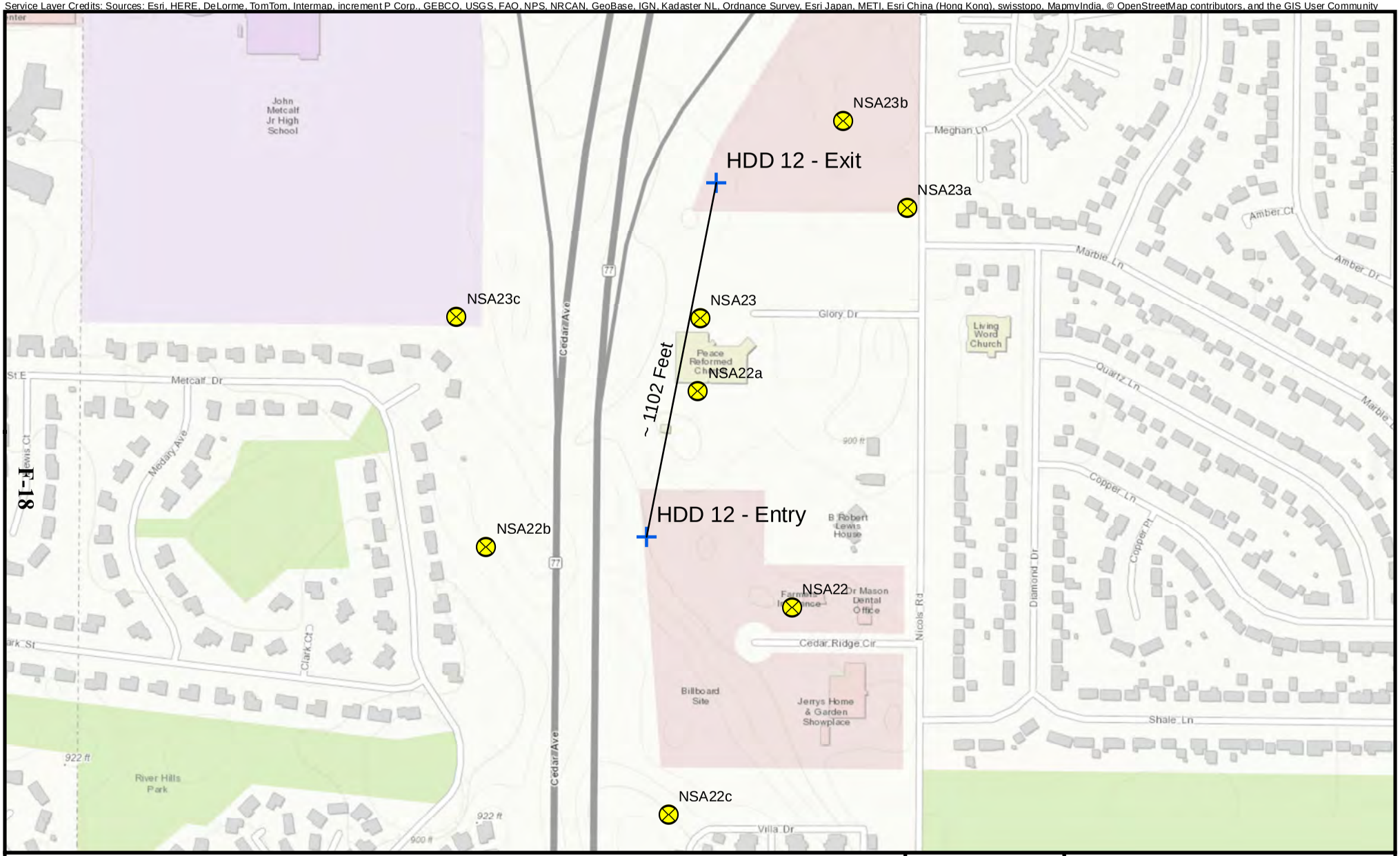
BURNS McDONNELL

Figure A-11
Northern Natural Gas
Cedar Station Upgrade
HDD #11 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/21/2016

Path: G:\Projects\Air-Noise Dept\Project Files\Northern Natural Gas\Cedar Station Noise Study\GIS\ArcDocs\Figure A-12.mxd irbrewe 7/15/2016



HDD Entry/Exit Locations

NSAs

NORTH

400 200 0 400

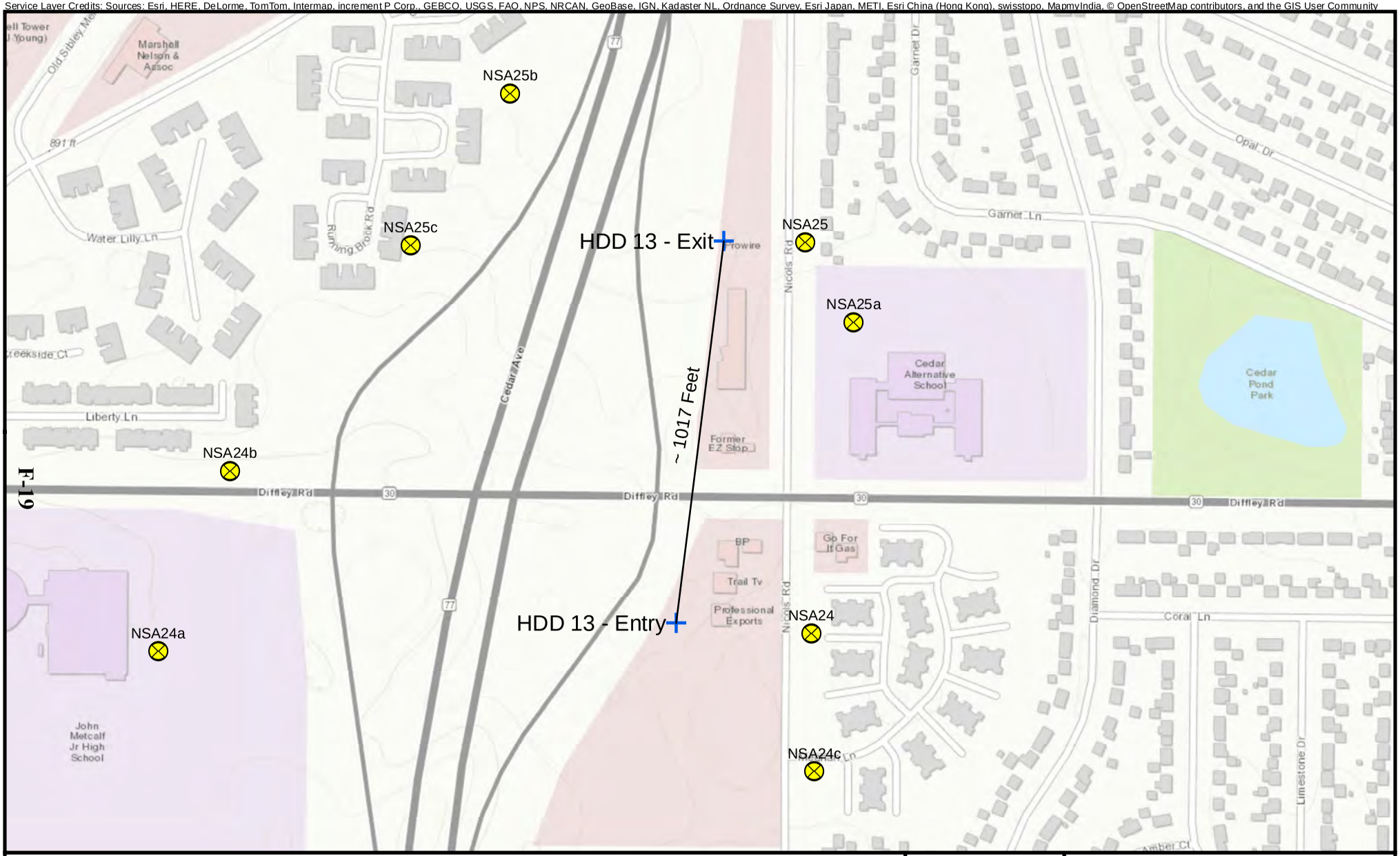
Scale in Feet

BURNS McDONNELL

Figure A-12
Northern Natural Gas
Cedar Station Upgrade
HDD #12 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016



+ HDD Entry/Exit Locations

⊗ NSAs

NORTH

350 175 0 350

Scale in Feet

BURNS McDONNELL

Figure A-13
Northern Natural Gas
Cedar Station Upgrade
HDD #13 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

Issued: 7/15/2016

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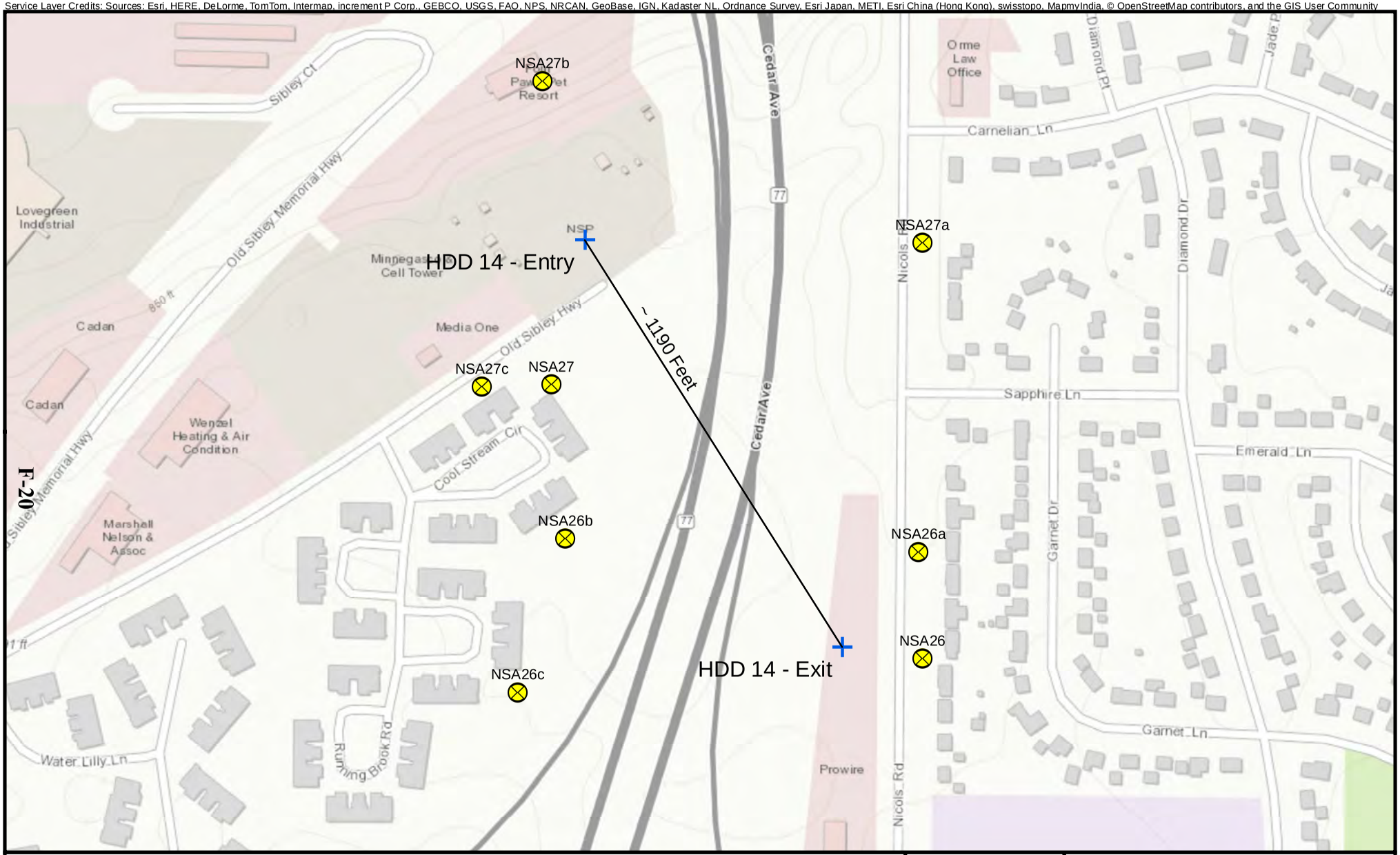

Figure A-14
Northern Natural Gas
Cedar Station Upgrade
HDD #14 Entry/Exit Locations
and Closest NSAs

Source: Burns & McDonnell Engineering Company, Inc.

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